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TECHNICAL MEMORANDUM (TM) #5

Date:	March 12, 2021	Project #: 23021.020
To:	Project Management Team Project Advisory Committee	
From:	Nick Gross, Amy Griffiths, Marc Butorac, PE, PTOE, PMP	
Project:	McMinnville OR 99W (NE McDonald Lane to Linfield Avenue) Active Transportation Concept Plan	
Subject:	TM #5: Alternatives Development and Preferred Alternative Concept	

PURPOSE

Today, the couplet section of OR 99W (Adams and Baker Street) has traffic volumes ranging between 11,700 and 13,000 vehicles average annual daily traffic (AADT), no dedicated bicycle lanes, no enhanced pedestrian crossings, and is identified in ODOT's statewide systemic safety analysis as high pedestrian and bicycle risk factor locations. As a result, the OR 99W corridor needs context sensitive solution(s) to support a lower-stress, safer connection within the city's multi-modal transportation system.

This memorandum describes, evaluates, and recommends a preferred alternative design concept for the OR 99W corridor in the City of McMinnville *to create a safer, more comfortable, and more attractive place to walk, bike, roll, and take transit*. The project team developed three corridor and six enhanced crossing design concepts to address the OR 99W multi-modal needs identified in the *Existing Conditions and Future Needs Analysis Memorandum* (Reference 1) and based on input from the Project Management Team (PMT) and Project Advisory Committee (PAC).

Additional public input will be solicited as part of the virtual public meeting with the preferred concept refinement to occur as part of the final version of TM #5.

OR 99W CONCEPT DEVELOPMENT

The follow section describes and illustrates the existing condition and proposed concept designs to address the needs and deficiencies along OR 99W. Typical sections along with concept design roll plots were produced to convey the proposed concepts. Upon selection of a preferred alternative, further design detail will identify potential constraints, challenges, and considerations.

The concept designs were developed based on field observations and initial assessments by the consultant team, national and state guidance for bicycle facility selection, and input from the PMT and PAC. *Appendix "A" includes a summary of the project team field visit and observations. Appendix "B" includes a summary of PAC input.*

Concept 1: Two-Way Separated Bike Lane on Adams Street

Existing Condition

The existing curb-to-curb section for the majority of Adams Street consists of two 12-foot southbound travel lanes, and two 8-foot parking lanes. Figure 1 illustrates the typical existing curb-to-curb cross-section for Adams Street. Curb extensions constrain the existing curb-to-curb cross-section at some intersections along the corridor, as described in Table 1.

Proposed Concept

Concept 1 proposes a two-way separated bike lane or "cycle track" along the west side of Adams Street between 15th Street and 2nd Street. The two-way separated bike lane connects to OR 99W with buffered bike lanes at 15th Street and 2nd Street, as illustrated in Figure 3. Parking along the west side of Adams Street would be removed to accommodate the two-way bicycle facility due to the constrained curb-to-curb width. The two-way separated bike lane requires travel lane width reduction from 12 to 11 feet. Parking along the east side of Adams Street will be maintained. Figure 2 illustrates the proposed concept cross-section and Figure 3 illustrates the proposed conceptual layout.

The two-way separated bike lane facility is difficult to implement within the existing 40-foot curb-to-curb cross section. The recommended minimum width for parking and vehicle travel lanes is 7 feet and 11 feet, respectively. The remaining cross section width to accommodate the two-way separated bike lane is 11 feet[1]. Based on national and state guidance for bicycle facility design 13 feet is the preferred minimum width for a two-way separated bike lane:

- The preferred minimum width for a two-way bicycle facility is 10 feet so that people biking in opposite directions can pass each other comfortably.
- A minimum of 3 feet is recommended to provide vertical separation from people driving by installing flex-post delineators.

As illustrated in Figure 2, the two-way separated bike lane is constrained due to the need to accommodate a parking lane and two travel lanes within the existing curb-to-curb cross section.

Appendix "C" includes additional information about design treatments.

[1] Less space is available at pinch points along the corridor.

Figure 1: Adams Street – Existing

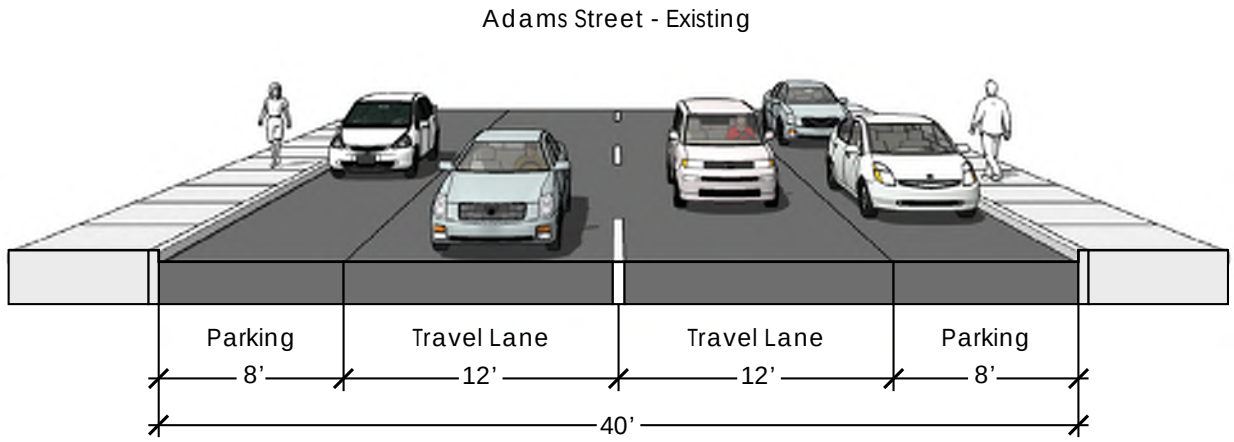

Figure 2: Adams Street – Two-Way Separated Bike Lane

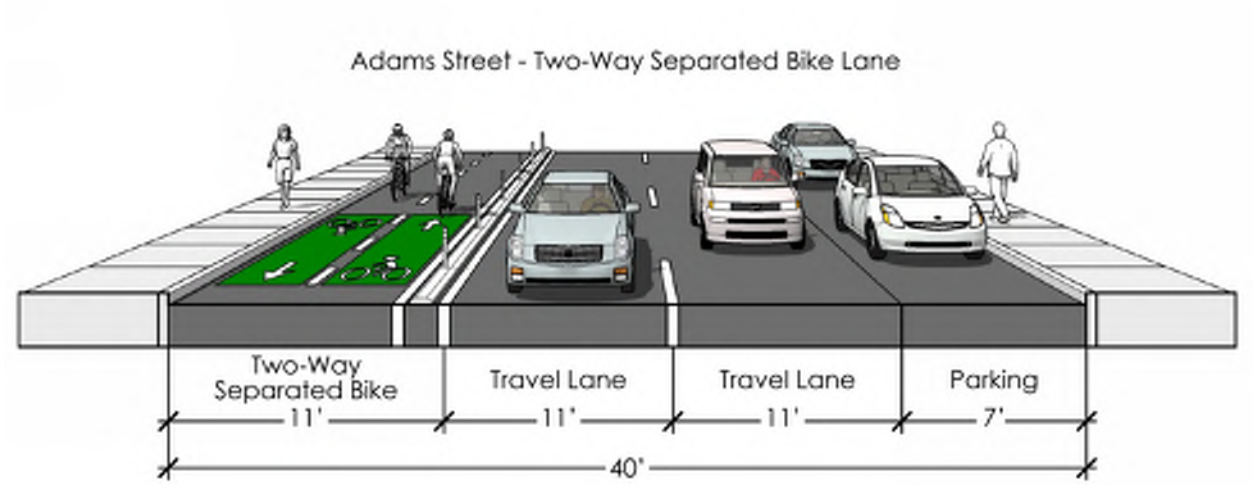

Figure 3: Concept 1: Two-Way Separated Bike Lane on Adams Street

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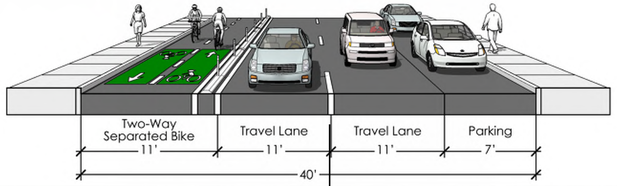


Scale: 1" = 100'
100 50 0 100

Table 1 summarizes key considerations in implementing the concept as identified in Figure 3.

Table 1: Concept 1 Considerations

Label	Notes	Significance
A	• The existing intersection of OR 99W/N Baker Street is highly skewed and wide.	• Realigning the intersection could help reduce exposure to people biking and improve safety conditions at the intersection for all users.
B	• No sight distance concerns were observed at the intersection of Baker Street/ 15th Street. • There is a pole at the southwest corner of the intersection that blocks ADA clearance.	• No modification to improve sight distance are anticipated at this location, which is supportive of using this street as a crossing opportunity between the two-way separated bike lane and the buffered bike lanes proposed in this concept. • If modifications are made to the existing curbs at this intersection, the concept would need to relocate this utility pole to ensure ADA compliance at the intersection.
C	• Drivers turning right from 15th Street onto Adams Street may not expect to look right for people biking contraflow.	• Signage and driver education would be necessary to improve driver awareness of people biking contraflow.
D	• Curb extensions at the Adams Street/ 11th Street intersection constrain existing curb-to-curb width of the roadway to 34'-8".	• It may be necessary to remove the curb extension or reduce the width of the two-way separated bike lane and buffer at this location.
E	• Curb extensions at the northeast corner of the Adams Street/ 3rd Street intersection constrain existing curb-to-curb width of the roadway.	• This pinch point is not expected to impact the proposed width of the two-way separated bike lane or travel lanes: parking is not accommodated at this location and the curb extension is located along the opposite side of the street of the two-way separated bike lane
F	• Adams Street/NE 2nd Street is a signalized intersection. • There is a yield controlled eastbound slip lane from 2nd Street onto Adams Street.	• The signalized intersection provides a protected opportunity for crossing between the two-way separated bike lane and buffered bike lanes proposed in this concept. Specific attention should be paid to the bicycle and vehicle interaction at the eastbound slip lane. • A bike box, bike signal, and other enhancements may be needed at this location.

Based on project team field visit and observations, 15th Street and 2nd Street were identified as the most feasible locations to transition people biking to and from the two-way separated bike lane facility along Adams Street. Signal modifications would likely be needed at the intersections of 2nd Street/Adams Street and 2nd Street/Baker Street. Further evaluation and analysis will be conducted to determine appropriate signage, striping, and connectivity to the two-way separated bike lane facility if it is selected as the preferred alternative to be advanced into concept design.

Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

Existing Conditions

The existing curb-to-curb section for the majority of Adams Street consists of two 12-foot southbound travel lanes, and two 8-foot parking lanes. Curb extensions constrain the existing curb-to-curb cross-section at some intersections along the corridor, as described in Table 2.

Baker Street is wider than Adams Street: the existing curb-to-curb cross-section for the majority of Baker Street consists of two 14-foot northbound travel lanes, and two 8-foot parking lanes. The typical existing curb-to-curb cross-section of Adams Street is described previously.

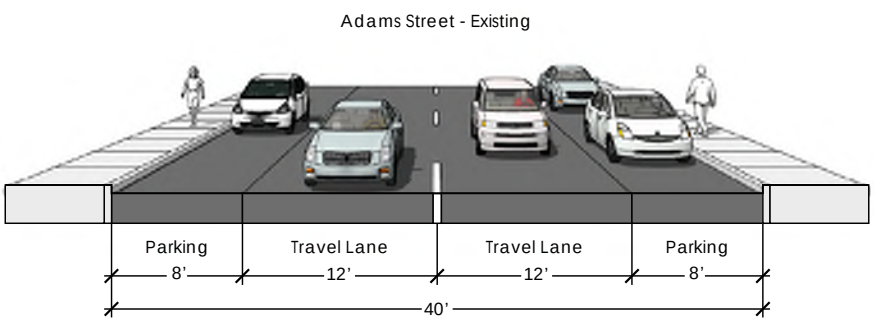
Figure 4 illustrates the existing curb-to-curb cross-sections of Adams Street and Baker Street.

Proposed Concept

Concept 2 proposes buffered bike lanes along both Adams Street and Baker Street through the full extents of the OR 99W couplet. Parking along the west side of Adams Street will be removed to accommodate the buffered bike lane; parking along the east side of Adams will be maintained. Adams Street travel lane widths will be maintained. Travel lanes along Baker Street will be reduced to from 12 to 11 feet. Parking along both sides of Baker Street will be maintained.

Figure 5 illustrates the proposed concept cross-sections for Adams Street and Baker Street. Figure 6 illustrates the proposed conceptual layout.

Figure 4: Adams and Baker Street – Existing Cross-Sections



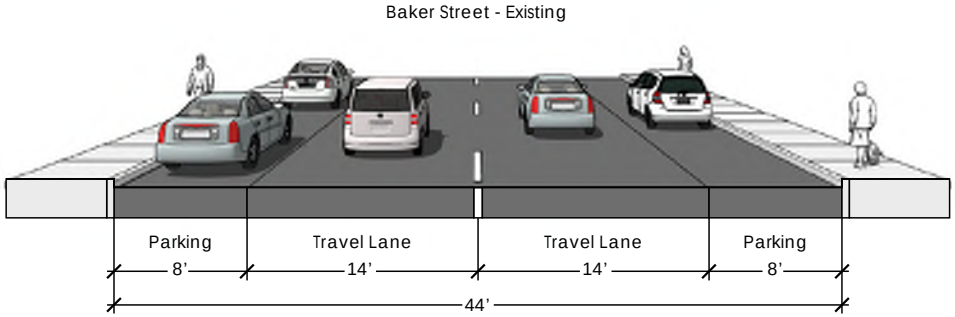
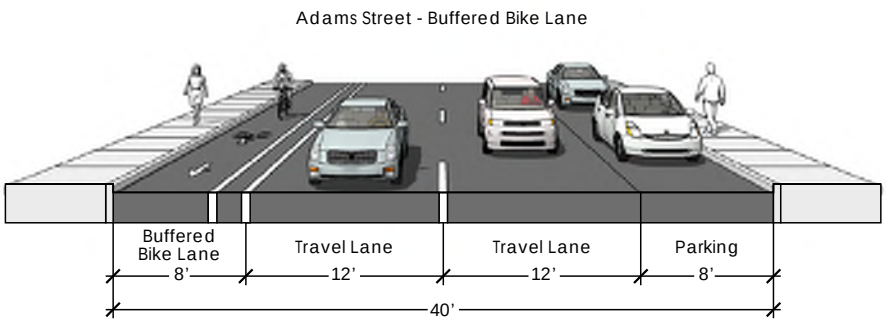


Figure 5: Adams Street and Baker Street – Buffered Bike Lanes



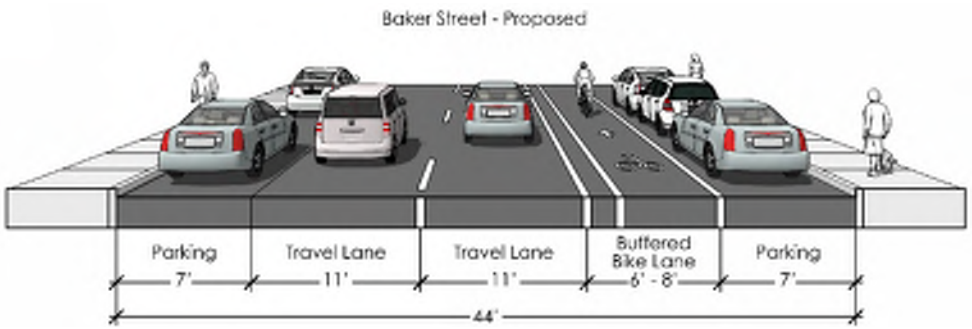


Figure 6: Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

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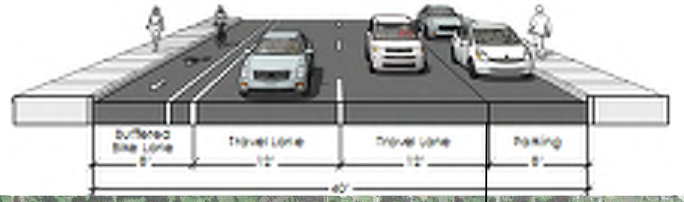

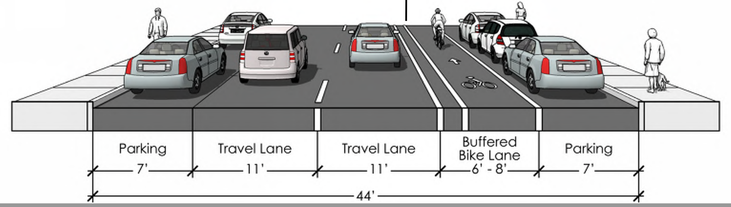

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Table 2 summarizes key considerations in implementing the concept as identified in Figure 6.

Table 2: Concept 2 Considerations

Figure Label	Notes	Significance
A	• The existing intersection of OR 99W/N Baker Street is highly skewed and wide.	• Realigning the intersection could help reduce exposure to people biking and improve safety conditions at the intersection for all users.
B	• No sight distance concerns were observed at the intersection of Baker Street/ 15th Street. • There is a pole at the southwest corner of the intersection that blocks ADA clearance.	• No modification to improve sight distance are anticipated at this location, which is supportive of using this street as a crossing opportunity between the two-way separated bike lane and the buffered bike lanes proposed in this concept. • If modifications are made to the existing curbs at this intersection, the concept would likely need to relocate this utility pole to ensure ADA compliance at the intersection.
C	• The center median and curb extension constrains existing curb-to-curb width of the roadway to 37'-8'.	• Parking is not accommodated at this location and the curb extension is on the opposite side of the roadway as the proposed bike lane. Therefore, this pinch point is not expected to impact the proposed width of the buffered bike lane or travel lanes.
D	• Curb extensions at the Adams Street/ 11th Street intersection constrain existing curb-to-curb width of the roadway to 34'-8".	• The constrained width by curb extensions on both sides of the street may require a reduction in the width of the proposed buffered bike lane and/or vehicle travel lanes at this location.
E	• Curb extension at the southwest corner of the Baker Street/ 11th Street intersection constrain existing curb-to-curb width of the roadway to 39'-6".	• Since parking is not accommodated at this curb extension, this pinch point is not expected to impact the proposed width of the buffered bike lane or travel lanes.
F	• Curb extension at the northeast corner of the Baker Street/9th Street intersection constrain existing curb-to-curb width to 40'-5".	• Since parking is not accommodated at this curb extension, this pinch point is not expected to impact the proposed width of the buffered bike lane or travel lanes.
G	• Curb extension at the northeast corner of the Adams Street/ 3rd Street intersection constrain existing curb-to-curb width of the roadway.	• Since parking is not accommodated at this location, and the curb extension is located along the opposite side of the street as the buffered bike lane, this pinch point is not expected to impact the proposed width of the buffered bike lane or travel lanes.
H	• Baker Street/3rd Street is a signalized intersection.	• A dedicated northbound right turn lane on Baker at 3rd will require that parking be removed on both sides of Baker leading up to the intersection. Parking may also need to be removed north of the intersection for a short distance.
I	• Adams Street/NE 2nd Street is a signalized intersection. There is a yield controlled eastbound slip lane from 2nd Street onto Adams Street.	• Specific attention should be paid to the bicycle and vehicle interaction at this location.

Based on project team field visit and observations, existing curb extensions constrain the available cross-section at "pinch points" along the couplet. Existing curb restrictions prohibit parking at the curb extensions or immediately adjacent to them; therefore, parking is not included in the roadway cross-section at these points. However, shifting the bike lane and vehicle lanes at the intersection may pose a

potential safety concern. As such, the bike facilities are not shifted in this concept. Along Baker Street, there is no parking at the curb extension, and the existing curb-to-curb width can accommodate the travel lanes and buffered bike lane without shifting the buffered bike lane. Along Adams Street, the bike lane may have a reduced width or no buffer at these pinch points.

Concept 3: Neighborhood Greenway on Davis Street or Evans Street

Existing Condition

Two potential parallel neighborhood greenway routes have been identified as low-stress alternatives, or supplemental routes to walking and biking along OR 99W: Davis Street and Evans Street. The existing curb-to-curb cross-section and street configuration elements (e.g., presence of parking) vary along the potential neighborhood greenway routes. Figure 7 illustrates the typical curb-to-curb cross-sections of the neighborhood street alignments.

Proposed

Concept 3 proposes a neighborhood greenway concept between the intersection of Linfield Avenue/OR 99W and the intersection of McDonald Lane/OR 99W. Based on feedback received from the PAC meeting as well as field visit observations, two primary neighborhood routes were identified as potential neighborhood greenway alignments: Evans Street and Davis Street. Both neighborhood greenways utilize Linfield Avenue from OR 99W to connect to 2nd Avenue via Davis Street. To the north, both neighborhood greenways utilize 17th Street to connect to OR 99W via 18th Street and McDonald Lane. Figure 8 illustrates the proposed concept cross-section and Figure 9 illustrates the proposed conceptual layout. This concept maintains the existing parking and travel lane widths of the greenway route.

If Concept 3 is selected as a preferred concept, either the Davis Street or Evans Street alignment would be constructed.

Appendix "C" includes additional information about design treatments for neighborhood greenways.

Figure 7: Neighborhood Street – Existing

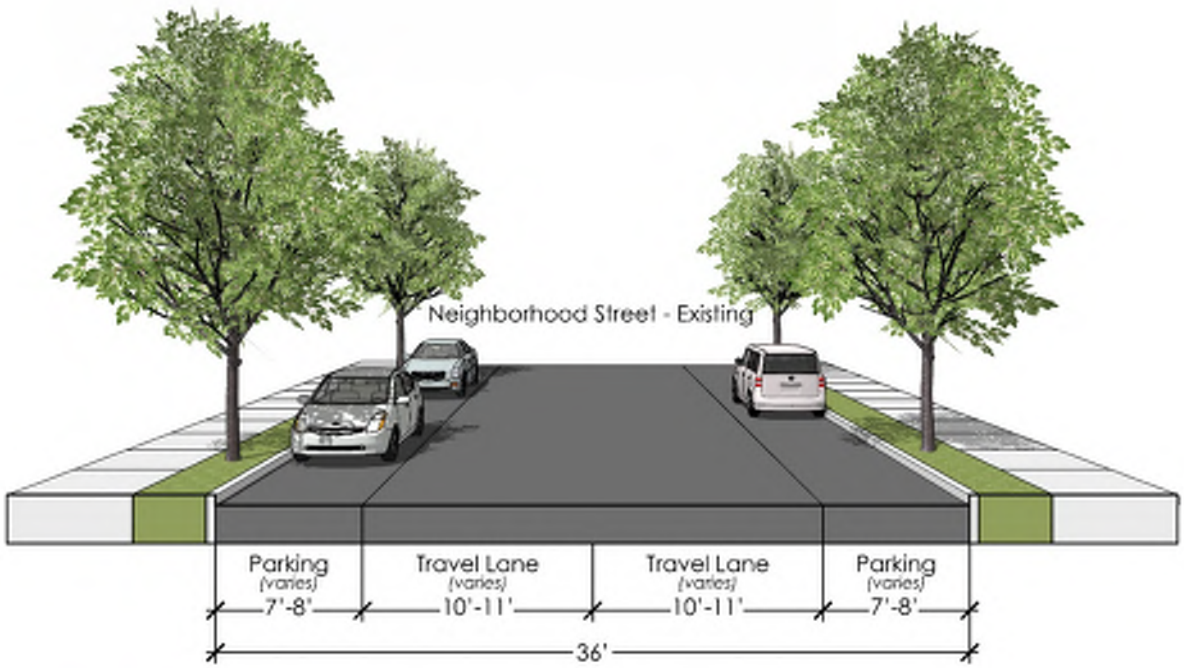

Figure 8: Neighborhood Street – Neighborhood Greenway

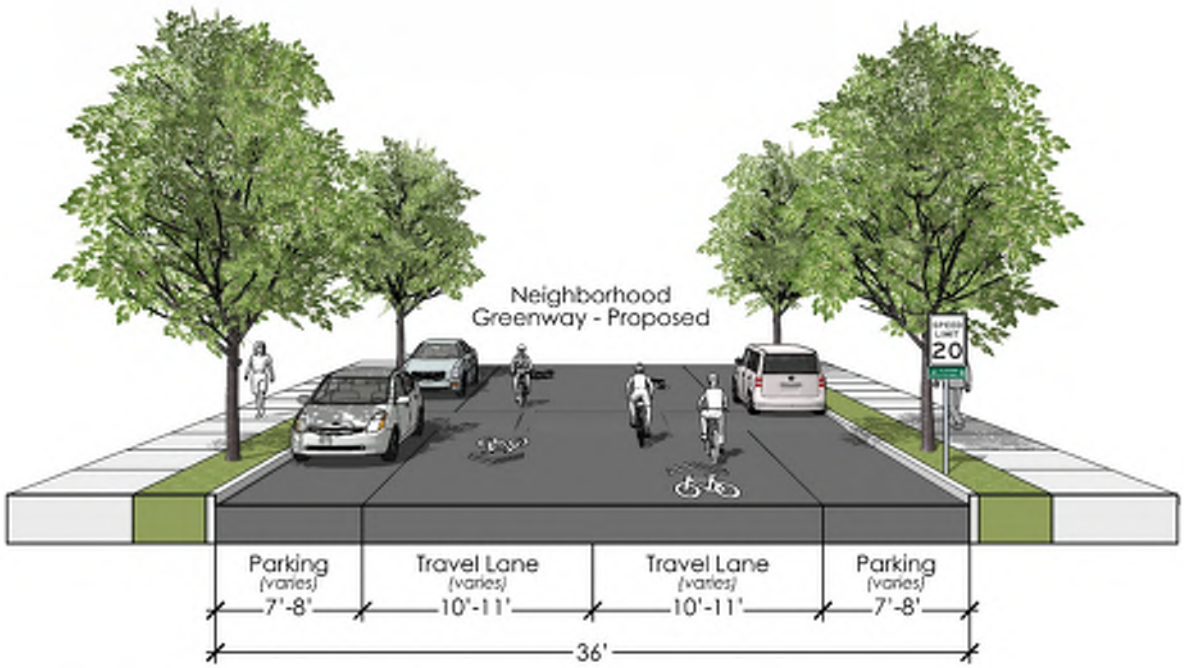

Figure 9: Concept 3: Neighborhood Greenway Conceptual Layout

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Table 3 and Table 4 summarize key considerations identified in Figure 9 for the Davis Street and Evans Street Neighborhood Greenway concepts, respectively.

Table 3: Concept 3A Considerations (Davis Street)

Figure Label	Notes	Significance
A	• At the intersection of 17th Street/Evans Street people biking will transition from existing bike lanes on Evans Street to sharrows on 17th Street.	• Wayfinding signage will be used to support this transition.
B C	• Today there is a stop control at these intersections on Davis Street with cross traffic moving freely.	• To facilitate through-movements for people walking and biking, it is recommended that these stop-controls be shifted to the cross-streets. Traffic-calming measures (e.g., speed bumps, chicanes, etc.) should be implemented to maintain lower traffic volumes along Davis Street.
D	• Today there is a stop control on Davis Street at this intersection with cross traffic moving freely along 8th Street. • Parallel to this point on Davis Street, bike lanes begin along Evans Street and run between 17th Street and 8th Street.	• To facilitate through-movements for people walking and biking, it is recommended that the stop signs be shifted from Davis Street to 8th Street. Traffic-calming measures (e.g., speed bumps, chicanes, etc.) should be implemented to maintain lower traffic volumes along Davis Street. • Maintaining the bike lanes along Evans Street would require signage distinguishing the low-stress neighborhood greenway facility from the bike lanes along a busier street. Based on PMT, PAC, and public comment, it will be determined whether the bike lanes along Evans Street should be maintained or removed.
E	• Today there is a stop control at 5th Street/Davis Street with cross traffic along 5th Street moving freely.	• To facilitate through-movements for people walking and biking, it is recommended that the stop control be shifted to 5th Street. Traffic-calming measures should be implemented to maintain lower traffic volumes along Davis Street. • 5th Street/Evans Street is signalized at this location.
F	• Today there is a stop control at 4th Street/Davis Street with cross traffic moving freely along 4th Street.	• To facilitate through-movements for people walking and biking, it is recommended that the stop control be shifted to 4th Street. Traffic-calming measures should be implemented to maintain lower traffic volumes along Davis Street.
G	• The intersection of 3rd Street/Davis Street is signalized.	• This intersection provides a lower-stress crossing than the intersection of 3rd Street/Evans Street, which is two-way stop-controlled.
H	• There is a hill for riders on Davis (uphill for northbound riders)	• This hill is located along both neighborhood greenway alignments. It is not anticipated to serve as a deterrent to usage.

Table 4: Concept 3B Considerations (Evans Street)

Figure Label	Notes	Significance
A	• At the intersection of 17th Street/Evans Street bikes will need to be transitioned from existing bike lanes on Evans Street to sharrows on 17th Street.	• Wayfinding signage will be used to support this transition.
E	• The intersection of 5th Street/Evans Street is signalized.	• This intersection may provide a lower-stress crossing than the intersection of 5th Street/Davis Street, which is two-way stop controlled.
G	• The intersection of 3rd Street/Evans Street is not signalized, but rather two-way stop-controlled.	• This intersection provides a higher-stress crossing than the intersection of 3rd Street/Davis Street, which is signalized.
H	• There is a hill for riders on Davis (uphill for northbound riders).	• This hill is located along both neighborhood greenway alignments. It is not anticipated to be a deterrent to usage.

Based on project team field visit and observations, Davis Street resembles more of a neighborhood route with calmer traffic conditions, lower traffic volumes, a narrower cross section, and no center line striping. Furthermore, Davis Street crosses 3rd Street at a signalized intersection whereas Evans Street crosses 3rd Street at a two-way stop-controlled intersection. Both neighborhood greenway alignments have stop controls at many intersections, which may need to be adjusted to prioritize through movement for people walking and biking.

Concept Cost Estimates

Planning-level cost estimates for each concept are provided in Table 5. The estimates include costs for mobilization, signage, striping, and a 30% contingency to cover costs for administrative or engineering services related to the potential projects. The concepts maintain existing curb-to-curb cross-sections; therefore, no right-of-way costs are anticipated.

Table 5: Planning-level Cost Estimates

Concept	Planning-Level Cost Estimate	Notes
Concept 1: Two-Way Separated Bike Lane on Adams Street	$857,000	• Assumes project is completed with a paving project and estimate excludes costs associated with said paving project. • Includes potential signal modifications to transition from the buffered bike lanes to the two-way separated bike lane at 2nd Street. • Excludes specific intersection treatments. These will be added once a preferred alternative is selected.
Concept 2: OR 99W Buffered Bike Lanes	$400,000	• Assumes project is completed with a paving project and estimate excludes costs associated with said paving project. • Excludes specific intersection treatments. These will be added once a preferred alternative is selected.
Concept 3A: Neighborhood Greenway on Davis Street	$140,000	• Includes the cost of switching the stop sign to the other street. • Excludes traffic calming structures.
Concept 3B: Neighborhood Greenway on Evans Street	$89,000	• Excludes traffic calming structures. • Costs associated with traffic calming are anticipated to be higher for the Evans Street Greenway than the Davis Street Greenway.

As summarized in Table 5, the two-way separated bike lane is the most expensive concept, followed by the buffered bike lanes, and the neighborhood greenway concepts. Additionally, maintenance costs are anticipated to be substantially higher for Concept 1 than for the other concepts because of the flex-post delineators and special maintenance equipment needed to sweep the two-way separated bike lane.

The cost estimate for the preferred concept will be refined in the draft Concept Plan.

Appendix "D" contains the full planning level cost-estimates for each concept.

OR 99W CONCEPT EVALUATION

Evaluation criteria and performance measures identified in the Evaluation Criteria and Performance Measures Memorandum were used to assess the trade-offs of each concept and determine which concept most closely aligns with the project goals based on the corridor context and needs of intended users. The evaluation criteria below support the Corridor Vision Statement and the City of McMinnville Transportation System Plan (TSP) policies:

1. *Complete Streets*: The alternative provides comfortable facilities for people walking and biking, regardless of age and ability.

2. *Multi-Modal Transportation System*: The alternative provides integrated network of facilities and services for a variety of motorized and non-motorized travel modes based on the appropriate relative priority given the corridor context.

3. *Connectivity*: The alternative provides comprehensive connectivity and circulation to existing active transportation facilities in the City of McMinnville. The alternative encourages walking and biking to essential destinations within the City of McMinnville.

4. *Safety*: The alternative provides safety countermeasures that reduce the number of fatal and severe injury crashes.

5. *Equity*: The project meets the requirements set forth in the Americans with Disabilities Act (ADA) and provides transportation options to transportation disadvantaged populations.

6. *Livability*: The alternative minimizes impacts to adjacent property owners and encourages the use of public transit, bikeways, sidewalks, and walkways. The project provides equity and receives public support.

7. *Design Feasibility:* The alternative has no major design feasibility concerns.

The scoring scale for each criterion ranges from -1 to +2, reflecting the extent to which a project achieves the evaluation criteria per the associated performance measures. An evaluation of the concept designs according to this scale is provided below. *Appendix "F" contains the Evaluation Criteria and Performance Measures Memorandum.*

Complete Streets

The *Complete Streets* criterion considers the level of comfort each concept provides for people walking and biking, regardless of age and ability. This is measured with respect to bicycle and pedestrian level of traffic stress (LTS)[2].

Today, the BLTS scores ranges between BLTS 3 and BLTS 4 within the project study area. Each concept is expected to improve the experience for people biking according to LTS analysis. Table 6 summarizes the complete streets score based on implementation of the various concepts.

Table 6: Complete Streets Evaluation

Concept	Complete Streets Score	Existing LTS	Concept LTS
Concept 1: Two-Way Separated Bike Lane on Adams Street	**+1.5**	• BLTS 3 (north and south of couplet) • BLTS 4 (within couplet)	• BLTS 1 with segments of BLTS 2
Concept 2: Buffered Bike Lanes on Adams Street and Baker Street	**+1**	• BLTS 3 (north and south of couplet) • BLTS 4 (within couplet)	• BLTS 2
Concept 3A: Davis Street Greenway	**+2**	• BLTS 1 with segments of BLTS 2	• BLTS 1 with segments of BLTS 2
Concept 3B: Neighborhood Greenway on Evans Street	**+2**	• BLTS 1 with segments of BLTS 2	• BLTS 1 with segments of BLTS 2

Concept 1: Two-Way Separated Bike Lane on Adams Street

Concept 1 achieves a score of BLTS 1 along segments of Adams Street where the separated bike lane is proposed and a score of BLTS 2 where buffered bike lanes are proposed (north and south of the proposed separated bike lane). Compared to existing conditions, this improves the LTS score between 1 and 3 points.

Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

Concept 2 achieves a score of BLTS 2 throughout the project extents. Compared to existing conditions, this improves the LTS score between 1 and 2 points.

Concept 3: Neighborhood Greenway on Davis Street or Evans Street

Concept 3A and 3B achieves a score of BLTS 1 with some short segments of BLTS 2 along the parallel route. Compared to existing conditions, there is little-to-no change in LTS score; however, Concept 3A or

[2]The concepts developed for OR 99W are confined to the curb-to-curb width of the roadway. As a result, the pedestrian level of traffic stress (PLTS) was minimally impacted.

3B direct people walking and biking to the lowest stress, most comfortable experience for people biking compared to the concepts developed.

Multi-Modal Transportation System

The *Multi-Modal Transportation System* criterion evaluates if the concept alternative meets the needs of the modal priority set by the identified urban context in the ODOT Blueprint for Urban Design (BUD)[3]. According to the BUD, walking, biking, transit are the high priority modes for the study area, but these modes must still be balanced with the needs of vehicle and freight traffic. Table 7 summarizes the recommended design guidance for priority modes based on the BUD context.

Table 7: Recommended Modal Facility Selection for ODOT Highways in Urban Areas Based on Urban Contexts

OR 99W Segment	Recommended Context	Bicyclist Facility Recommendation	Pedestrian Facility Recommendation
NE McDonald Road to NW 15th Street	Urban Mix	Wide, comfortable, buffered facilities	Wide, comfortable, buffered facilities
NW 15th Street to SE 1st Street	Traditional Downtown/CBD	Wide, comfortable facilities	Wide, comfortable, buffered facilities
SE 1st Street to SW Linfield Avenue	Urban Mix	Wide, comfortable, buffered facilities	Wide, comfortable, buffered facilities

Concept 1: Two-Way Separated Bike Lane on Adams Street

Concept 1 provides wide, comfortable, and buffered facilities along segments of Adams Street where the separated bike lane is proposed. The separated bike lane increases the buffer distance between people walking and the travel lane. Concept 1 also provides buffered facilities along the buffered bike lanes segments (north and south of the proposed separated bike lane); however, the width and level of comfort of these facilities is less than the separated bike lane.

Concept 1 may impact freight mobility in the corridor. Although the BUD does not designate freight as a priority mode, OR 99W is a designated Reduction Review Route for freight; this Concept Plan should not limit the ability of freight to travel along OR 99W. The physical separation and lane reductions may not fully support the multi-modal transportation needs of OR 99W.

[3] The ODOT BUD provides enhanced design guidance; for more information visit: https://www.oregon.gov/odot/Engineering/Pages/Manuals.aspx

Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

Concept 2 provides buffered facilities throughout the project extents; however, the width and level of comfort of these facilities is less than the separated bike lane.

Concept 3: Neighborhood Greenway on Davis Street or Evans Street

The modal considerations identified as part of the ODOT BUD are specific to the OR 99W corridor. Providing wide, comfortable, and buffered facilities on the parallel neighborhood greenway are not necessary to achieve a comfortable user experience due to the lower volume, lower vehicle speeds, and residential context of the roadway. Neighborhood greenway facilities prioritize the needs of people walking and biking, which are the priority users based on urban context.

Table 8 summarizes the results of the multi-modal transportation system evaluation scores.

Table 8: Multi-Modal Transportation System Evaluation

Concept	Multi-Modal Transportation System Score
Concept 1: Two-Way Separated Bike Lane on Adams Street	**+1**
Concept 2: Buffered Bike Lanes on Adams Street and Baker Street	**+1**
Concept 3A: Neighborhood Greenway on Davis Street	**+1**
Concept 3B: Neighborhood Greenway on Evans Street	**+1**

Connectivity

The *Connectivity* criterion evaluates how well the concept supports the development of the McMinnville active transportation network by assessing whether the concept is identified in existing planning documents, removes gaps or barriers in the existing walking and biking network, and is located near active transportation generators and essential destinations. Transit stops are included in this list of destinations, with Yamhill County Transit operating four routes with weekday hourly service in McMinnville[4]:

- Route 1: McMinnville – South Loop;
- Route 2: McMinnville – East Loop;
- Route 3: McMinnville – North Loop; and,
- Route 4: McMinnville – West Loop.

[4]For additional information about transit routes in McMinnville, see https://ycbus.org/.

Table 9: Connectivity Evaluation

Concept	Number of Essential Destinations	Portion of Walk-to-School Routes Overlap	Connectivity Score
Concept 1: Two-Way Separated Bike Lane on Adams Street	Many (19)	Minor	**+2**
Concept 2: OR 99W Buffered Bike Lanes	Many (24)	Minor	**+2**
Concept 3A: Neighborhood Greenway on Davis Street	Some (11)	Moderate	**+1.7**
Concept 3B: Neighborhood Greenway on Evans Street	Many (20)	Substantial	**+2**

Concept 1: Two-Way Separated Bike Lane on Adams Street

Concept 1 minimizes barriers and fills gaps within the existing active transportation network by providing a two-way separated bike lane and buffered bike lanes along OR 99W. The need for improved multi-modal accommodations within the OR 99W couplet was identified in the City's TSP. Most of the OR 99W corridor is not identified as a walk-to-school route; however, Adams Street and Baker Street south of 2nd Street are both identified as walk-to-school routes for Newby Elementary School and McMinnville High School, respectively. Nineteen (19) essential destinations were identified immediately adjacent to the alignment of Concept 1; the majority of which are transit stops and health related clinics.

Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

Concept 2 minimizes barriers and fills gaps within the existing active transportation network by providing buffered bike lanes along OR 99W. The need for improved multi-modal accommodations within the OR 99W couplet was identified in the City's TSP. Most of the OR 99W corridor is not identified as a walk-to-school route; however, Adams Street and Baker Street south of 2nd Street are both identified as walk-to-school routes for Newby Elementary School and McMinnville High School, respectively. Twenty-four (24) essential destinations were identified immediate adjacent to the alignment of Concept 2; the majority of which are transit stops and health related clinics.

Concept 3: Neighborhood Greenway on Davis Street or Evans Street

While the neighborhood greenway concepts are not identified in the City's TSP, the need for improving the multi-modal accommodations along OR 99W is addressed by providing a parallel route. Walk-to-school routes for Sue Buel Elementary School, McMinnville High School, and Patton Middle School, and Memorial Elementary school are located along the neighborhood greenway route(s). Eleven essential destinations were identified immediate adjacent to the alignment of Concept 3A; the majority of which are transit stops and churches. Twenty essential destinations were identified immediate adjacent to the alignment of Concept 3B; the majority of which are transit stops and churches. Concepts 3A and 3B pass three school frontages.

Safety

The *Safety* criterion considers the concept impact to safety along the corridor through crash reduction factors, crash history, bicycle risk factor scoring, and pedestrian risk factor scoring. The proposed concepts include crash reduction factors (CRFs) for roadway segments. CRFs are used to estimate the potential reduction in crashes that could occur with the implementation of the proposed concepts. Table 10 summarizes the CRFs identified for each concept and respective crash reduction percentages with respect to cost.

Table 10: Crash Reduction Factors

Concept	Concept CRFs	Crash Reduction Factor (CRF)	Crash Reduction Value with Respect to Cost[2]
Concept 1: Two-Way Separated Bike Lane on Adams Street	BP23: Install Cycle Tracks	**59%** Reduction in **Bicycle** Crashes at **All Injury Severities**	Moderate Value
	BP24: Install Buffered Bike Lanes	**47%** Reduction in **Bicycle** Crashes at **All Injury Severities**	
Concept 2: Buffered Bike Lanes on Adams Street and Baker Street	BP24: Install Buffered Bike Lanes	**47%** Reduction in **Bicycle** Crashes at **All Injury Severities**	Moderate Value
Concept 3A: Neighborhood Greenway on Davis Street	BP27: Install Bicycle Boulevard	**63%** Reduction in **Pedestrian and Bicycle Crashes** at **All Severities**	Highest Value[3]
Concept 3B: Neighborhood Greenway on Evans Street			High Value

[1]CRF Source: ODOT ARTS Program Crash Reduction Factor Appendix

[1]Crash reduction value with respect to cost is based on the estimated planning-level costs provided above; this considers the order-of-magnitude cost with respect to safety benefits.

[2]Although planning-level cost estimates shown are higher for Davis Street Greenway, traffic calming efforts are anticipated to make the Evans Street Greenway option more expensive.

Table 11 summarizes the safety evaluation with respect to crash reduction factor, crash history, pedestrian risk factor scoring, and bicycle risk factor scoring.

Table 11: Safety Evaluation

Concept	Safety Score
Concept 1: Two-Way Separated Bike Lane on Adams Street	**+1.9**
Concept 2: Buffered Bike Lanes on Adams Street and Baker Street	**+1.8**
Concept 3A: Neighborhood Greenway on Davis Street	**+2.0**
Concept 3B: Neighborhood Greenway on Evans Street	**+1.9**

Concept 1: Two-Way Separated Bike Lane on Adams Street

Concept 1 provides the second highest CRF for people biking at 59%. There were 22 reported crashes of people walking or biking along the alignment between January 1, 2014 and December 31, 2018[5]. Segments of the concept alignment score in the top 20% of risk factor locations for people walking and for people biking.

Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

Concept 2 provides the lowest CRF for people biking at 47%. There were 30 reported crashes of people walking or biking along the alignment between January 1, 2014 and December 31, 2018. Segments of the concept alignment score in the top 20% of risk factor locations for people walking and for people biking.

Concept 3: Neighborhood Greenway on Davis Street or Evans Street

The neighborhood greenway concepts provide the highest CRF for people walking and biking at 63%. There were eight reported crashes of people walking or biking along the Davis Street Greenway alignment and seven reported crashes of people walking or biking along the Evans Street Greenway alignment between January 1, 2014 and December 31, 2018. Additionally, these concepts provide parallel facilities that reduce expected crashes involving people walking and biking along the couplet. Segments of the concept alignment score in the top 40% of risk factor locations for people biking. The route also provides an alternative to locations in the top 20% risk factor locations for people walking and for people biking.

The existing signal at 3rd Street/Davis Street and anticipated costs associated with traffic calming needs along Evans Street makes the Davis Street Greenway score slightly higher with respect to safety than the Evans Street Greenway option.

Appendix "C" includes additional information about ARTS countermeasures.

Equity

The *Equity* criterion considers how the concept supports access for transportation disadvantaged populations (TDP). A TDP index was calculated according to the Oregon Department of Transportation (ODOT) Active Transportation Needs Inventory Assessment[6]. The higher the index number the more

[5] The five most recent years of pedestrian and bicyclist crash data (January 1, 2014 to December 31, 2018) were obtained from ODOT's Crash Analysis and Reporting Unit. This alignment extends from Linfield Avenue to McDonald Lane.

[6]The index converts household statistics from the American Community Survey to a per capita index. It is calculated at the census block group level as the sum of people 65 and older, 17 and younger, non-white or Hispanic, speak English "not well" or "not at all", low-income, with a disability, living in crowded households, or living in households without vehicle access. That sum is divided by total block population. People fitting into multiple vulnerability categories are counted multiple times.

historically disadvantaged the population is with respect to transportation. Each of the three concepts are along the same block groups, which have a TDP Index ranging from 1.6 to 1.9. None of the concepts are anticipated to directly impact ADA compliance.

As a result, historically disadvantaged populations with respect to transportation would be served equally when compared to the TDP index. However, the different concepts provide distinct advantages with respect to supporting access for transportation disadvantaged groups. Concept 1 and Concept 2 may provide more direct access for economically disadvantaged populations; Concept 2 and Concept 3 may provide more comfortable facilities for people using a mobility device, as described below.

Table 12 summarizes the results of the equity evaluation scores.

Table 12: Equity Evaluation

Concept	Equity Score
Concept 1: Two-Way Separated Bike Lane on Adams Street	**+1**
Concept 2: OR 99W Buffered Bike Lanes	**+0.8**
Concept 3A: Neighborhood Greenway on Davis Street	**+1**
Concept 3B: Neighborhood Greenway on Evans Street	**+1**

Concept 1: Two-Way Separated Bike Lane on Adams Street

Concept 1 directly improves transportation options and facilities for transportation disadvantaged populations of all ages and abilities. The concept provides physical separation from vehicle traffic, providing low-stress facilities for elderly, youth, and people using mobility devices along the corridor. This concept also provides direct access to facilities along the couplet, supporting access to jobs for individuals without access to motor vehicles.

Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

Concept 2 also directly improves transportation options and facilities for some transportation disadvantaged populations by providing direct access to facilities along the couplet. This concept, however, does not provide the same level of comfort as the other concepts because there is no physical separation from the high traffic volumes along the couplet.

Concept 3: Neighborhood Greenway on Davis Street or Evans Street

The lower traffic volumes along the neighborhood greenway routes support elderly, youth, and people who use mobility devices. The concept directly improves transportation options and facilities for transportation disadvantaged populations of all ages and abilities, supporting comfortable access to destinations in the project area.

Livability

The *Livability* criterion considers impacts the concept has to residential and commercial access along the corridor and the public response. The public response is pending, as it will be determined in a virtual open house.

Table 13 provides the *Livability* score for each concept. All concepts considered are expected to directly improve access to residential and commercial areas and are not expected to require right-of-way acquisition. Information collected in the virtual open house will be used to distinguish between each concept's impact to livability in the study area.

Table 13: Livability Evaluation

Concept	Livability Score
Concept 1: Two-Way Separated Bike Lane on Adams Street	**+1.5**
Concept 2: OR 99W Buffered Bike Lanes	**+1.5**
Concept 3A: Neighborhood Greenway on Davis Street	**+1.5**
Concept 3B: Neighborhood Greenway on Evans Street	**+1.5**

Concept 1: Two-Way Separated Bike Lane on Adams Street

Parking removal along one side of Adams Street is not anticipated to impact commercial access. Concept 1 directly improves access for people walking and biking to residential and commercial areas surrounding the couplet.

Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

Parking removal along one side of Adams Street is not anticipated to impact commercial access. Concept 2 directly improves access for people walking and biking to residential and commercial areas surrounding the couplet.

Concept 3: Neighborhood Greenway on Davis Street or Evans Street

Concepts 3A and 3B directly improve access for people walking and biking to residential and commercial areas, particularly those east of the couplet.

Design Feasibility

The *Design Feasibility* criterion assesses potential design feasibility considerations for each concept to determine whether there are any potential "fatal flaws" that would preclude implementation.

As described in Table 14, Concept 1 is expected to have the most substantial design challenges of the concepts considered based on potential to impede heavy vehicle movements and special considerations for designing contraflow facilities and transitioning users from buffered bike lanes to the two-way

separated bike lane within the OR 99W couplet. Additional information about design challenges associated with each concept is provided below.

Table 14: Design Feasibility Evaluation

Concept	Design Feasibility Score
Concept 1: Two-Way Separated Bike Lane on Adams Street	**-1**
Concept 2: Buffered Bike Lanes on Adams Street and Baker Street	**0**
Concept 3A: Neighborhood Greenway on Davis Street	**+1**
Concept 3B: Neighborhood Greenway on Evans Street	**0**

Concept 1: Two-Way Separated Bike Lane on Adams Street

Concept 1 poses the most substantial design challenges due to the removal of parking along the west side of Adams Street, the reduction in travel lane widths to accommodate the two-way separated bike lane, and transition zones to bring people biking to and from the two-way separated bike lane facility. The physical buffers also have potential to impede heavy vehicle movements and may also provide maintenance challenges.

Concept 2: Buffered Bike Lanes on Adams Street and Baker Street

Concept 2 poses design challenges due to parking removal along the west side of Adams Street, reduction in travel lane widths along Adams Street and Baker Street, and ability to fit buffered bike lanes along Baker Street at the constrained pinch points created by existing curb extensions.

Concept 3: Neighborhood Greenway on Davis Street or Evans Street

Concepts 3A and 3B pose minor design challenges due to the nature and lack of infrastructure required with the neighborhood greenway concept. Traffic calming in the form of signage, traffic diverters, and speed humps will be explored to reduce the potential of cut-through traffic, vehicle volumes, and vehicle speeds on the neighborhood routes.

Traffic calming measures along Concept 3B: Neighborhood Greenway on Evans Street Greenway are anticipated to have more design challenges and implications than Concept 3A: Neighborhood Greenway on Davis Street due to differences in the roadway classifications of Davis Street and Evans Street. According to the McMinnville TSP, Davis Street is classified as a minor collector from Booth Bend Road to 3rd Street and as a local street from 3rd Street to 14th Street. Evans Street is classified as a minor collector from 3rd Street north to OR 99W.

Evaluation Criteria Scoring

Table 15: Evaluation Criteria Scoring

Evaluation Criteria	Performance Measure	Concept 1: Two-Way Separated Bike Lane on Adams Street		Concept 2: Buffered Bike Lanes on Adams Street and Baker Street		Concept 3A: Neighborhood Greenway on Davis Street		Concept 3B: Neighborhood Greenway on Evans Street	
		Criteria Score	*Performance Measure Score*	*Criteria Score*	*Performance Measure Score*	*Criteria Score*	*Performance Measure Score*	*Criteria Score*	*Performance Measure Score*
Complete Streets	Bicycle Level of Traffic Stress (BLTS)	+1.5	+2	+1	+2	+2	+2	+2	+2
	Pedestrian Level of Traffic Stress (PLTS)		+1		0		+2		+2
Multi-Modal Transportation System	Type and presence of pedestrian, bicycle, transit, motor vehicle, and freight facilities align with the recommendations from the Blueprint for Urban Design	+1	+1	+1	+1	+1	+1	+1	+1
Connectivity	Project is identified by the City of McMinnville TSP or is located on the Safe Routes to School (SRTS) Network.	+2	+2	+2	+2	+1.7	+2	+2	+2
	Project removes barrier to walking and biking or fills gap in the walking and biking transportation network		+2		+2		+2		+2
	Proximity to activity generators and essential destinations		+2		+2		+1		+2
Safety	Crash Reduction Factor/Planning Level Project Cost	+1.9	+1.5	+1.8	+1	+2	+2	+1.9	+1.5
	Crash History		+2		+2		+2		+2
	Pedestrian Risk Factor Scoring		+2		+2		+2		+2
	Bicyclist Risk Factor Scoring		+2		+2		+2		+2
Equity	Project impact to transportation disadvantaged populations based on the ODOT Transportation Disadvantaged Population (TDP) Index	+1	+2	+0.8	+1.5	+1	+2	+1	+2
	Project impact to ADA compliance		0		0		0		0
Livability	Right-of-way acquisition needs	+1.5	+1	+1.5	+1	+1.5	+1	+1.5	+1
	Neighborhood street modification, business access and parking		+2		+2		+2		+2
	Public response based on Open House and Public Advisory Committee Comments		*pending*		*pending*		*pending*		*pending*
Design Feasibility	High-level feasibility of constructing the intended project at the location.	-1	-1	0	0	+1	+1	0	0
Total Score		**7.9**		**8.1**		**10.2**		**9.4**	

OR 99W CONCEPT CONSULTANT TEAM PRELIMINARY RECOMMENDATIONS

As shown in Table 15, *Concept 3A: Neighborhood Greenway on Davis Street* scores highest, followed by *Concept 3B: Neighborhood Greenway on Evans Street*. *Concept 2: Buffered Bike Lanes on Adams Street and Baker Street* scores higher than *Concept 1: Two-Way Separated Bike Lane on Adams Street*. Based on the scoring, and the distinct benefits each concept provides, the consultant team's preliminary recommendation is to construct Concept 3A: Neighborhood Greenway on Davis Street ("Davis Street Greenway") and Concept 2: Buffered Bike Lanes on Adams Street and Baker Street ("OR 99W Buffered Bike Lanes"). A list of primary benefits of these concepts is as follows:

- The Davis Street Greenway provides low-stress facilities for users of all ages and abilities.
- The Davis Street Greenway is a low-cost option.
- The existing character of Davis Street is more conducive to neighborhood greenway facilities; Evans Street would likely require more substantial traffic calming efforts to serve as a low-stress facility.
- The intersection of Davis Street/3rd Street is signalized, providing a more comfortable intersection crossing than the two-way stop controlled intersection of Evans Street/3rd Street.
- The OR 99W Buffered Bike Lanes provide direct access for people biking through the couplet and to destinations west of the couplet.
- The OR 99W Buffered Bike Lanes are a moderate-cost option that can be easily added to pavement projects along the couplet.

Public input will be key to confirming or modifying the alignment recommendation for the neighborhood greenway.

Access to the preferred concept design will be supported with enhanced crossings along OR 99W. Development of enhanced crossing recommendations is described in the following sections.

ENHANCED CROSSING DEVELOPMENT

Potential locations for enhanced crossing treatments were identified based on field observations and initial assessments by the consultant team, input from the PMT and PAC, and a review of the City's TSP and walk-to-school routes. This section analyzes and recommends enhanced crossing treatments for the following six intersections:

- Adams Street/15th Street;
- Baker Street/15th Street;
- Adams Street/8th Street;
- Baker Street/8th Street;
- Adams Street/3rd Street; and,
- Baker Street/Cowls Street

The intent of the enhanced crossing development is to identify and recommend crossing treatments that will provide safe, comfortable crossing opportunities for people walking and biking in the study area.[7] Once the preferred alternative is established, the enhanced crossings recommendations will be updated to tie into the preferred crossing facilities and support access to essential destinations and activity generators around McMinnville.

ENHANCED CROSSING EVALUATION

The six enhanced crossing study locations listed above were evaluated using the FHWA *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* (Reference 3) and NCHRP *Report 562 Improving Pedestrian Safety at Unsignalized Crossings* (Reference 4). This evaluation was conducted to identify appropriate crossing treatments based on existing roadway and traffic conditions.

Federal Highway Administration (FHWA) Guide for Improving Pedestrian Safety at Uncontrolled Locations

The FHWA *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* (Reference 3) was produced as part of the Safe Transportation for Every Pedestrian (STEP) program and provides guidance on selecting appropriate countermeasures to help improve pedestrian safety at uncontrolled crossing locations. Table 1 of the *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* provides a matrix of countermeasure options for evaluating appropriate levels of crossing protection based on roadway configurations, posted speed limit, and average annual daily traffic (AADT). Figure 10 illustrates the countermeasure matrix and highlights the applicable matrix cell based on the roadway configuration, posted speed limit, and AADT within the study area.

Figure 10: 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
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Traffic data available in ODOT's TransGIS shows that the average annual daily traffic (AADT) through the OR 99W couplet ranges between 11,700 and 13,000 vehicles. Adams Street and Baker Street have one-

[7] Enhanced crossing treatments require approval from ODOT Region 2 Traffic.

way, two-lane cross-sections with a posted speed of 30 mph (except for the segment of Adams Street south of 2nd Street which has a posted speed limit is 35 mph).

Based on the guidance provided in the countermeasure matrix, the following countermeasures should be considered at the identified crossing locations based on roadway context[8]:

Table 16: Appropriate FHWA Countermeasures Given Roadway Context

Countermeasure	FHWA Level of Recommendation
Countermeasure 1: High visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs	Crosswalk visibility enhancements should always occur in conjunction with other identified countermeasure.
Countermeasure 2: Raised Crosswalk	Countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgement
Countermeasure 3: Advance Stop Here For Pedestrians sign and stop line	Countermeasure should always be considered, but not mandated or required, based upon engineering judgement.
Countermeasure 4: In-Street Pedestrian Crossing sign	Countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgement
Countermeasure 5: Curb extensions	Countermeasure is a candidate treatment
Countermeasure 6: Pedestrian refuge island	Countermeasure should always be considered, but not mandated or required, based upon engineering judgement.
Countermeasure 7: Rectangular Rapid Flashing Beacon (RRFB)	Countermeasure is a candidate treatment
Countermeasure 8: Road diet	Countermeasure is a candidate treatment
Countermeasure 9: Pedestrian Hybrid Beacon (PHB)	Countermeasure is a candidate treatment

Source: FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

The complete matrix of countermeasure options can be found in Reference 3.

NCHRP Report 562 *Improving Pedestrian Safety at Unsignalized Crossings*

The NCHRP Report 562 *Improving Pedestrian Safety at Unsignalized Crossings* (Reference 4) provides a methodology for evaluating appropriate levels of crosswalk protection that considers traffic, travel

[8] *Note: Roadway Configuration "(2 or more lanes in each direction)" was selected due to the roadway context and configuration of the OR 99W couplet.*

speed, pedestrian crossing volumes as well as a number of other factors. NCHRP Report 562 methodology was applied to the potential enhanced crossing locations.

Pedestrian Volumes

Pedestrian crossing volumes at the potential enhanced crossing locations were unavailable. To conduct the NCHRP Report 562 analysis, the minimum pedestrian volume for a peak-hour evaluation recommended by NCHRP 562 was used (20 pedestrians per hour for both direction where the major road speed does not exceed 35 mph). Table 17 summarizes the results of the NCHRP Report 562 application.

Note: The FHWA Countermeasure Selection Matrix does not rely on existing or forecasted pedestrian crossing volumes to determine the appropriate level of enhanced crossing facility type.

Table 17: NCHRP Report 562 Analysis Study Intersections

ID	Major Street	Minor Street	PM Peak Hour Traffic Volume[1]	Posted Speed	Crossing Distance[2]	NCHRP 562 Recommended Treatment[3]
1	Adams Street	15th Street	1300	30	44	Active or Enhanced
2	Baker Street	15th Street	1280	30	34	Active or Enhanced
3	Adams Street	8th Street	1300	30	42	Active or Enhanced
4	Baker Street	8th Street	1260	30	46	Active or Enhanced
5	Adams Street	3rd Street	1300	30	34	Active or Enhanced
6	Baker Street	Cowls Street	1170	30	46	Active or Enhanced

[1]Peak hour volume estimate was taken as 10% of the AADT provided in TransGIS. This estimate was consistent with tube counts collected along a segment of Adams Street in 2017.
[2]Crossing distances were measured during the project team field visit.
[3]The "Active or Enhanced" treatment recommendation assumes a peak pedestrian volume of 20 pedestrians/hour.

Under the scenario where a minimum of 20 pedestrians would need to cross the major street in the peak hour, the NCHRP Report 562 analysis results in a "**ACTIVE OR ENHANCED**" indication for the six crossing locations. This category includes devices that enhance the visibility of the crossing location and devices designed to display a warning only when pedestrians are present or crossing the street.

Based on the existing walking and biking activity along the couplet, it is anticipated that the minimum pedestrian activity thresholds are currently met with increasing activity anticipated based on upcoming development and the other improvements included in the McMinnville OR 99W (NE McDonald Lane to Linfield Avenue) Active Transportation Concept Plan. *Appendix "E" includes the NCHRP 562 worksheets used in this analysis.*

ENHANCED CROSSING RECOMMENDATIONS

Based on the recommend guidance in the *FHWA Guide for Improving Pedestrian Safety at Uncontrolled Locations* and the results of the *NCHRP Report 562* analysis the following enhanced crossing treatments are recommended at the identified crossing locations:

- High visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
- Advance Stop Here For Pedestrians sign and stop line
- Rectangular Rapid Flashing Beacon (RRFB)

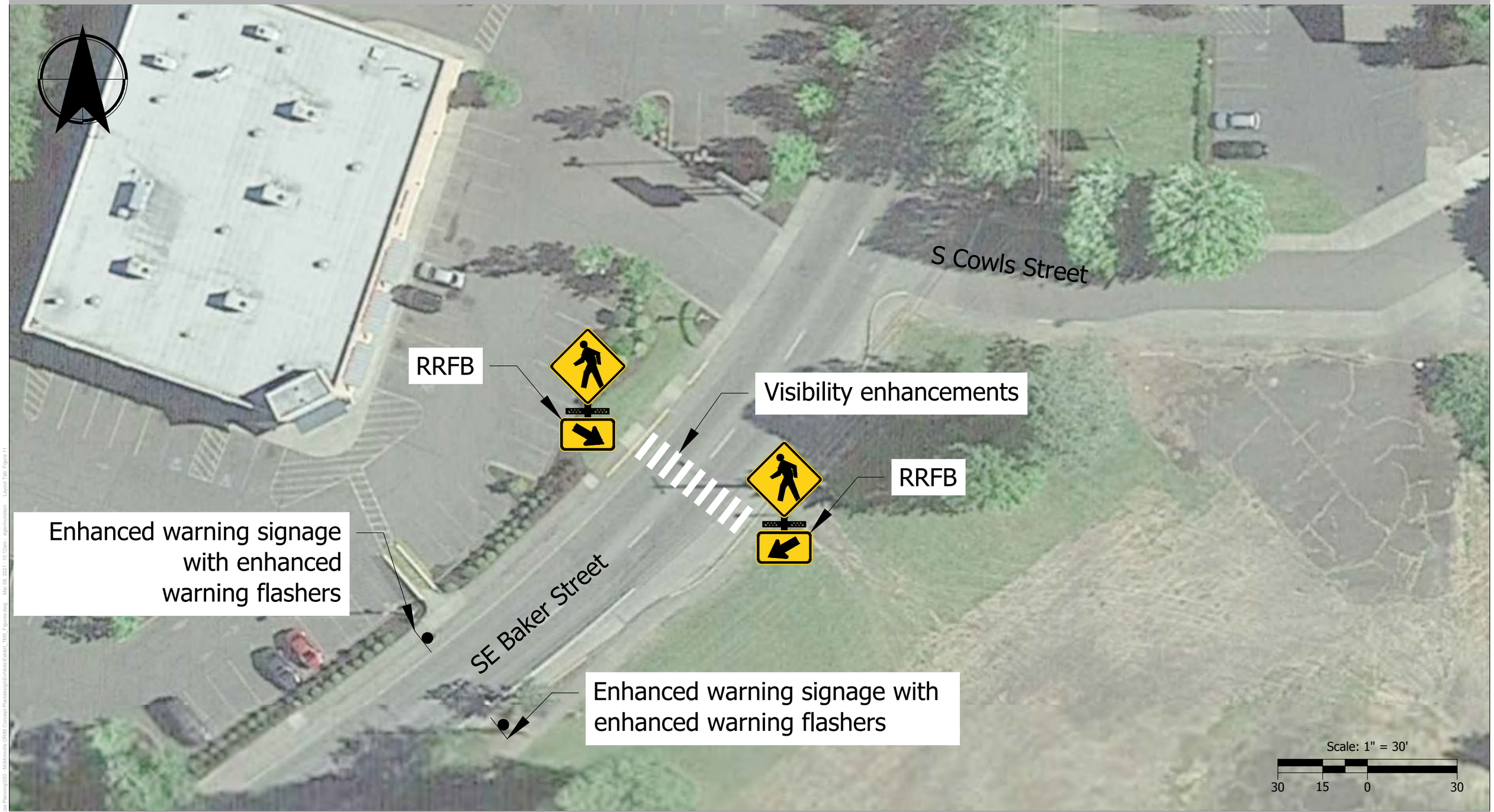
Figure 11 through Figure 14 illustrate conceptual layouts for the recommended enhance crossing treatments. The planning-level cost associated with high visibility crosswalk markings with RRFB is $125,000 per location. This estimate includes construction and professional fees for ADA ramp reconstruction on both sides of the roadway, striping, signage, and the RRFB. The estimate does not include right-of-way, utility relocations, or bicycle detection on approaches. The planning-level cost estimate for each intersection will be refined in the draft Concept Plan once the preferred OR 99W facility concept the enhancements would tie into is established.

Additionally, coordination with Yamhill County Transit is recommended to consider relocating existing transit stops to enhanced crossing locations to facilitate transit use in the area.

Appendix "C" provides additional information about design treatments for improving safety at intersections.

Figure 11: Enhanced Crossing Conceptual Layout at Baker Street/Cowls Street

Conceptual Design Subject to Change
Date: March 12, 2021



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McMinnville Active Transportation Concept Plan
McMinnville, OR

Figure 12: Enhanced Crossing Conceptual Layout at Adams Street/3rd Street

Conceptual Design Subject to Change
Date: March 12, 2021

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McMinnville Active Transportation Concept Plan
McMinnville, OR

Figure 13: Enhanced Crossing Conceptual Layout at Adams Street/8th Street and Baker Street/8th Street

Conceptual Design Subject to Change
Date: March 12, 2021

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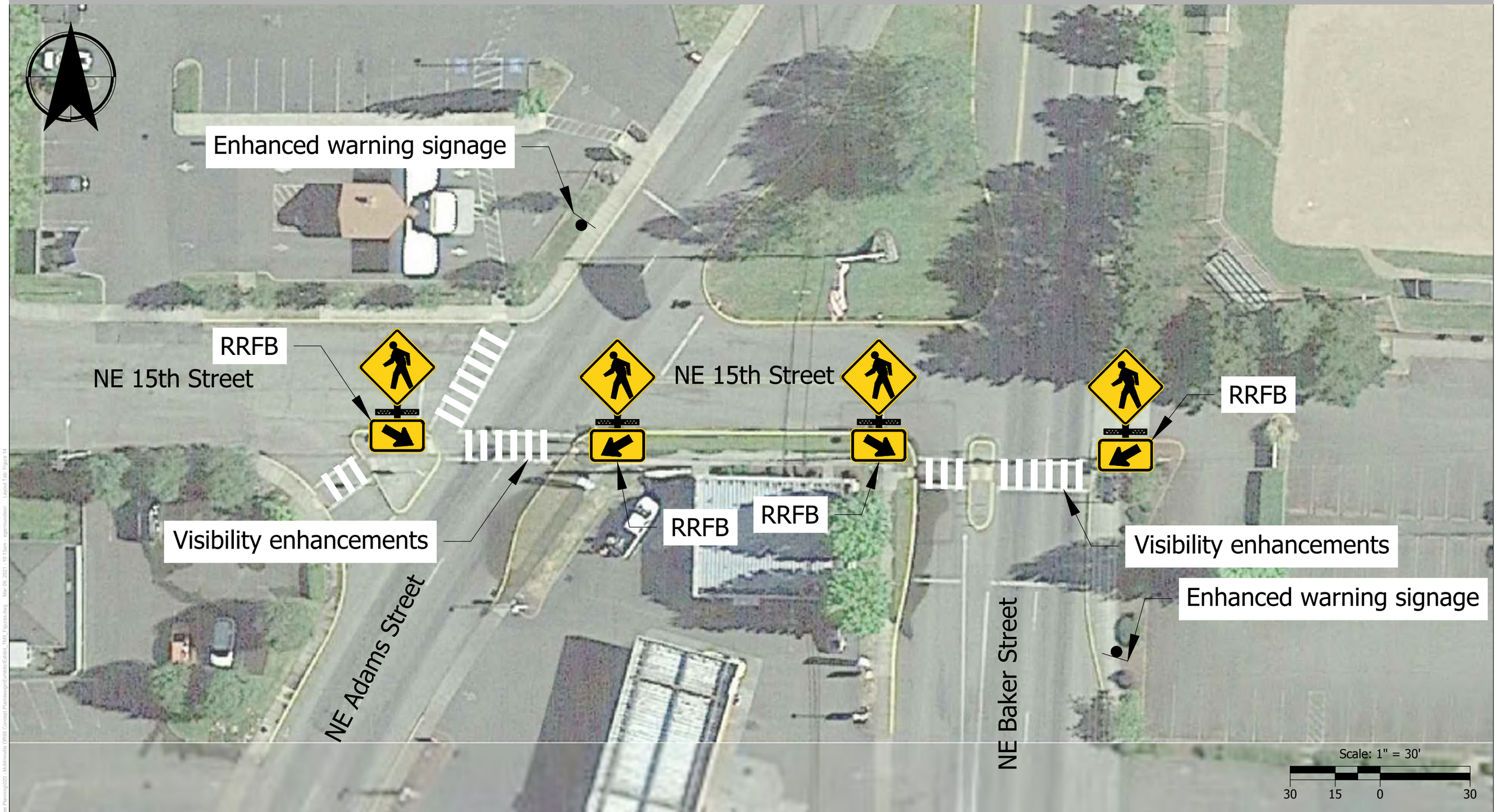
McMinnville Active Transportation Concept Plan
McMinnville, OR

Figure 14: Enhanced Crossing Conceptual Layout at Adams Street/15th Street and Baker Street/15th Street

Conceptual Design Subject to Change
Date: March 12, 2021



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McMinnville Active Transportation Concept Plan
McMinnville, OR

Phasing and Implementation

The McMinnville OR 99W Active Transportation Concept Plan concept recommendations can be separated into distinct projects to support incremental implementation as funding sources are identified. Securing funding for construction of the Davis Street Neighborhood Greenway should be prioritized, however, if funding sources are identified for any other project that project may be implemented first. Timing and potential funding sources for each project is outlined in Table 18.

Table 18: Phasing and Funding Recommendations

Project	Priority Order[1]	Timing	Potential Funding Sources
Davis Street Neighborhood Greenway	1	As soon as funding can be made available	• Safe Routes to School
OR 99W Buffered Bike Lanes	2	Improvements should occur as part of the next resurfacing preservation project	• Safe Routes to School • STIP Preservation funding
Adams Street/15th Street Enhanced Crossing	3	Construct these crossings at the same time[2], or with development	• Private development • Transportation Safety Division Grants • STIP Preservation funding
Adams Street/15th Street Enhanced Crossing			• Private development • Transportation Safety Division Grants • STIP Preservation funding
Baker Street/Cowls Street Enhanced Crossing	4	Time with upcoming development	• Upcoming private development • Transportation Safety Division Grants • STIP Preservation funding
Adams Street/8th Street Enhanced Crossing	5	Construct these crossings at the same time[2], or with development	• Private development • Transportation Safety Division Grants • STIP Preservation funding
Baker Street/8th Street Enhanced Crossing			• Private development • Transportation Safety Division Grants • STIP Preservation funding
Adams Street/3rd Street Enhanced Crossing	6	Time with upcoming development	• Private development • Transportation Safety Division Grants • STIP Preservation funding

[1] The priority order of enhanced crossing projects was established based on PAC input.

[2] Constructing enhanced crossings in pairs may reduce costs and help make the full connection across the couplet, however enhanced crossings can be designed and constructed separately if there is only available funding for one crossing.

Senate Bill 408 Requirements

Oregon Senate Bill (SB) 408 requires balancing competing interests on facility plans developed by ODOT. An example of competing interest is described in ODOT's Oregon Greenhouse Gas Reduction Toolkit: Strategy Report (Reference 2): "Preserving the economic interests of property owners (who place a high value on convenient access to their property) will require finding a balance between private property interests and the safety and operations of public roadways."

The concepts developed to address the multi-modal needs along OR 99W are not anticipated to impact the access or reduce capacity of the OR 99W corridor. Concepts developed are limited to signing and striping with the exception of the potential two-way separated bike lane which proposes vertical flex-post separation.

NEXT STEPS

The preferred alternative concept outlined in this memo will be incorporated into a draft Concept Plan.

OR 99W is a designated Reduction Review Route for freight, the Oregon Mobility Advisory Committee will have the opportunity to provide input on these concepts before finalizing the draft Concept Plan.

REFERENCES

1. TM #4: Existing Conditions and Future Needs. Kittelson & Associates, Inc. 2020.
2. ODOT Greenhouse Reduction Toolkit. <https://www.oregon.gov/odot/Planning/Pages/GHG-Toolkit.aspx>
3. *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations.* Federal Highway Administration. 2017.
4. NCHRP Report 562 *Improving Pedestrian Safety at Unsignalized Crossings.* National Cooperative Highway Research Program. 2006.

Appendix A Field Visit Notes

Field Visit Summary

This appendix summarizes the field observations and key findings based on the McMinnville OR 99W (NE McDonald Lane to Linfield Avenue) Active Transportation Concept Plan project development field visit. The project team, including Amy Griffiths, Nick Gross, and Eric Germundson, conducted the site visit on Wednesday January 13, 2020 from approximately 1:00 to 4:00 PM. The weather was sunny and in the mid-40s.

The purpose of the field visit was to document existing physical and operational conditions of the alternative concept alignments to develop a further understanding of cross-sectional elements, pinch points, and traffic flows. Field measurements were recorded by the project team at pinch points and at the enhanced crossing study locations. The field notes are documented in this appendix.

Field Observations

Field observations were documented along the different alternative concept alignments to better understand the varying character of the different alignments, right-of-way constraints, and potential challenges for construction. Figure 15 provides detailed notes from the field visit.

OR 99W (Outside the Couplet)

The following bullets summarize the key observations along OR 99W outside the couplet:

- High traffic volumes were observed, including heavy vehicles.
- The center median south of the couplet creates pinch points that may make constructing a two-way separated bike lane challenging.
- The skewed intersection of N Baker Street / OR 99W north of the couplet is complex. People biking in the southbound direction through the intersection are exposed to traffic for approximately 265 feet, and the skew associated with the intersection creates visibility challenges.

Adams Street-Baker Street Couplet

The following bullets summarize the key observations along Adams and Baker Street:

- Low parking utilization was observed.
- Adams Street is approximately 40’-5” to 40’-11” wide, except at pinch points created by curb extensions.
- Baker Street is approximately 44’-6” to 44’-9” wide, except at pinch points created by curb extensions.
- Traffic volumes are substantially higher than they are along parallel routes. Signals help create traffic gaps for crossing the street.

Neighborhood Greenway Alignments

The following bullets summarize the key observations along Evans Street in the study area:

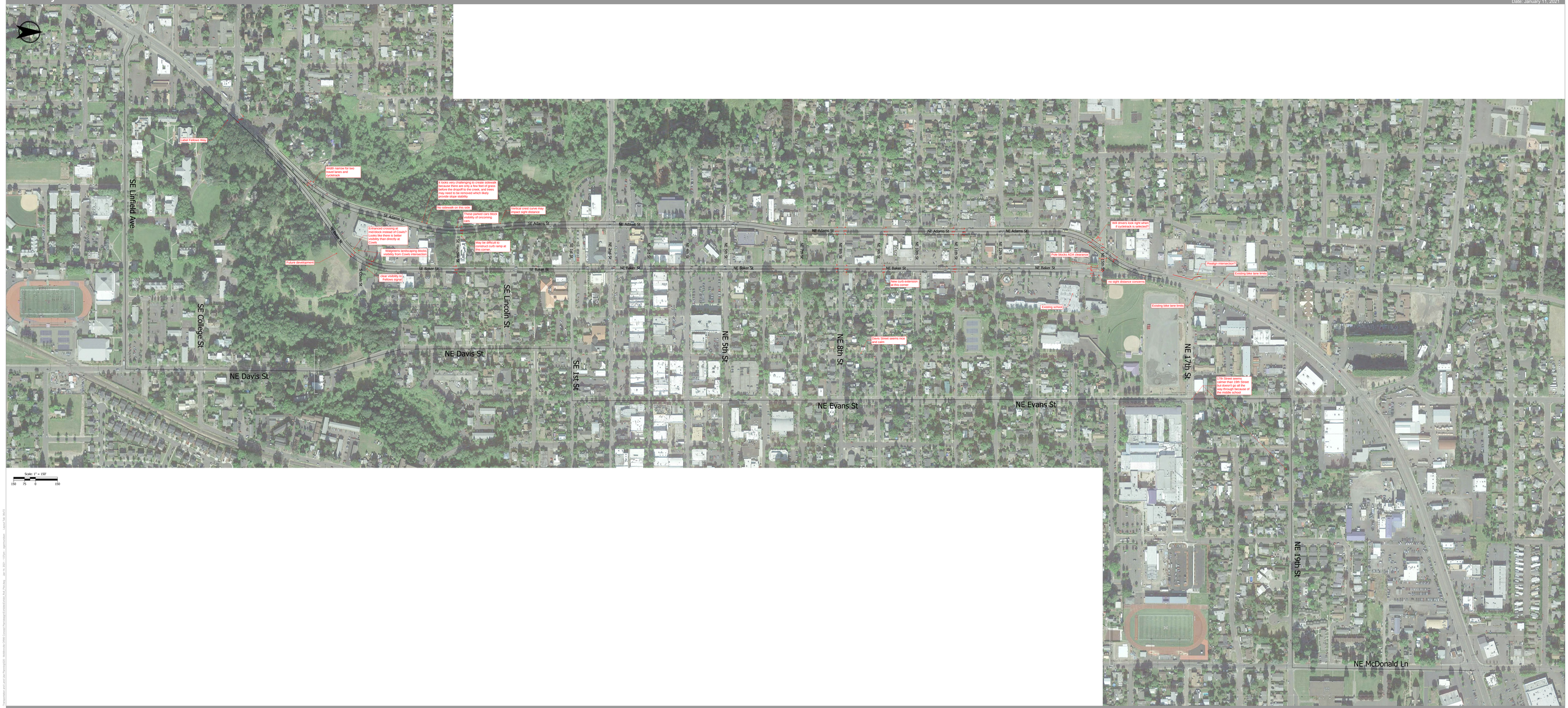
- Evans Street had lower traffic volumes than OR 99W but was busier than Davis Street. Evans Street would likely require greater traffic calming efforts to provide comfortable facilities as a neighborhood greenway.
- Constructing bike lanes along the remainder of Evans Street would require removal of a parking lane.
- Parking was highly utilized.

The following bullets summarize the key observations along Davis Street in the study area:

- Davis Street was less busy than Evans Street or the couplet.
- There is a moderate hill along Davis Street at the southern end of the corridor.

Project Roll Plot

Conceptual Design Subject to Change
Date: January 11, 2021



KITTELSON & ASSOCIATES
PHONE: (503) 228-5230 CONTACT: Marc Butorac

McMinnville Active Transportation Concept Plan

McMinnville, OR

Appendix B PAC Input

PAC Meeting #1 Homework Summary

A homework assignment was developed and distributed to the Project Advisory Committee (PAC)[9] in advance of the first PAC Meeting, which was held on Thursday, December 10th from 3:00 PM to 5:00 PM. The homework assignment was developed to solicit input on preferred route alignments and facility types to be evaluated in TM #5: Alternatives Development and Preferred Alternative Concept. This appendix summarizes the PAC homework responses. Twelve homework responses were received.

Preferred Facility Type

Respondents were provided a toolbox of bicycle facility types. The three main options described were a two-way separated bike lane, buffered bike lanes, and a neighborhood greenway along a parallel route.

- Six respondents prefer the neighborhood greenway option to the options along OR 99W; some respondents mention that even facilities with vertical separation along OR 99W may not feel comfortable.
- Four respondents prefer the two-way separated bike lane option, several respondents cite a need for physical separation for any facilities along OR 99W.
- One respondent prefers the buffered bike lane because he is concerned about maintenance difficulties for physically separated bike facilities.
- One respondent suggested a one-way separated bike lane because he is concerned about people biking in opposite directions in a limited space.

Preferred Neighborhood Greenway Alignment

Respondents also provided a recommendation for their preferred alignment, particularly with respect to the neighborhood greenway.

- Six respondents recommend that the neighborhood greenway travel primarily along Evans Street.
- Five respondents recommend that the neighborhood greenway travel along Davis Street and connect back to Evans Street at some point north of 11th Street.
- One respondent mentioned Davis Street or Evans Street, with no preference towards either.
- Respondents primarily recommended connecting to OR 99W to the parallel route via Linfield Avenue from the south and via Evans or McDonald on the north.

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[9] Information about the PAC is available on the project website: https://www.walkbike99wmcminnville.com/websites/69/pages/398

Appendix C Design Toolbox

NEIGHBORHOOD GREENWAY AND ENHANCED CROSSING TREATMENTS

Neighborhood Greenways are low-volume, low-speed streets where people biking and driving share road space. Motorized vehicle restrictions created by traffic calming elements and intersection crossing treatments are used to prioritize access for people biking. The treatments would include shared lane markings and wayfinding signage for people biking. Additional treatments to consider include speed humps, chicanes, and traffic diverters. Examples of chicanes, traffic diverters, and intersection crossing treatments are shown below.

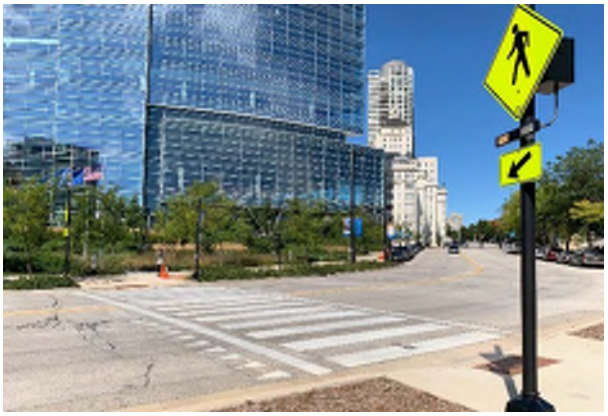
Chicanes

Traffic Diverters/Medians with Bicycle Access

Bulb-out/Curb Extension

Crossing Island (Pedestrian Refuge)

Rectangular Rapid Flash Beacon



Pedestrian Hybrid Beacon

Source: NACTO

SAFETY COUNTERMEASURES

Table 19: ODOT All Roads Transportation Safety Program (ARTS) Countermeasures

Countermeasures	Crash Reduction Factor (CRF)
BP1: Install Pedestrian Countdown Timer(s)	70% Reduction in Pedestrian Crashes at All Severities
BP2: Provide Intersection Illumination (Bike & Ped)	42% Reduction in Nighttime Pedestrian and Bicycle Crashes at All Injury Severities
BP3: Install Urban Leading Pedestrian or Bicycle Interval at Signalized Intersections	37% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP4: Install No Pedestrian Phase Feature with Flashing Yellow Arrow	43% Reduction in Pedestrian Crashes at All Severities
BP5: Reduce Right Turn Permissive Conflicts (Right Turn Arrow)	20% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP6: Install Urban Green Bike Lanes at Conflict Points	39% Reduction in Bicycle Crashes at All Severities
BP7: Install Bike Box at Conflict Points	35% Reduction in Bicycle Crashes at All Severities
BP8: Install Pedestrian Refuge Island	31% Reduction in Pedestrian Crashes at All Severities
BP9: Install Rectangular Rapid Flashing Beacon (2-Lane Road)	10% Reduction in Pedestrian Crashes at All Severities
BP10: Install Rectangular Rapid Flashing Beacon without Median (3-Lane or More Roadway)	10% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP11: Install Rectangular Rapid Flashing Beacon with Median (3-Lane or More Roadway)	56% Reduction in Pedestrian Crashes at All Severities
BP12: Install Pedestrian Activated Beacon at Intersection	10% Reduction in Pedestrian Crashes at All Severities
BP13: Install Pedestrian Activated Beacon Midblock	10% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP14: Install Pedestrian Activated Beacon (Flashing Beacon in Conjunction with Median and Stop Bar)	56% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP15: Install continental Crosswalk Markings and Advanced Pedestrian Warning Signs at Uncontrolled Locations	15% Reduction in Pedestrian Crashes at All Severities
BP16: Install Curb Ramps and Extensions with a Marked Crosswalk and Pedestrian Warning Signs	37% Reduction in Pedestrian Crashes at All Severities
BP17: Install Advance Pedestrian or Bicycle Warning Signs	5% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP18: Install Pedestrian Signal	55% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP19: Pedestrian Hybrid Beacon	55% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP20: Convert 4-Lane Roadway to 3-Lane Roadway with Center Turn Lane (Road Diet)	29% Reduction in All Crashes at All Severities
BP21: Install Bike Signal	45% Reduction in Bicycle Crashes at All Severities

Countermeasures	Crash Reduction Factor (CRF)
BP23: Install Cycle Tracks	59% Reduction in Bicycle Crashes at All Injury Severities
BP24: Install Buffered Bike Lanes	47% Reduction in Bicycle Crashes at All Injury Severities
BP25: Prohibit Right-Turn-On-Red	41% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP26: Advanced Yield and Stop Markings & Signs	25% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP27: Install Bicycle Boulevard	63% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP28: Install Raised Crosswalk	30% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP29: Add Sidewalk	20% Reduction in Pedestrian – walking along Crashes at All Severities
BP30: Install Speed Humps/Table (Not on State Highways)	15% Reduction in Pedestrian and Bicycle Crashes at All Severities
BP31: Add Street Tree's (supports blueprint for Urban Design)	10% Reduction in All Crashes at All Severities

Source: ODOT ARTS Program Crash Reduction Factor Appendix

Appendix D Cost Estimates

McMinnville OR 99W Active Transportation Concept Plan

Concept 1: Two-Way Separated Bike Lane (Cycle Track)

ODOT

Engineer's Conceptual Estimate

Prepared By: Eric Germundson, PE		*Date: March 12, 2021*		
Reviewed By: Nick Gross, Amy Griffiths, and Marc Butorac				
This Estimate has a Rating of:		**3C**	*(See rating scale guide below.)*	
ITEM	**UNIT**	**TOTAL QUANTITY**	**UNIT PRICE**	**TOTAL COST**
MOBILIZATION	LS	ALL	$37,000.00	$37,000.00
TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	LS	ALL	$8,000.00	$8,000.00
TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	ALL	$24,000.00	$24,000.00
STRIPE REMOVAL	FOOT	500	$0.50	$250.00
LEGEND REMOVAL	SQFT	250	$3.00	$750.00
BAR REMOVAL	SQFT	500	$3.00	$1,500.00
PERMANENT SURFACE MOUNTED TUBULAR MARKERS	EACH	350	$200.00	$70,000.00
METHYL METHACRYLATE, EXTRUDED	FOOT	16,500	$4.00	$66,000.00
PAVEMENT LEGEND, TYPE B-HS: ARROWS	EACH	10	$20.00	$200.00
PAVEMENT BAR, TYPE B-HS	SQFT	2,000	$10.00	$20,000.00
PAVEMENT LEGEND, TYPE B-HS: ON-STREET PARKING	EACH	10	$250.00	$2,500.00
GREEN BICYCLE LANE, METHYL METHACRYLATE	SQFT	33,500	$5.00	$167,500.00
REMOVE EXISTING SIGNS	LS	ALL	$5,000.00	$5,000.00
REMOVE AND REINSTALL EXISTING SIGNS	LS	ALL	$10,000.00	$10,000.00
PERFORATED STEEL SQUARE TUBE ANCHOR SIGN SUPPORTS	LS	ALL	$10,000.00	$10,000.00
SIGNS, STANDARD SHEETING, EXTRUDED ALUMINUM	SQFT	500	$25.00	$12,500.00
SIGNAL MODIFICATIONS	LS	ALL	$100,000.00	$100,000.00
TOTAL CONSTRUCTION COST				**$ 535,200**
TOTAL PROJECT SUBTOTAL				**$ 535,200**
30% Engineering & Administrative Services				**$ 160,560**
30% Contingency				**$ 160,560**
TOTAL ESTIMATED PROJECT COST				**$ 857,000**

Assumptions:

- Cycle track assumed to be painted green
-
-
-
-
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-

Scope Accuracy:

Level 1: Project scope well understood and well defined.

Level 2: Project scope conceptual. Scope lacks detail due to potential permit requirements; Unknown project conditions; limited knowledge of external impacts.

Level 3: Project scope is a "vision" with limited detail.

Engineering Effort:

Level A: Preliminary engineering performed. Technical information is available, engineering calculations have been performed; clear understanding of the materials size and quantities needed to execute job. Schedule understood; staff and permitting is fairly clear, (however this element may still need refining). Project Development & Construction Contingencies ranges between 10%-20%.

Level B: Conceptual engineering performed. Technical information is available, rough engineering calculations may have been performed, or similar information from previous similar work is compared and used. Project Development Contingencies ranges between 15% to 25% and Construction Contingencies ranges between 20% to 30%.

Level C: No engineering performed. Educated guesstimating. Limited technical information available and/or analysis performed. Project Development and Construction Contingencies should be selected appropriately by Project Manager. Contingency may range up to 50%.

McMinnville OR 99W Active Transportation Concept Plan

Concept 2: OR99W Buffered Bike Lanes

ODOT

Engineer's Conceptual Estimate

Prepared By: Eric Germundson, PE		*Date: March 12, 2021*		
Reviewed By: Nick Gross, Amy Griffiths, and Marc Butorac				
This Estimate has a Rating of:		**3C**	*(See rating scale guide below.)*	
ITEM	**UNIT**	**TOTAL QUANTITY**	**UNIT PRICE**	**TOTAL COST**
MOBILIZATION	LS	ALL	$22,000.00	$22,000.00
TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	LS	ALL	$5,000.00	$5,000.00
TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	ALL	$11,000.00	$11,000.00
STRIPE REMOVAL	FOOT	1,000	$0.50	$500.00
LEGEND REMOVAL	SQFT	500	$3.00	$1,500.00
BAR REMOVAL	SQFT	1,000	$3.00	$3,000.00
METHYL METHACRYLATE, EXTRUDED	FOOT	33,500	$4.00	$134,000.00
PAVEMENT LEGEND, TYPE B-HS: ARROWS	EACH	20	$20.00	$400.00
PAVEMENT BAR, TYPE B-HS	SQFT	4,000	$10.00	$40,000.00
PAVEMENT LEGEND, TYPE B-HS: ON-STREET PARKING	EACH	20	$250.00	$5,000.00
REMOVE EXISTING SIGNS	LS	ALL	$5,000.00	$5,000.00
REMOVE AND REINSTALL EXISTING SIGNS	LS	ALL	$5,000.00	$5,000.00
PERFORATED STEEL SQUARE TUBE ANCHOR SIGN SUPPORTS	LS	ALL	$5,000.00	$5,000.00
SIGNS, STANDARD SHEETING, EXTRUDED ALUMINUM	SQFT	500	$25.00	$12,500.00
TOTAL CONSTRUCTION COST			**$**	**249,900**
TOTAL PROJECT SUBTOTAL			**$**	**249,900**
30% Engineering & Administrative Services			**$**	**74,970**
30% Contingency			**$**	**74,970**
TOTAL ESTIMATED PROJECT COST			**$**	**400,000**

Assumptions:

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Scope Accuracy:

Level 1: Project scope well understood and well defined.

Level 2: Project scope conceptual. Scope lacks detail due to potential permit requirements; Unknown project conditions; limited knowledge of external impacts.

Level 3: Project scope is a "vision" with limited detail.

Engineering Effort:

Level A: Preliminary engineering performed. Technical information is available, engineering calculations have been performed; clear understanding of the materials size and quantities needed to execute job. Schedule understood; staff and permitting is fairly clear, (however this element may still need refining). Project Development & Construction Contingencies ranges between 10%-20%.

Level B: Conceptual engineering performed. Technical information is available, rough engineering calculations may have been performed, or similar information from previous similar work is compared and used. Project Development Contingencies ranges between 15% to 25% and Construction Contingencies ranges between 20% to 30%.

Level C: No engineering performed. Educated guesstimating. Limited technical information available and/or analysis performed. Project Development and Construction Contingencies should be selected appropriately by Project Manager. Contingency may range up to 50%.

McMinnville OR 99W Active Transportation Concept Plan

Concept 3: Neighborhood Greenway on Davis Street

ODOT

Engineer's Conceptual Estimate

Prepared By: Eric Germundson, PE		*Date: March 12, 2021*		
Reviewed By: Nick Gross, Amy Griffiths, and Marc Butorac				
This Estimate has a Rating of:		**3C**	*(See rating scale guide below.)*	
ITEM	**UNIT**	**TOTAL QUANTITY**	**UNIT PRICE**	**TOTAL COST**
MOBILIZATION	LS	ALL	$8,000.00	$8,000.00
TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	LS	ALL	$2,000.00	$2,000.00
TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	ALL	$4,000.00	$4,000.00
LEGEND REMOVAL	SQFT	500	$3.00	$1,500.00
BAR REMOVAL	SQFT	500	$3.00	$1,500.00
PAVEMENT BAR, TYPE B-HS	SQFT	1,800	$10.00	$18,000.00
REMOVE EXISTING SIGNS	LS	ALL	$5,000.00	$5,000.00
REMOVE AND REINSTALL EXISTING SIGNS	LS	ALL	$25,000.00	$25,000.00
PERFORATED STEEL SQUARE TUBE ANCHOR SIGN SUPPORTS	LS	ALL	$10,000.00	$10,000.00
SIGNS, STANDARD SHEETING, EXTRUDED ALUMINUM	SQFT	500	$25.00	$12,500.00
TOTAL CONSTRUCTION COST			**$**	**87,500**
TOTAL PROJECT SUBTOTAL			**$**	**87,500**
30% Engineering & Administrative Services			**$**	**26,250**
30% Contingency			**$**	**26,250**
TOTAL ESTIMATED PROJECT COST			**$**	**140,000**

Assumptions:

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Scope Accuracy:

Level 1: Project scope well understood and well defined.

Level 2: Project scope conceptual. Scope lacks detail due to potential permit requirements; Unknown project conditions; limited knowledge of external impacts.

Level 3: Project scope is a "vision" with limited detail.

Engineering Effort:

Level A: Preliminary engineering performed. Technical information is available, engineering calculations have been performed; clear understanding of the materials size and quantities needed to execute job. Schedule understood; staff and permitting is fairly clear, (however this element may still need refining). Project Development & Construction Contingencies ranges between 10%-20%.

Level B: Conceptual engineering performed. Technical information is available, rough engineering calculations may have been performed, or similar information from previous similar work is compared and used. Project Development Contingencies ranges between 15% to 25% and Construction Contingencies ranges between 20% to 30%.

Level C: No engineering performed. Educated guesstimating. Limited technical information available and/or analysis performed. Project Development and Construction Contingencies should be selected appropriately by Project Manager. Contingency may range up to 50%.

McMinnville OR 99W Active Transportation Concept Plan

Concept 3: Neighborhood Greenway on Evans Street

ODOT

Engineer's Conceptual Estimate

Prepared By: Eric Germundson, PE		*Date: March 12, 2021*		
Reviewed By: Nick Gross, Amy Griffiths, and Marc Butorac				
This Estimate has a Rating of:		**3C**	*(See rating scale guide below.)*	
ITEM	**UNIT**	**TOTAL QUANTITY**	**UNIT PRICE**	**TOTAL COST**
MOBILIZATION	LS	ALL	$5,000.00	$5,000.00
TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	LS	ALL	$1,000.00	$1,000.00
TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	ALL	$3,000.00	$3,000.00
PAVEMENT BAR, TYPE B-HS	SQFT	1,900	$10.00	$19,000.00
REMOVE EXISTING SIGNS	LS	ALL	$5,000.00	$5,000.00
REMOVE AND REINSTALL EXISTING SIGNS	LS	ALL	$5,000.00	$5,000.00
PERFORATED STEEL SQUARE TUBE ANCHOR SIGN SUPPORTS	LS	ALL	$5,000.00	$5,000.00
SIGNS, STANDARD SHEETING, EXTRUDED ALUMINUM	SQFT	500	$25.00	$12,500.00
TOTAL CONSTRUCTION COST			**$**	**55,500**
TOTAL PROJECT SUBTOTAL			**$**	**55,500**
30% Engineering & Administrative Services			**$**	**16,650**
30% Contingency			**$**	**16,650**
TOTAL ESTIMATED PROJECT COST			**$**	**89,000**

Assumptions:

-
-
-
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-

Scope Accuracy:

Level 1: Project scope well understood and well defined.

Level 2: Project scope conceptual. Scope lacks detail due to potential permit requirements; Unknown project conditions; limited knowledge of external impacts.

Level 3: Project scope is a "vision" with limited detail.

Engineering Effort:

Level A: Preliminary engineering performed. Technical information is available, engineering calculations have been performed; clear understanding of the materials size and quantities needed to execute job. Schedule understood; staff and permitting is fairly clear, (however this element may still need refining). Project Development & Construction Contingencies ranges between 10%-20%.

Level B: Conceptual engineering performed. Technical information is available, rough engineering calculations may have been performed, or similar information from previous similar work is compared and used. Project Development Contingencies ranges between 15% to 25% and Construction Contingencies ranges between 20% to 30%.

Level C: No engineering performed. Educated guesstimating. Limited technical information available and/or analysis performed. Project Development and Construction Contingencies should be selected appropriately by Project Manager. Contingency may range up to 50%.

Appendix E Enhanced Crossing Analysis

Enhanced Crossing Key Findings

This memorandum summarizes the results of an enhanced crossing facility assessment for people walking and biking along the OR 99W couplet. The crossing assessment was performed at six intersections, as illustrated in Figure 16.

The purpose of this assessment is to identify and recommend crossing treatments that will provide safe, comfortable crossing opportunities for people walking and biking in the study area based on the existing traffic volumes, posted speeds, and proposed crossing location characteristics.[10] The analysis relies on the guidance provided by National Cooperative of Highway Research Program (NCHRP) *Report 562: Improving Pedestrian Safety at Unsignalized Crossings* and Federal Highway Administration (FHWA) *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations.*

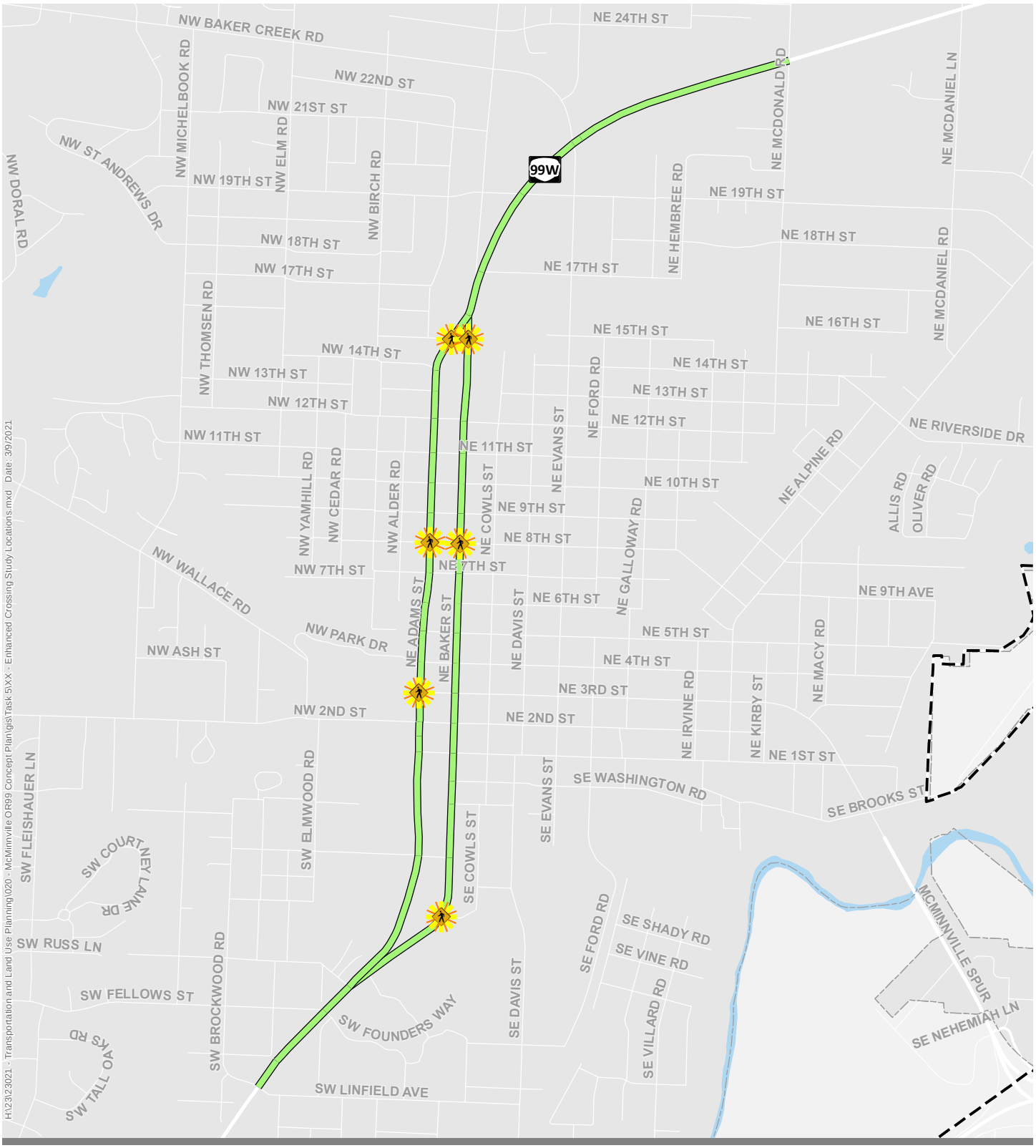
Enhanced Crossing Worksheets based on NCHRP and FHWA guidance are attached in this appendix.

Enhanced Crossing Recommendations

Based on the traffic volume data, roadway context, anticipated levels of walking and biking activity upon completion of the McMinnville OR 99W Active Transportation Concept Plan, and crossing analysis, the following enhanced crossing facility and treatments are recommended at the proposed crossing location along the Adams Street-Baker Street Couplet:

- Evaluate lighting conditions at the proposed crossing location to ensure proposed lighting conditions.
- Install high-visibility pavement markings and signs per the Manual on Uniform Traffic Control Devices (MUTCD).
- Install a rectangular rapid flashing beacon (RRFB) at the six enhanced crossing study locations.
- Explore opportunities to integrate bicycle detection at proposed crossing approaches to reduce or eliminate dismounting for people biking to activate beacon push buttons.

[10] Enhanced crossing treatments require approval from ODOT Region 2 Traffic.



Enhanced Crossing Study Locations

Crosswalk

Crosswalk with Bulb-Out(s)

Signalized

Signalized with Bulb-Out(s)

OR99W Project Extents

Figure 16

KITTELSON & ASSOCIATES

Enhanced Crossing Study Locations
McMinnville, OR

GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

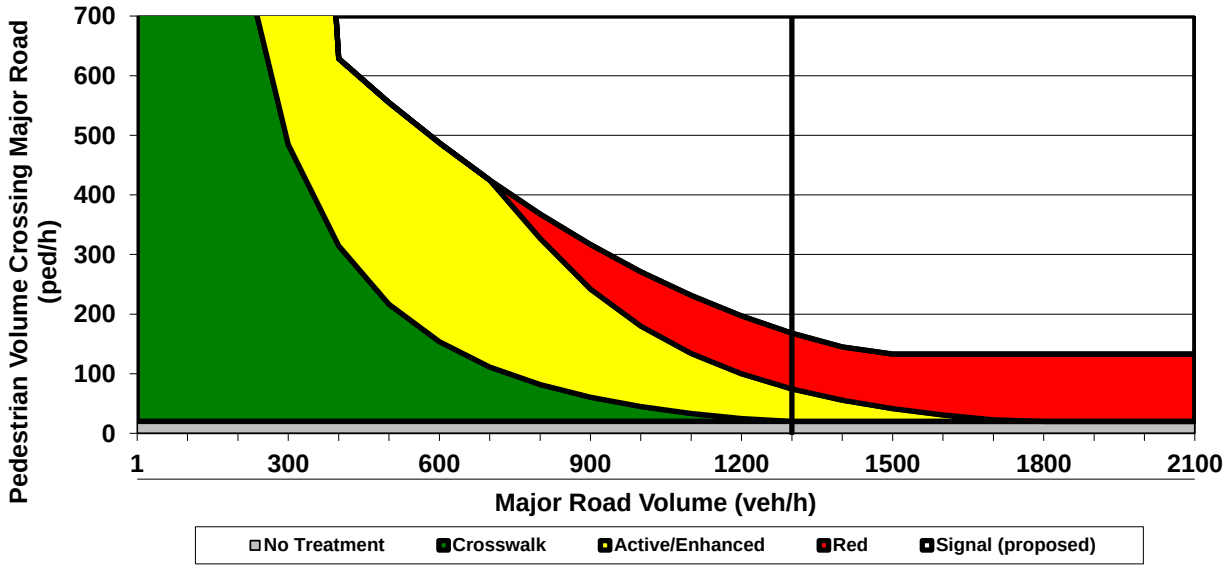
This spreadsheet is still under development, please inform TTI if errors are identified.

Key

- Blue fields contain descriptive information.
- Green fields are required and must be completed.
- Tan fields are adjustments that are filled out only under certain conditions (follow instructions to the left of the cell).
- Gray fields are automatically calculated and should not be edited.

Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	Adams Street
Analysis Date	January 20, 2021	Minor Street or Location	3rd Street (Northern Leg)
Data Collection Date	TransGIS ADT, PH Tube Counts June 8, 2017	Peak Hour	5:00-6:00 PM

Step 1: Select worksheet:		
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)	*1a*	30
Is the population of the surrounding area <10,000? (enter ***YES*** or ***NO***)	*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?		
Peak-hour pedestrian volume (ped/h), V_p	*2a*	20
Result: Go to step 3.		
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?		
Major road volume, total of both approaches during peak hour (veh/h), $V_{maj\text{-}s}$	*3a*	1300
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant	*3b*	168
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant	*3c*	168
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)	*3d*	NO
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — % rate of reduction for *3c* (up to 50%)	*3e*	0%
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — Reduced value or *3c*	*3f*	168
Result: The signal warrant is not met. Go to step 4.		
Step 4: Estimate pedestrian delay.		
Pedestrian crossing distance, curb to curb (ft), L	*4a*	34
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)	*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)	*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c	*4d*	13
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), $V_{maj\text{-}d}$	*4e*	1300
Major road flow rate (veh/s), v	*4f*	0.36
Average pedestrian delay (s/person), d_p	*4g*	255
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.	*4h*	1.4
	4i	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.		
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***	*5a*	LOW
Treatment Category:	**ACTIVE OR ENHANCED**	



This worksheet provides general recommendations on pedestrian crossing treatments to consider at unsignalized intersections; in all cases, engineering judgment should be used in selecting a specific treatment for installation. This worksheet does not apply to school crossings. In addition to the results provided by this worksheet, users should consider whether a pedestrian treatment could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex geometrics, or nearby traffic signals.

GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

This spreadsheet is still under development, please inform TTI if errors are identified.

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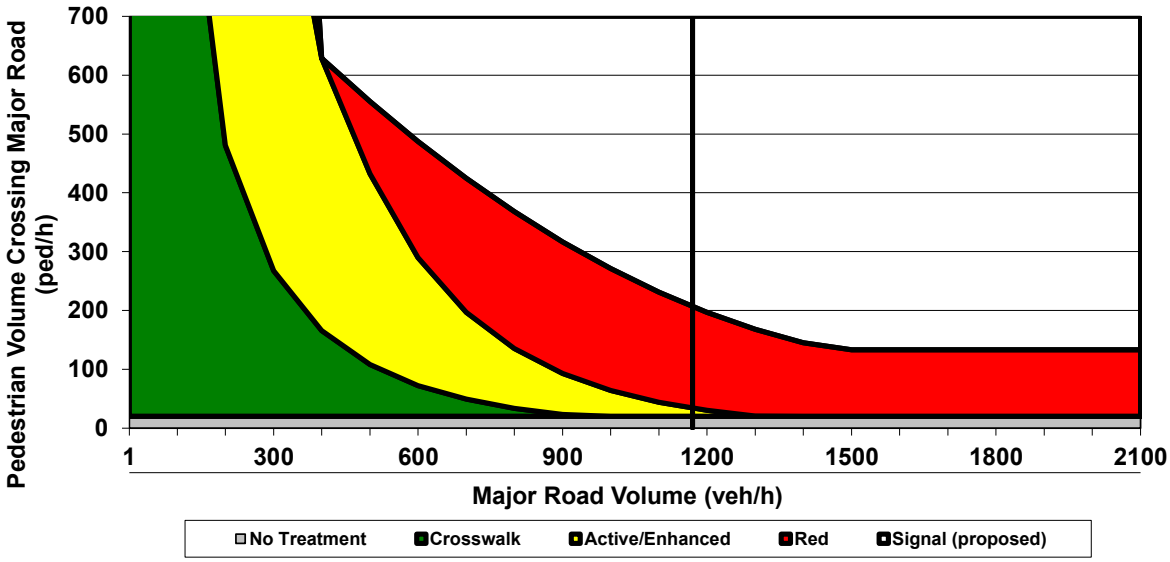
- Gray fields are automatically calculated and should not be edited.

Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	Baker Street
Analysis Date	January 20, 2021	Minor Street or Location	Cowls Street (Bus Stop)
Data Collection Date	TransGIS ADT, PH Tube Counts June 8, 2017	Peak Hour	5:00-6:00 PM (Vehicular Peak)

Step 1: Select worksheet:		
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)	*1a*	30
Is the population of the surrounding area <10,000? (enter ***YES*** or ***NO***)	*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?		
Peak-hour pedestrian volume (ped/h), V_p	*2a*	20
Result: Go to step 3.		
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?		
Major road volume, total of both approaches during peak hour (veh/h), $V_{maj\text{-}s}$	*3a*	1170
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant	*3b*	207
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant	*3c*	207
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)	*3d*	NO
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — % rate of reduction for *3c* (up to 50%)	*3e*	0%
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — Reduced value or *3c*	*3f*	207
Result: The signal warrant is not met. Go to step 4.		
Step 4: Estimate pedestrian delay.		
Pedestrian crossing distance, curb to curb (ft), L	*4a*	46
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)	*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)	*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c	*4d*	16
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), $V_{maj\text{-}d}$	*4e*	1170
Major road flow rate (veh/s), v	*4f*	0.33
Average pedestrian delay (s/person), d_p	*4g*	605
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.	*4h*	3.4
	4i	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.		
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***	*5a*	LOW
Treatment Category:	**ACTIVE OR ENHANCED**	



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GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

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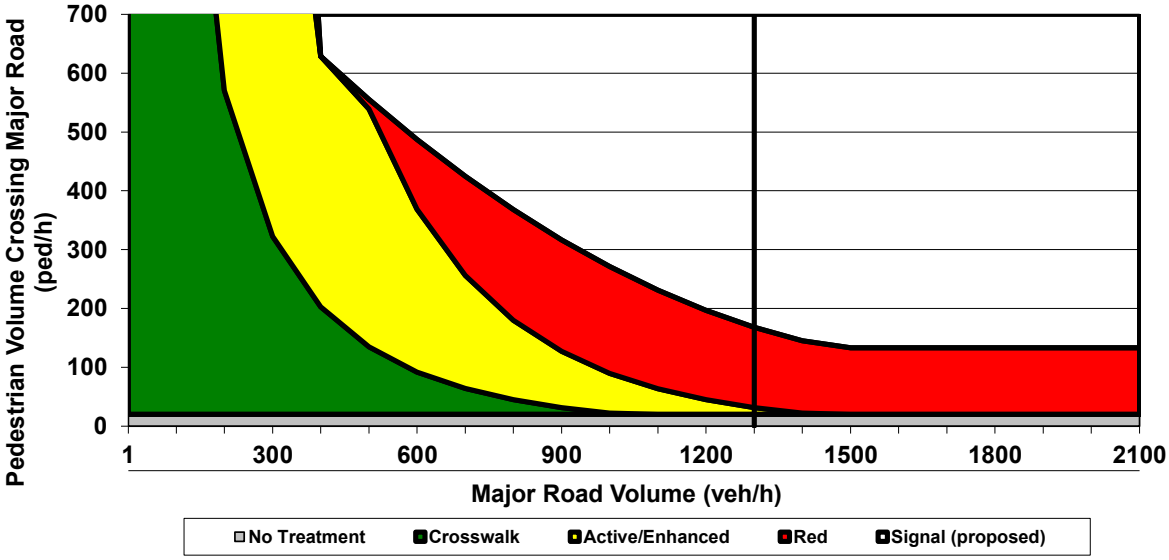
Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	Adams Street
Analysis Date	January 20, 2021	Minor Street or Location	8th Street (Southern Leg)
Data Collection Date	TransGIS ADT, PH Tube Counts June 8, 2017	Peak Hour	5:00-6:00 PM

Step 1: Select worksheet:		
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)	*1a*	30
Is the population of the surrounding area <10,000? (enter ***YES*** or ***NO***)	*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?		
Peak-hour pedestrian volume (ped/h), V_p	*2a*	20
Result: Go to step 3.		
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?		
Major road volume, total of both approaches during peak hour (veh/h), $V_{maj\text{-}s}$	*3a*	1300
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant	*3b*	168
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant	*3c*	168
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)	*3d*	NO
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — % rate of reduction for *3c* (up to 50%)	*3e*	0%
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — Reduced value or *3c*	*3f*	168
Result: The signal warrant is not met. Go to step 4.		
Step 4: Estimate pedestrian delay.		
Pedestrian crossing distance, curb to curb (ft), L	*4a*	42
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)	*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)	*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c	*4d*	15
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), $V_{maj\text{-}d}$	*4e*	1300
Major road flow rate (veh/s), v	*4f*	0.36
Average pedestrian delay (s/person), d_p	*4g*	597
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.	*4h*	3.3
	4i	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.		
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***	*5a*	LOW
Treatment Category:	**ACTIVE OR ENHANCED**	



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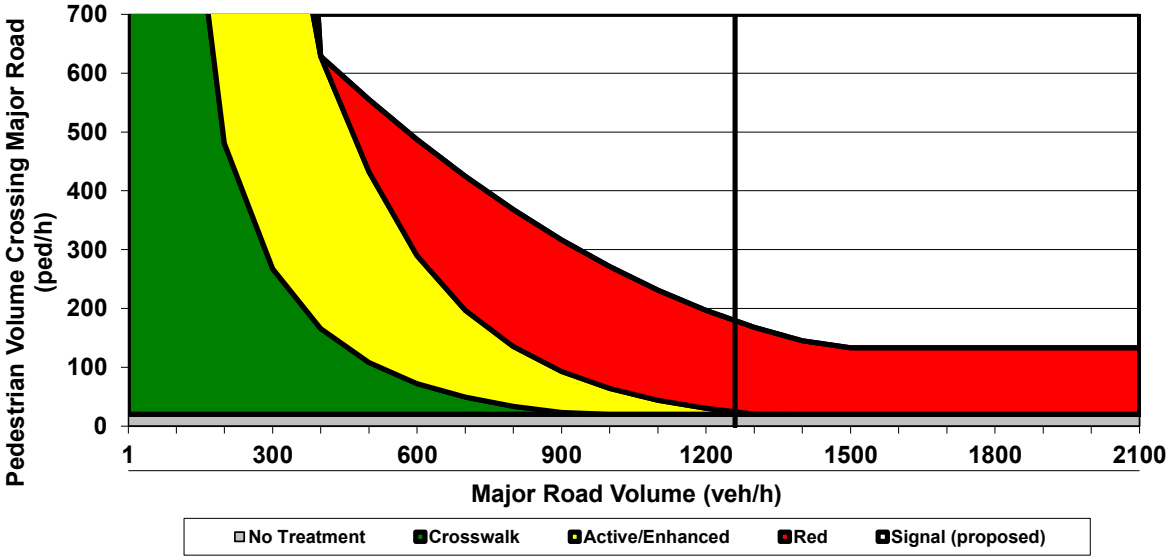
Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	Baker Street
Analysis Date	January 20, 2021	Minor Street or Location	8th Street (Southern Leg)
Data Collection Date	TransGIS ADT, PH Tube Counts June 8, 2017	Peak Hour	5:00-6:00 PM

Step 1: Select worksheet:		
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)	*1a*	30
Is the population of the surrounding area <10,000? (enter ***YES*** or ***NO***)	*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?		
Peak-hour pedestrian volume (ped/h), V_p	*2a*	20
Result: Go to step 3.		
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?		
Major road volume, total of both approaches during peak hour (veh/h), $V_{maj\text{-}s}$	*3a*	1260
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant	*3b*	179
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant	*3c*	179
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)	*3d*	NO
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — % rate of reduction for *3c* (up to 50%)	*3e*	0%
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — Reduced value or *3c*	*3f*	179
Result: The signal warrant is not met. Go to step 4.		
Step 4: Estimate pedestrian delay.		
Pedestrian crossing distance, curb to curb (ft), L	*4a*	46
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)	*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)	*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c	*4d*	16
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), $V_{maj\text{-}d}$	*4e*	1260
Major road flow rate (veh/s), v	*4f*	0.35
Average pedestrian delay (s/person), d_p	*4g*	793
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.	*4h*	4.4
	4i	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.		
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***	*5a*	LOW
Treatment Category:	**ACTIVE OR ENHANCED**	



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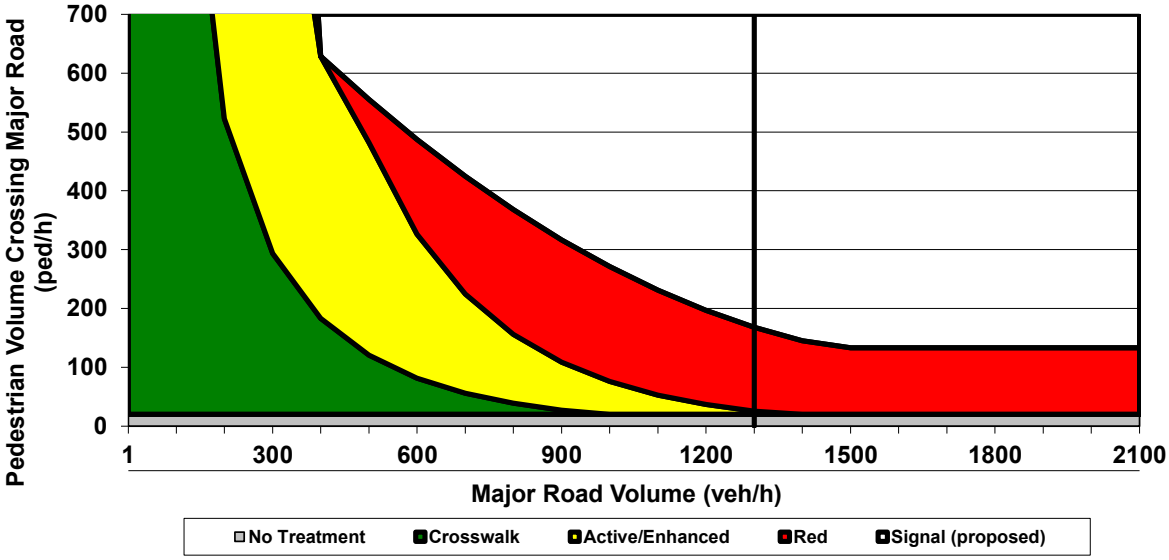
Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	Adams Street
Analysis Date	January 20, 2021	Minor Street or Location	15th Street (Southern Leg)
Data Collection Date	TransGIS ADT, PH Tube Counts June 8, 2017	Peak Hour	5:00-6:00 PM

Step 1: Select worksheet:		
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)	*1a*	30
Is the population of the surrounding area <10,000? (enter ***YES*** or ***NO***)	*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?		
Peak-hour pedestrian volume (ped/h), V_p	*2a*	20
Result: Go to step 3.		
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?		
Major road volume, total of both approaches during peak hour (veh/h), $V_{maj\text{-}s}$	*3a*	1300
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant	*3b*	168
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant	*3c*	168
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)	*3d*	NO
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — % rate of reduction for *3c* (up to 50%)	*3e*	0%
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — Reduced value or *3c*	*3f*	168
Result: The signal warrant is not met. Go to step 4.		
Step 4: Estimate pedestrian delay.		
Pedestrian crossing distance, curb to curb (ft), L	*4a*	44
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)	*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)	*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c	*4d*	16
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), $V_{maj\text{-}d}$	*4e*	1300
Major road flow rate (veh/s), v	*4f*	0.36
Average pedestrian delay (s/person), d_p	*4g*	737
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance).	*4h*	4.1
If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.	*4i*	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.		
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***	*5a*	LOW
Treatment Category:	**ACTIVE OR ENHANCED**	



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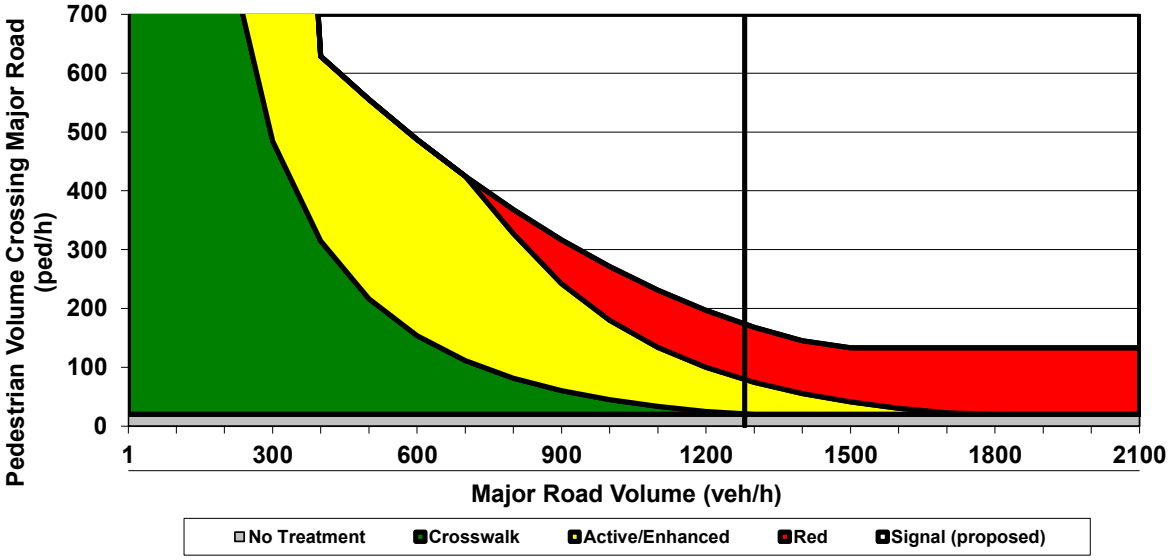
Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	Baker Street
Analysis Date	January 20, 2021	Minor Street or Location	15th Street (southern Leg)
Data Collection Date	TransGIS ADT, PH Tube Counts June 8, 2017	Peak Hour	5:00-6:00 PM

Step 1: Select worksheet:		
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)	*1a*	30
Is the population of the surrounding area <10,000? (enter ***YES*** or ***NO***)	*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?		
Peak-hour pedestrian volume (ped/h), V_p	*2a*	20
Result: Go to step 3.		
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?		
Major road volume, total of both approaches during peak hour (veh/h), $V_{maj\text{-}s}$	*3a*	1280
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant	*3b*	173
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant	*3c*	173
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)	*3d*	NO
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — % rate of reduction for *3c* (up to 50%)	*3e*	0%
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — Reduced value or *3c*	*3f*	173
Result: The signal warrant is not met. Go to step 4.		
Step 4: Estimate pedestrian delay.		
Pedestrian crossing distance, curb to curb (ft), L	*4a*	34
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)	*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)	*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c	*4d*	13
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), $V_{maj\text{-}d}$	*4e*	1280
Major road flow rate (veh/s), v	*4f*	0.36
Average pedestrian delay (s/person), d_p	*4g*	255
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance).	*4h*	1.4
If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.	*4i*	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.		
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***	*5a*	LOW
Treatment Category:	**ACTIVE OR ENHANCED**	



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Locations:
Adams Street/15th Street, Baker Street/15th Street, Adams Street/8th Street, Baker Street/8th Street, Adams Street/3rd Street, and, Baker Street/Cowls Street

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)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5 7	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

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. Lagerwey, 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.

Appendix F Evaluation Criteria and Performance Measures Memorandum

KITTELSON & ASSOCIATES
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PORTLAND, OR 97204
P 503.228.5230 F 503.273.8169

MEMORANDUM

Date:	October 7, 2020	Project #: 23021.020
To:	Project Management Team Project Advisory Committee	
From:	Nicholas Gross, Nick Gross, Marc Butorac, PE, PTOE, PMP	
Project:	McMinnville Active Transportation Concept Plan	
Subject:	Final Evaluation Criteria and Performance Measures	

INTRODUCTION

The purpose of this document is to articulate the goals and objectives, evaluation criteria, and performance measures to fulfill the Corridor Vision Statement for the McMinnville Active Transportation Concept Plan. Understanding and executing a performance-based approach with clear, actionable, and measurable evaluation criteria enables project teams to make informed decisions about the performance trade-offs of alternative solutions to best suit the project goals based on the corridor context and needs of the intended users. The corridor context and relative need of the intended users are set according to the Oregon Department of Transportation (ODOT) Blueprint for Urban Design (BUD – Reference 1) and the Draft Corridor Vision (Reference 2).

GUIDING GOALS AND POLICIES

The primary purpose of the McMinnville Active Transportation Concept Plan is to identify improvements along the OR99W corridor in the City of McMinnville that will result in a safer, more comfortable, and attractive place to walk, bike, roll and facilitate transit. The City of McMinnville Transportation System Plan (TSP – Reference 3) identifies guiding goals and policies for the transportation vision for the City. The goals and policies relevant to the McMinnville Active Transportation Concept Plan are included in Table 1 on the following page.

Table 1: TSP Goal and Policy Guidance

TSP Goals and Supplemental Policies	
Complete Streets	*"The safety and convenience of all users of the transportation system including pedestrians, bicyclists, transit users, freight, and motor vehicle drivers shall be accommodated and balanced in all types of transportation and development projects and through all phases of a project so that even the most vulnerable McMinnville residents – children, elderly, and persons with disabilities – can travel safely within the public right of way."*
Multi-Modal Transportation System	*"The transportation system for the McMinnville planning area shall consist of an integrated network of facilities and services for a variety of motorized and non-motorized travel modes."*
Connectivity and Circulation	*"The vehicle, pedestrian, transit, and bicycle circulation systems shall be designed to connect major activity centers in the McMinnville planning area, increase the overall accessibility of downtown and other centers, as well as provide access to neighborhood residential, shopping and industrial areas, and McMinnville's parks and schools."*
Transportation System and Energy Efficiency	*"The implementation of transportation system and transportation demand management measures, provision of enhanced transit service, and provision of bicycle and pedestrian facilities in the McMinnville planning area shall be embraced by policy as the first choice for accommodating travel demand and relieving congestion in a travel corridor, before street widening projects for additional travel lanes are undertaken. The McMinnville Transportation System Plan shall promote alternative commute methods that decrease demand on the transportation system" including "walking and bicycling."*
Transportation Safety	*"The City of McMinnville shall make the design, construction, and operation of a safe transportation system for all modes of travel a high priority."*
Accessibility for Persons with Disabilities	*"The McMinnville transportation system shall be designed with consideration of the needs of persons with disabilities by meeting the requirements set forth in the Americans with Disabilities Act (ADA)."*
Livability	*"Transportation facilities in the McMinnville planning area shall be, to the degree possible, designed and constructed to mitigate noise, energy consumption, and neighborhood disruption, and to encourage the use of public transit, bikeways, sidewalks, and walkways."*
Health and Welfare	*"Through implementation of its Complete Streets policy and the TSP by enhancing its pedestrian and bicycle systems, the City of McMinnville will help encourage greater physical activity and improved health and welfare of its residents."*
Transportation Sustainability	*"Through implementation of the TSP and the Comprehensive Plan, the City of McMinnville will, to the extent possible, seek measures that simultaneously help reduce traffic congestion, pollution, crashes and consumer costs, while increasing mobility options for non-drivers, and encouraging a more efficient land use pattern."*
Aesthetics and Streetscaping	*"Aesthetics and streetscaping shall be a part of the design of McMinnville's transportation system. Streetscaping, where appropriate and financially feasible, including public art, shall be included in the design of transportation facilities. Various streetscaping designs and materials shall be utilized to enhance the livability in the area of a transportation project."*

EVALUATION CRITERIA AND PERFORMANCE MEASURES

The goals and policy guidance from the TSP have been converted into draft evaluation criteria for the Active Transportation Concept Plan. These criteria align with the Draft Corridor Vision for OR99W. The performance measures provide a performance-based decision framework for the selection of a preferred alternative. Aligning with guidance from the BUD, the performance measures are designed to be understandable, consistent, measurable, able to differentiate between alternatives, and specific to this project.

Table 2 provides the draft evaluation criteria and performance measures for the McMinnville Active Transportation Concept Plan.

- **Evaluation Criteria** are derived from the goal and supplemental policies from the McMinnville TSP and will be used to evaluate draft alternatives.
- **Description** includes the purpose and general explanation of the evaluation criteria, connecting the criteria to the specific community or agency values (based on the TSP) goals and desired outcomes for the project.
- **Performance Measures** are the measurements used to assess the evaluation criteria.
- **Proposed Methodology** describes how the criterion will be measured, whether it is qualitative or quantitative, and the data needed to evaluate the criteria.

Table 3 provides a scoring scale from -1 to +2, reflecting the extent to which a project achieves the prioritization measure and describes the data required to complete the scoring. Performance measure sub-categories within each evaluation criterion are scored individually, and then averaged to provide an overall score for the evaluation criterion. Each evaluation criteria score can result in a range between -7 (worst possible score) to +14 (best possible score) based on the seven evaluation criteria listed in Table 2.

Appendix A provides a sample evaluation of potential projects.

Table 2: Evaluation Criteria and Performance Measures

Evaluation Criterion	Description	Proposed Performance Measures
Complete Streets	The alternative provides comfortable facilities for people walking and biking, regardless of age and ability. The "complete streets" criterion addresses the "Complete Streets" goal and supplemental policy identified in the TSP.	• Bicycle Level of Traffic Stress (BLTS) • Pedestrian Level of Traffic Stress (PLTS)
Multi-Modal Transportation System	The alternative provides integrated network of facilities and services for a variety of motorized and non-motorized travel modes based on the appropriate relative priority given the corridor context. The multi-modal transportation system criterion addresses the "Multi-Modal Transportation System" goal and supplemental policy identified in the TSP.	• Type and presence of pedestrian, bicycle, transit, motor vehicle, and freight facilities align with the recommendations from the Blueprint for Urban Design (provided in Appendix B)
Connectivity	The alternative provides comprehensive connectivity and circulation to existing active transportation facilities in the City of McMinnville. The alternative encourages walking and biking to essential destinations within the City of McMinnville. The "connectivity" criterion addresses the "Connectivity and Circulation", "Transportation System and Energy Efficiency", and "Transportation Sustainability" goals and supplemental policies identified in the TSP.	• Connection of alternative to the existing and planned bicycle and pedestrian network • Barriers to walking and biking (including an unsafe crosswalk or facilities in poor condition) removed by the alternative • Facility gap filled by alternative • Proximity of alternative to essential destinations • Proximity of alternative to activity generators
Safety	The alternative provides safety countermeasures that reduce the number of fatal and severe injury crashes. The "safety" criterion addresses the "Transportation Safety" and "Transportation Sustainability" goals and supplemental policies identified in the TSP.	• Percentage (%) of anticipated crash reduction based on crash reduction factor (CRF) scaled by planning-level cost of project • Bicyclist and pedestrian crash history • Pedestrian Risk Factor • Bicyclist Risk Factor
Equity	The project meets the requirements set forth in the Americans with Disabilities Act (ADA) and provides transportation options to transportation disadvantaged populations. The "equity" criterion addresses the "Accessibility for Persons with Disabilities" and "Health and Welfare" goals and supplemental policies identified in the TSP.	• This will use the Transportation Disadvantaged Population (TDP) Index from the ODOT Active Transportation Needs Inventory (ATNI). The index considers the following characteristics of a census block: elderly populations (65 and older), youth populations (under 18), non-white and Hispanic populations, low-income populations (households earning less than 200% of the poverty level as determined by the census), limited English proficiency population (aggregate of census populations who speak English "not well" or "not at all"), households without access to a vehicle, and people with a disability (severe or non-severe disability) • This criterion will also consider impacts to ADA compliance.
Livability	The alternative minimizes impacts to adjacent property owners and encourages the use of public transit, bikeways, sidewalks, and walkways. The project provides equity and receives public support. The "livability" criterion addresses the "Livability" and "Aesthetics and Streetscaping" goals and supplemental policies identified in the TSP.	• Right-of-way acquisition needs • Neighborhood street modification, business access and parking • Anticipated public support based on Open House and Public Advisory Committee Comments
Design Feasibility	The alternative has no major design feasibility concerns. The "design feasibility" criterion does not directly address any goals or supplemental policies identified in the TSP.	• Constructability (including, but not limited to, right-of-way availability, existing terrain, utility location, visibility concerns, etc.)

Table 3: Evaluation Criteria Scoring

Evaluation Criterion	Performance Measure	Scoring Scale				Resources
		-1	0	+1	+2	
Complete Streets	Quantitative: BLTS	Project **degrades** existing BLTS	Project makes **no change** to existing BLTS	Project **improves** existing BLTS by **1 point**	Project **improves** existing BLTS by **2 or 3 points**	Posted speed, traffic volumes, number of lanes, and bicycle facility type
	Quantitative: PLTS	Project **degrades** existing PLTS	Project makes **no change** to existing PLTS	Project **improves** existing PLTS by **1 point**	Project **improves** existing PLTS by **2 or 3 points**	Posted speed, traffic volumes, number of lanes, and pedestrian facility type
Multi-Modal Transportation System	Qualitative: Type and presence of pedestrian, bicycle, transit, motor vehicle, and freight facilities align with the recommendations from the Blueprint for Urban Design (provided in Appendix B)	Project **degrades** modal priorities based on urban context.	Project has **no impact** on modal priorities based on urban context.	Project **improves** modal priorities for urban context.	Project **significantly improves** modal priorities for urban context.	Posted speed, travel lane characteristics, shy distance, median, bicycle facility type and characteristics, pedestrian facility type and characteristics, parking type and characteristics The urban context was determined to be Traditional Downtown/CBD and Urban Mix in the Corridor Vision (Reference 2). Based on recommendations from the Blueprint for Urban Design, Transit, Bicyclist, and Pedestrian are "High" priority modes (reference table provided in Appendix B)
Connectivity	Qualitative: Project is identified by the City of McMinnville Transportation System Plan (TSP) or is located on the Safe Routes to School (SRTS) Network.	N/A	The project **is not** identified by the TSP **or** located on the SRTS Network	The project **is** identified by the TSP **or** is located on the STRS Network	The project **is** identified by the TSP **and** is located on the SRTS Network	City of McMinnville Transportation System Plan, Safe Routes to School Network
	Qualitative: Project removes barrier to walking and biking or fills gap in the walking and biking transportation network	Project **creates** barriers or gaps in the walking and biking transportation network	Project has **no impacts** to barriers or gaps in the walking and biking transportation network	Project **indirectly addresses** barriers or gaps in the walking and biking transportation network	Project **directly addresses** barriers or gaps in the walking and biking transportation network	Existing conditions inventory
	Quantitative: Proximity to activity generators and essential destinations	N/A	Project would serve **no** active generators or essential destinations in ¼ mile radius	Project would serve **some** active generators or essential destinations in ¼ mile radius	Project would serve **many** active generators or essential destinations in ¼ mile radius	Count of active generators and essential destinations within ¼ mile of the project location.
Safety	Quantitative: Crash Reduction Factor C/Planning Level Project Cost	N/A	The project is **not** anticipated to reduce crashes at a location.	The project provides a **moderate** value crash reduction factor given the project cost.	The project provides a **high** value crash reduction factor given the project cost.	This is a quantitative measurement based on crash countermeasures and planning-level cost estimates.
	Quantitative: Crash History	N/A	There were **no** bicyclist or pedestrian crashes reported in the 5-year crash history within 250 feet of the project.	There were **1 or 2** bicyclist or pedestrian crashes reported in the 5-year crash history within 250 feet of the project.	There were **3 or more** bicyclist or pedestrian crashes reported in the 5-year crash history within 250 feet of the project.	5-Year Crash History
	Quantitative: Pedestrian Risk Factor Scoring	N/A	The project is **not** located on, or perpendicular to a **Medium or High** risk factor location.	The project is located on, or perpendicular to a **Medium** risk factor location.	The project is located on, or perpendicular to a **High** risk factor location.	This is a quantitative measure based on the ODOT Statewide Pedestrian and Bicycle Safety Plan's established risk factor scoring for systemic safety.
	Quantitative: Bicyclist Risk Factor Scoring	N/A	The project is **not** located on, or perpendicular to a **Medium or High** risk factor location.	The project is located on, or perpendicular to a **Medium** risk factor location.	The project is located on, or perpendicular to a **High** risk factor location.	

Table 3: Evaluation Criteria Scoring

Evaluation Criterion	Performance Measure	Scoring Scale				Resources
		-1	0	+1	+2	
Equity	Quantitative: Project impact to transportation disadvantaged populations based on the ODOT Transportation Disadvantaged Population (TDP) Index	Project **degrades** transportation options and facilities for transportation disadvantaged populations	Project has **no impact** on transportation options and facilities for transportation disadvantaged populations	Project **indirectly improves** transportation options and facilities for transportation disadvantaged populations	Project **directly improves** transportation options and facilities for transportation disadvantaged populations	Census block data
	Qualitative: Project impact to ADA compliance	Project **degrades** ADA compliance	Project makes **no improvements** to ADA compliance	Project makes **moderate improvements** to ADA compliance	Project makes **significant improvements** to ADA compliance	ODOT ADA Inspection Summary, ADA Standards for Accessible Design
Livability	Quantitative: Right-of-way acquisition needs	The project requires **significant** right-of-way acquisition	The project requires **minor** right-of-way-acquisition	The project requires **no** right-of-way acquisition	N/A	Right-of-way maps
	Qualitative: Neighborhood street modification, business access and parking	The project **degrades** access and/or mobility to residential and commercial areas	The project **has no impact** to access and/or mobility to residential and commercial areas	The project **indirectly improves** access and/or mobility to residential and commercial areas	The project **directly improves** access and/or mobility to residential and commercial areas	Parking inventories, locations of residential and commercial properties in study area
	Qualitative: Public response based on Open House and Public Advisory Committee Comments	The project has (or is expected to have) significant **negative** public response	The project has (or is expected to have) a **neutral** public response	The project has (or is expected to have) a **positive** public response	The project has (or is expected to have) **strong support** from the public	Open House and Public Advisory Committee Comments
Design Feasibility[1]	Qualitative: High-level feasibility of constructing the intended project at the location.	The project poses **significant** design challenges	The project poses **moderate** design challenges	The project poses **minor** design challenges	The project poses **no notable** design challenges	Constructability (including, but not limited to, right-of-way availability, existing terrain, utility location, visibility concerns, etc.)

[1] ADA design requirements will be considered but not included as a precluding factor to design feasibility.

NEXT STEPS

The Evaluation Criteria and Performance Measures has been reviewed by the project management team (PMT) and updated to produce the Final Evaluation Criteria and Performance Measures. The Evaluation Criteria will be used to compare the alternatives developed as part of Task 5: Alternatives Development, Analysis, and Preferred Alternative Concept.

REFERENCES

1. Oregon Department of Transportation. *Blueprint for Urban Design, 2020.*
2. Kittelson & Associates, Inc. *Corridor Vision, 2020.*
3. City of McMinnville. *Transportation System Plan, 2010.*

Appendix A Sample Evaluation

Bulb-Out Improvements at NE 8th Street / NE Baker Street Intersection[1]		
Evaluation Criterion	**Score**	**Methodology[1]**
Complete Streets	1	Posted speed: 30 mph Number of Lanes: 2 AADT: 14300 Change in LTS: 1 point
Multi-Modal Transportation System	1	The project improves facilities for people walking and biking, improving modal priorities for the urban context.
Connectivity	1.3	The TSP recommended that new curb extensions should be installed at the NE 8th Street / NE Baker Street Intersection. The project is not on a SRTS network. There are some essential destinations and active transportation generators within ¼ mile of the intersection. The project directly addresses a barrier in the walking transportation network.
Safety	1.8	Two crashes involving pedalcyclists within a 5-Year Period: 1 serious injury crash and 1 minor injury crash. Install Curb Ramps and Extensions with a Marked Crosswalk and Pedestrian Warning Signs (BP12) has a Crash Reduction Factor of 37% for pedestrian crashes. This is a high value crash reduction factor given the project cost. Project is located on a high risk factor location for bicyclists and pedestrians.
Equity	2	Project highly improves ADA compliance at a location. Project directly improves transportation options and facilities for transportation disadvantaged populations.
Livability	0.3	The project requires no right-of-way acquisition. The project indirectly improves access to residential and commercial areas. The project is expected to have a negative public response.
Feasibility	2	The project has no significant design challenges
Total Score	9.4	

[1] The scoring provides an example of the evaluation criteria and performance metrics, however the methodology includes incomplete data and analysis. The scoring for this particular project would need to be refined in the project development process if it is considered in Task 5 of this project.

RRFB at NE 8th Street / NE Baker Street Intersection[2]		
Evaluation Criterion	**Score**	**Methodology[1]**
Complete Streets	2	Posted speed: 30 mph Number of Lanes: 2 AADT: 14300 Change in Crossing LTS: 2 points
Multi-Modal Transportation System	2	The project significantly improves modal priorities for urban context, as it provides an enhanced crossing for people walking and biking.
Connectivity	1.3	The TSP recommended that new curb extensions should be installed at the NE 8th Street / NE Baker Street Intersection. The project is not on a SRTS network. There are some essential destinations and active transportation generators within ¼ mile of the intersection. The project directly addresses a barrier in the walking transportation network.
Safety	1.5	Two crash involving pedalcyclists in 5-year period: 1 minor injury crash and 1 fatal injury crash Install Rectangular Rapid Flashing Beacon (2-Lane Road) (BP8) has a Crash Reduction Factor of 10% for pedestrian crashes. This is a moderate value crash reduction factor given the project cost. Project is located on a high risk factor location for bicyclists and pedestrians.
Equity	2	Project highly improves ADA compliance at a location. Project directly improves transportation options and facilities for transportation disadvantaged populations.
Livability	0.7	The project requires no right-of-way acquisition. The project indirectly improves access to residential and commercial areas. The project is expected to have a neutral public response.
Feasibility	2	The project has no significant design challenges.
Total Score	11.5	

[2] The scoring provides an example of the evaluation criteria and performance metrics, however the methodology includes incomplete data and analysis. The scoring for this particular project would need to be refined in the project development process if it is considered in Task 5 of this project.

Bike Lane along Baker Street between NE 1st Street and 5th Street[3]		
Evaluation Criterion	**Score**	**Methodology**
Complete Streets	1.5	Posted speed: 30 mph Number of Lanes: 2 AADT: 14300 Change in BLTS: improve by 2 points Change in PLTS: improve by 1 point
Multi-Modal Transportation System	1	Based on the context the BUD recommends buffered facilities. Therefore, although this project improves modal priorities for urban context, it does not provide ideal facilities.
Connectivity	1.3	The project is not identified by the TSP or located on the SRTS Network. The project directly addresses a gap in the biking transportation network. The project would serve many active generators and essential destinations in a ¼ mile radius.
Safety	1.8	There were 3 or more crashes involving pedalcyclist in a 5-year period. Install Bike Lanes (BP18) has a Crash Reduction Factor of 36% reduction for crashes involving bicyclist. This is a high value crash reduction based on project cost. Project is located on a medium pedestrian risk factor location and high bicyclist risk factor location.
Equity	1	Does not impact ADA compliance. Project directly improves transportation options and facilities for transportation disadvantaged populations.
Livability	1.3	The project requires no right-of-way acquisition. The project directly improves mobility to residential and commercial areas. The project is expected to have a positive public response.
Feasibility	2	The project has no anticipated design challenges.
Total Score	9.9	

[3] The scoring provides an example of the evaluation criteria and performance metrics, however the methodology includes incomplete data and analysis. The scoring for this particular project would need to be refined in the project development process if it is considered in Task 5 of this project.

Appendix B Blueprint for Urban Design

Designing based on urban context, considering roadway designations and activity of different modes

Urban 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)[4]	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 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
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

Source: ODOT Blueprint for Urban Design, Volume 1
Orange box indicates Urban Contexts considered as part of this project.

General Modal Considerations in Different Urban Concepts

Land Use Context	Motorist	Freight	Transit	Bicyclist	Pedestrian
Traditional Downtown/CBD	Low	Low	High	High	High
Urban Mix	Medium	Low	High	High	High

Source: ODOT Blueprint for Urban Design, Volume 1