

LEBANON URBAN DESIGN VERIFICATION

LEBANON, OR

Final January 2024



Lebanon Urban Design Verification LEBANON, OR

Prepared for:
Oregon Department of Transportation (ODOT)
3700 SW Philomath Blvd
Corvallis, OR 97333
Project Manger: James Feldmann

In coordination with **City of Lebanon**
Ron Whitlatch
Kelly Hart
Alysia Rodgers

Prepared by:
Kittelson & Associates, Inc.
851 SW 6th Avenue
Suite 600
Portland, OR 97204

Camilla Dartnell, PE
Sophia Semensky
Poppy Yang
Phillip S.D. Worth

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CONTENTS

Introduction	5
Project Process	7
We Heard You: Public Input.....	10
Issues and Key Considerations	12
Solutions Overview.....	24
Project Concept Designs	30
Implementation	83

TABLES

.....	9
Table 1: General Modal Priority Per Urban Context	9
Table 2: Number of Walking and Biking Crashes By Severity (2016 to 2020).....	13
Table 3: Target Crossing Spacing Based on Urban Context	16
Table 4: OR 34 (Tangent Street) Projects	31
Table 5: U.S. 20 (Santiam Highway/Main Street/Park Street) Projects	36
Table 6: 5th Street Bikeway Projects.....	45
Table 7: Grove Street Bikeway Projects	59
Table 8: Crossing Projects.....	70
Table 9: Potential ADA Upgrade Locations	83
Table 10: Lebanon TSP and CIP Projects	84

FIGURES

Figure 1: Study Area and Essential Destinations.....	6
Figure 2: Project Schedule	7
Figure 3: Study Corridor Urban Contexts	8
Figure 4: Reported Crashes by Mode and Severity.....	14
Figure 5: Existing Sidewalk Widths.....	15
Figure 6: Existing Marked Crosswalks and Intersection Control Devices	17
Figure 7: Existing Bicycle Lane Widths	18
Figure 8: Parking Utilization in the Mid-Day.....	20
Figure 9: Parking Utilization in the Evening.....	21
Figure 10: Key Considerations for Bike Solutions Supporting U.S. 20.....	25
Figure 11: Proposed Bicycle Facilities.....	26
Figure 12: Proposed Parking Changes.....	27
Figure 13: Recommended Crossings	29
Figure 14A: OR 34 Bicycle Facilities Sheet A.....	32
Figure 14B: OR 34 Bicycle Facilities Sheet B	33
Figure 15A: U.S. 20 Bicycle Facilities Sheet A	38
Figure 15B: U.S. 20 Bicycle Facilities Sheet B	39
Figure 16A: Park Street Bicycle Facilities Sheet A.....	40
Figure 16B: Park Street Bicycle Facilities Sheet B.....	41
Figure 17A: 5th Street Bicycle Facilities Sheet A.....	47
Figure 17B: 5th Street Bicycle Facilities Sheet B.....	48
Figure 17C: 5th Street Bicycle Facilities Sheet C	49
Figure 17D: 5th Street Bicycle Facilities Sheet D.....	50
Figure 17E: 5th Street Bicycle Facilities Sheet E	51
Figure 17F: 5th Street Bicycle Facilities Sheet F	52

Figure 17G: 5th Street Bicycle Facilities Sheet G.....	53
Figure 17H: 5th Street Bicycle Facilities Sheet H	54
Figure 17I: 5th Street Bicycle Facilities Sheet I	55
Figure 17J: 5th Street Bicycle Facilities Sheet J	56
Figure 17K: 5th Street Bicycle Facilities Sheet K.....	57
Figure 18A: Grove Street Bicycle Facilities Sheet A	60
Figure 18B: Grove Street Bicycle Facilities Sheet B	61
Figure 18C: Grove Street Bicycle Facilities Sheet C.....	62
Figure 18D: Grove Street Bicycle Facilities Sheet D	63
Figure 18E: Grove Street Bicycle Facilities Sheet E.....	64
Figure 18F: Grove Street Bicycle Facilities Sheet F.....	65
Figure 18G: Grove Street Bicycle Facilities Sheet G	66
Figure 19A: U.S. 20 and Elmore Crossing Improvements	71
Figure 19B: OR 34 and 2nd Street Crossing Improvements.....	72
Figure 19C: U.S. 20 and Industrial Way Intersection Improvements	73
Figure 19D: OR 34 and 9th Street Intersection Improvements.....	74
Figure 19E: U.S. 20 and Dodge Street Intersection Improvements.....	75
Figure 19F: U.S. 20 and Isabella Street E Intersection Improvements	76
Figure 19G: U.S. 20 and Isabella Street W Intersection Improvements	77
Figure 19H: U.S. 20 and Sherman Street Intersection Improvements	78
Figure 19I: U.S. 20 and Jennings Street Intersection Improvements	79
Figure 19J: U.S. 20 and Russell Drive Intersection Improvements	80
Figure 19K: U.S. 20 and Truman Street Intersection Improvements	81

ATTACHMENTS

- Attachment I: Public Involvement Plan
- Attachment II: Public Outreach Summary
- Attachment III: Technical Memorandum 1: Background
- Attachment IV: Technical Memorandum 2: Operations and Parking Analyses
- Attachment V: Truck Turning Templates

INTRODUCTION

The Lebanon Urban Design Verification (UDV) project aims to address **walking and biking needs and solutions** on ODOT owned roadways in Lebanon. In some cases, adding parallel routes on City-owned roads can provide biking solutions for those accessing the highway. The UDV focuses on solutions that can be included in existing or upcoming projects **in the next 10 years**. The UDV process focuses on identifying leveraging opportunities in maintenance activities and upcoming Fix-It projects to implement design solutions.

*The Lebanon UDV focuses on **walking and biking solutions** that can be implemented in the **next 10 years**.*

Currently, high speeds and volumes on the highways in Lebanon and a **lack of bicycle facilities** make biking uncomfortable for most people. There are **sidewalks along most of the highway system** that facilitate walking and rolling. However, there are **few places to cross** the multiple lanes of traffic comfortably and a review of crash reports reveals that there were 16 crashes involving pedestrians and bicyclists on U.S. 20 and OR 34 in the last 5 years, including three serious injuries.

The study area, shown in Figure 1, focuses on two major ODOT-owned roadways in Lebanon:

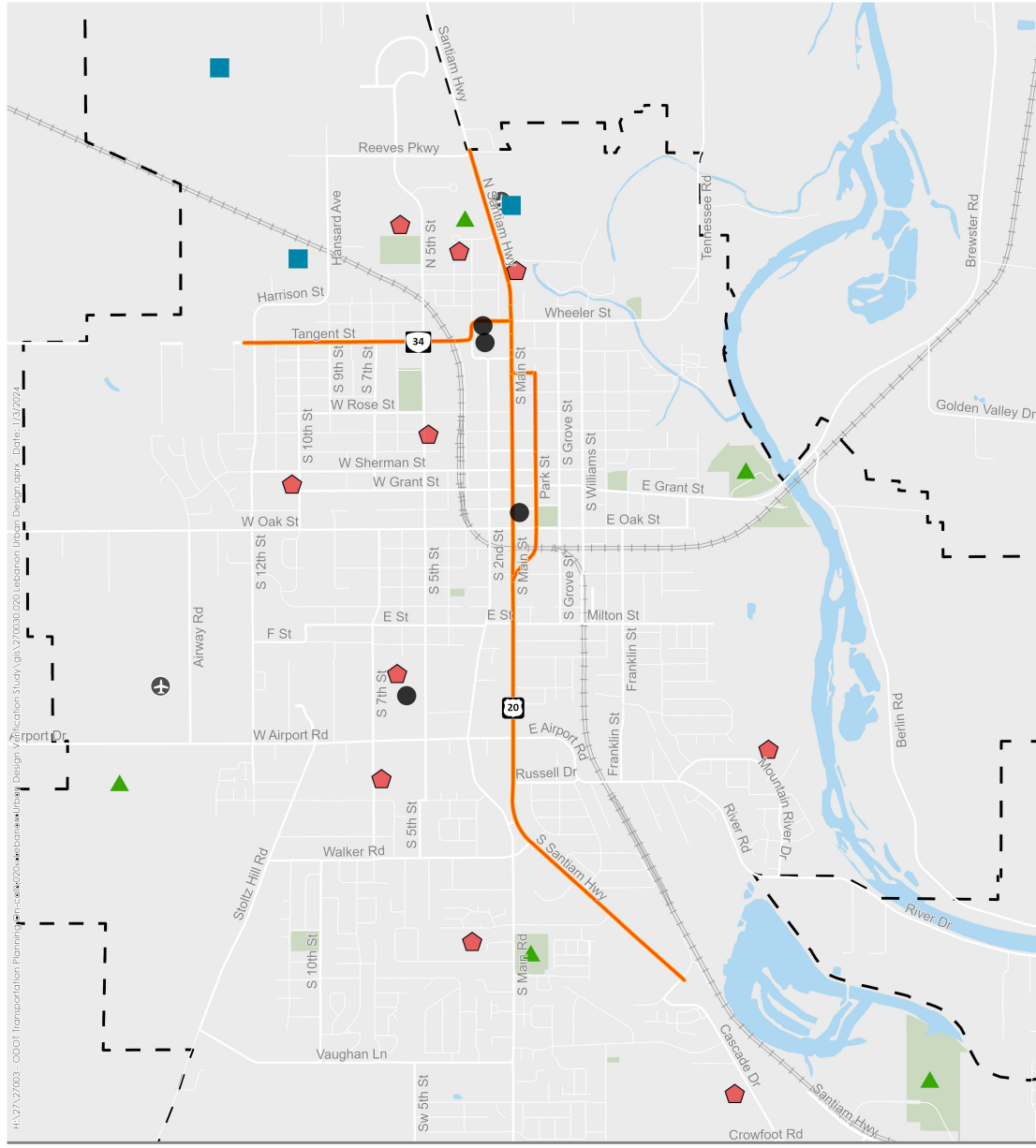
- OR 34 (includes Tangent Street and Morgan Street)
- U.S. 20 (includes Main Street, Park Street, and Santiam Highway)

The key intended outcomes from this study include:

- Evaluating available space for all users and considering active transportation leverage opportunities – with a preferred design solution;
- Conducting corridor-specific public engagement to identify multimodal design solutions and options;
- Better informing communities about upcoming STIP Fix-It projects; and
- Collaborating between the City of Lebanon and ODOT.

This document describes the project process; provides an overview of the background, including the needs assessment and concept development; details the bicycle and pedestrian concepts; and outlines an implementation plan. The bicycle and pedestrian concepts include maps, graphics, and plan view layouts of the recommendations.





Airports	Essential Destinations	0 0.25 0.5 Miles	
Study Segments	Civic		
City Boundary	Employment		
UGB	Recreation/Entertainment		
	School		

**Study Area and
 Essential Destinations
 Lebanon, Oregon**

Figure 1: Study Area and Essential Destinations

PROJECT PROCESS

For this project, the team took the following steps and schedule:

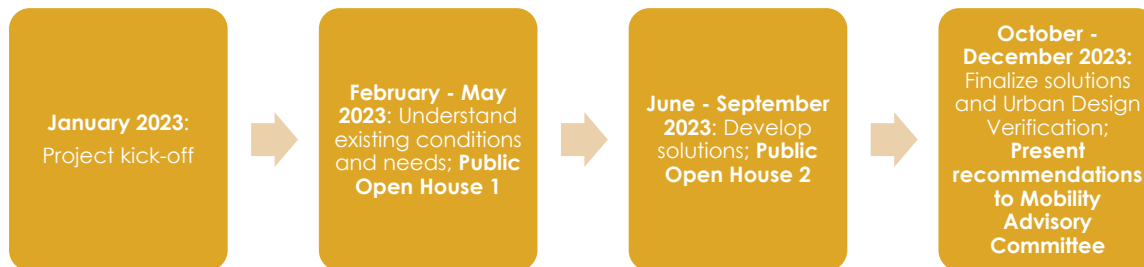


Figure 2: Project Schedule

For this study, the project team reviewed existing conditions and documents to identify needs, held open houses for input, analyzed traffic and parking, developed and evaluated options, and produced a final concept. Public input at key points shaped the performance-based and context-sensitive solutions. The team also consulted with key City and ODOT staff throughout the process and presented to the Mobility Advisory Committee in December to gather input on the design concepts.

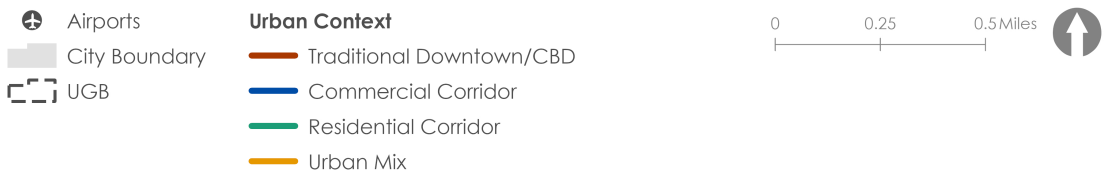
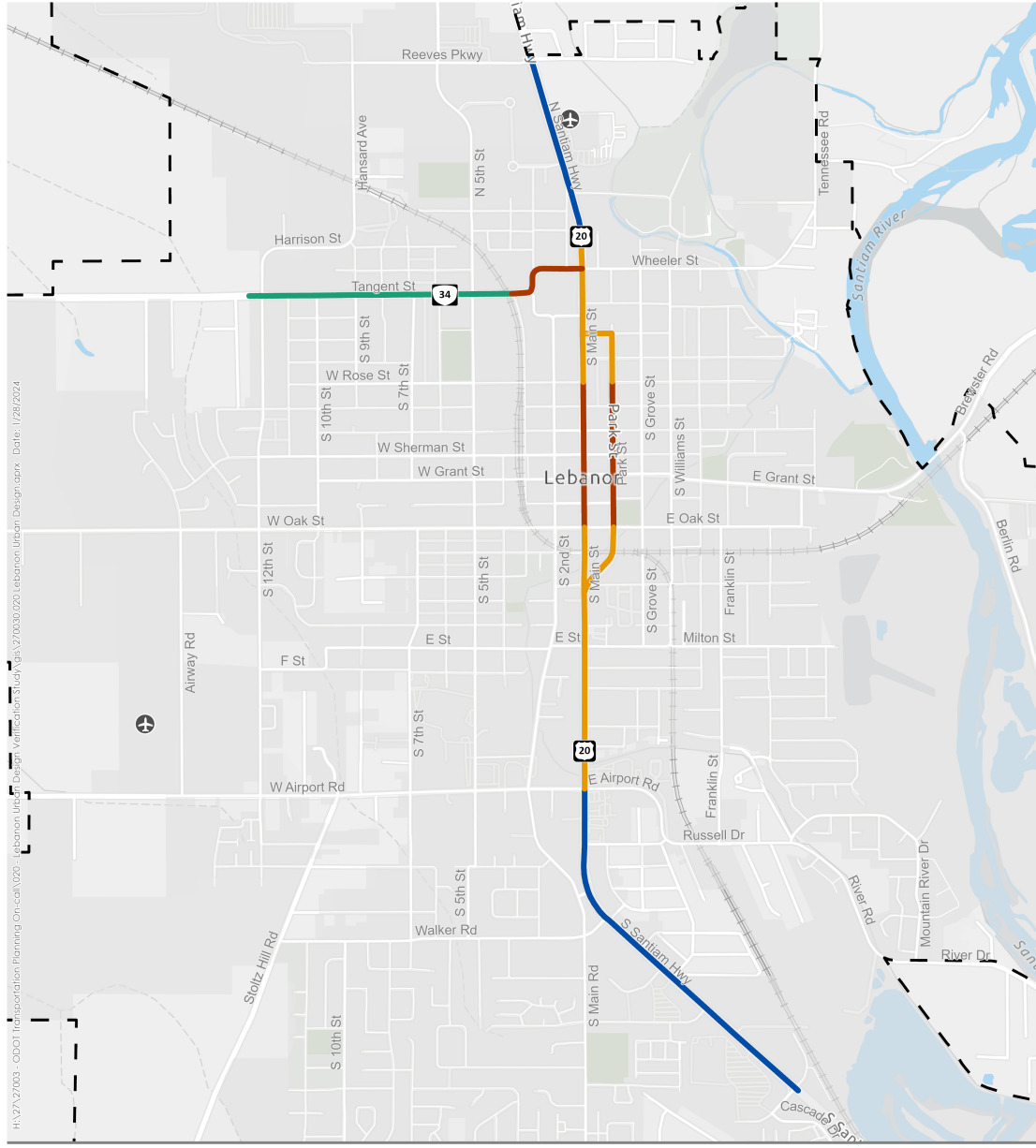
DESIGN VERIFICATION PROCESS AND URBAN CONTEXT

To develop the solutions, the project team used several key design principles including:

- Using performance-based design, driven by ODOT's Highway Design Manual (informed by the Blueprint for Urban Design), to develop context sensitive solutions;
- Applying best practices and ODOT standards in biking and walking design;
- Considering ease of implementation to provide the greatest likelihood of early implementation;
- Suggesting phased implementation for projects that have elements that create a barrier to near-term implementation (example: striping a buffered bike lane in the near-term and adding physical vertical separation when additional funding allows).

Performance-based or context-sensitive design is a shift away from applying strict design standards toward **designing based on a community's specific setting and circumstances**. Performance-based design supports planning efforts to create projects that are context sensitive and well-suited to the intended outcomes desired by the community.

The ODOT Blueprint for Urban Design, which has been incorporated into the ODOT 2023 Highway Design Manual (HDM), provides a framework for determining urban context along state roads, helping decision-makers evaluate design trade-offs. Identifying project outcomes and users helps determine performance measures. The project team, with input from other members of ODOT, established the following context classifications for the study corridors, presented in Figure 3.



**Study Corridor Urban Contexts
 Lebanon, Oregon**

Figure 3: Study Corridor Urban Contexts



Photo: Kittelson and Associates, Inc.

These urban classifications best reflect the existing land use conditions of the corridors. Based on the context classification, the HDM identifies the relative importance of the user type with respect to varying land use contexts. Table 1 provides the modal priority for each context classification. Reviewing the users' needs influences the recommendations as part of the performance-based design decision framework.

Most of U.S. 20 is classified as a Traditional Downtown or Urban Mix, for which **pedestrian and bicyclist modes are identified as high priority**—over motorist and freight. Along the northern and southern sections of U.S. 20 entering or leaving town, the classification of commercial corridor has pedestrians and bicyclists as lower than motorists and freight. Most of OR 34 is classified as residential corridor, which has bicyclists and pedestrians as medium priority—the same as motorists and freight.

Table 1: General Modal Priority Per Urban Context

Land Use Context	Motorist	Freight	Transit	Bicyclist	Pedestrian
Traditional Downtown/CBD	Low	Low	High	High	High
Urban Mix	Medium	Low	High	High	High
Commercial Corridor	High	High	High	Medium	Medium
Residential Corridor	Medium	Medium	Low	Medium	Medium
Suburban Fringe	High	High	Varies	Low	Low
Rural Community	Medium	Medium	Varies	High	High

High: Highest level of facility should be considered and prioritized over other modal treatments.
Medium: Design elements should be considered; trade-offs may exist based on desired outcomes and user needs.
Low: Incorporate design elements as space permits.

WE HEARD YOU: PUBLIC INPUT



Photo: Kittelson and Associates, Inc.

The **project team relied on public input** to help inform what the challenges are with walking, biking, and rolling in Lebanon and which solutions will work best. The team also gathered feedback from the Mobility Advisory Committee (MAC) and led work sessions with City and ODOT staff to refine the concepts. To solicit public input on transportation needs and potential solutions, the project team conducted public engagement through two in-person outreach events and two online open houses.

The first outreach event provided information and gathered input on challenges for walking, biking, and rolling on U.S. 20 and OR 34. The team asked about what types of facilities they would be comfortable on, where they felt uncomfortable crossing, and about tradeoffs for removing parking or a travel lane on the highway or biking on a parallel route. At the March 16, 2023, event, the team distributed surveys and documented approximately 40-50 comments about walking/biking facilities.

The online open house from March 14-April 3 garnered 19 survey responses and 24 map comments.

The second outreach event presented preliminary bicycle facility solutions and proposed new or enhanced crossing locations. On July 28th, the team recorded approximately 10 comments on poster

*“More trails and bike lanes would benefit the **community health and economy.**”*

-Community Member

boards. The online open house from July 28-August 14 received 17 survey responses regarding the proposed network and designs.

ODOT staff presented the Lebanon UDV to the Mobility Advisory Committee (MAC) for their feedback on December 14th, 2023. They also shared the highway-focused materials with the public and invited comment from December 7th to 21st. The MAC noted a preference for 12' wide travel lanes and minimized overhead masts for enhanced crossings. When overhead masts are included, they preferred heights of 18'6" or more. Public comments supported buffered bike lanes on OR 34 and were mixed regarding buffered bike lanes on U.S. 20 (on Park Street). Comments also supported design elements that improved safety such as curb extensions and enhanced crossings. There was also concern about parking removal and a preference for vehicle lane removal over parking removal.

Key Findings From Open House 1 Included:

- Difficulty crossing along the highway, especially on U.S. 20 south of downtown and on OR 34 near the library.
- Need for improved visibility and lighting near crosswalks.
- Not enough designated space for bikes along the highways.
- Preference to bike on a parallel route rather than on Main Street, even if bike facilities were added on Main Street.
- Support for improving facilities on 5th Street as a parallel route to Main Street, as 5th Street is already known as the bike route in town and provides direct access to key destinations like parks and the High School.
- No protection for bikes and pedestrians on OR 34 west of 12th Street.
- High speeds on Park Street between Grant Street and Carolina Street.
- Concern about drivers not paying attention and the large number of logging trucks and other large trucks on U.S. 20.
- Poor quality of sidewalks and ADA ramps.

*Community members would prefer to bike on **an improved parallel route rather than on Main Street** (US-20), even if bike facilities were added.*

Key Findings From Open House 2 Included:

- Participants supported improving parallel routes, especially the buffered bike lanes proposed on 5th Street from OR 34 to Market Street.
- The only concern raised about parking removal on 5th Street was near Century Park.
- A few participants felt speeds were too high on OR 34 and U.S. 20 for comfortable biking.
- Participants shared high support for making bike connections on Market Street.
- A community member recommended consideration of a roundabout at U.S. 20 and Airport Road to improve safety, slow speeds, and improve operations.
- Community members recommended adding a new enhanced crossing at U.S. 20 and Truman Street (near Porter Street) and noted that a pedestrian was recently struck by a vehicle when crossing at this location.

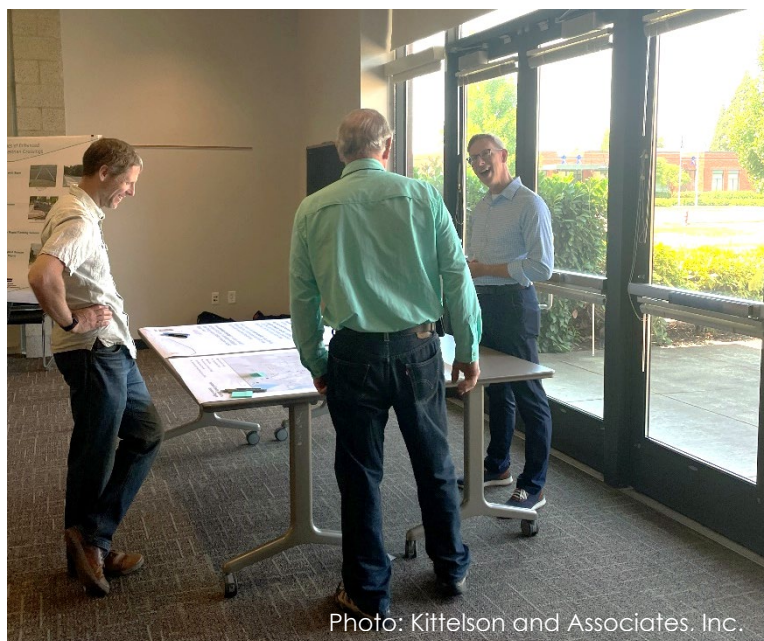


Photo: Kittelson and Associates, Inc.

ISSUES AND KEY CONSIDERATIONS



In addition to soliciting feedback from the public, the project team reviewed the key destinations in the area, safety conditions, and existing walking and biking facilities to identify potential needs. The team also collected parking utilization data and traffic operations data to understand tradeoffs for each decision.

BIKING AND WALKING CRASHES

The team analyzed data for reported crashes involving people walking or biking in the last five years (2016 to 2020) in the study area to understand safety needs. In addition to reviewing crash data, the team looked at the walking and biking crash risk factors present along the corridor.

Between January 2016 and December 2020, there were 14 reported crashes on U.S. 20 and two reported crashes on OR 34 involving people walking and biking. Table 2 presents the number of reported crashes by severity, and Figure 4 presents the crashes by mode and severity.

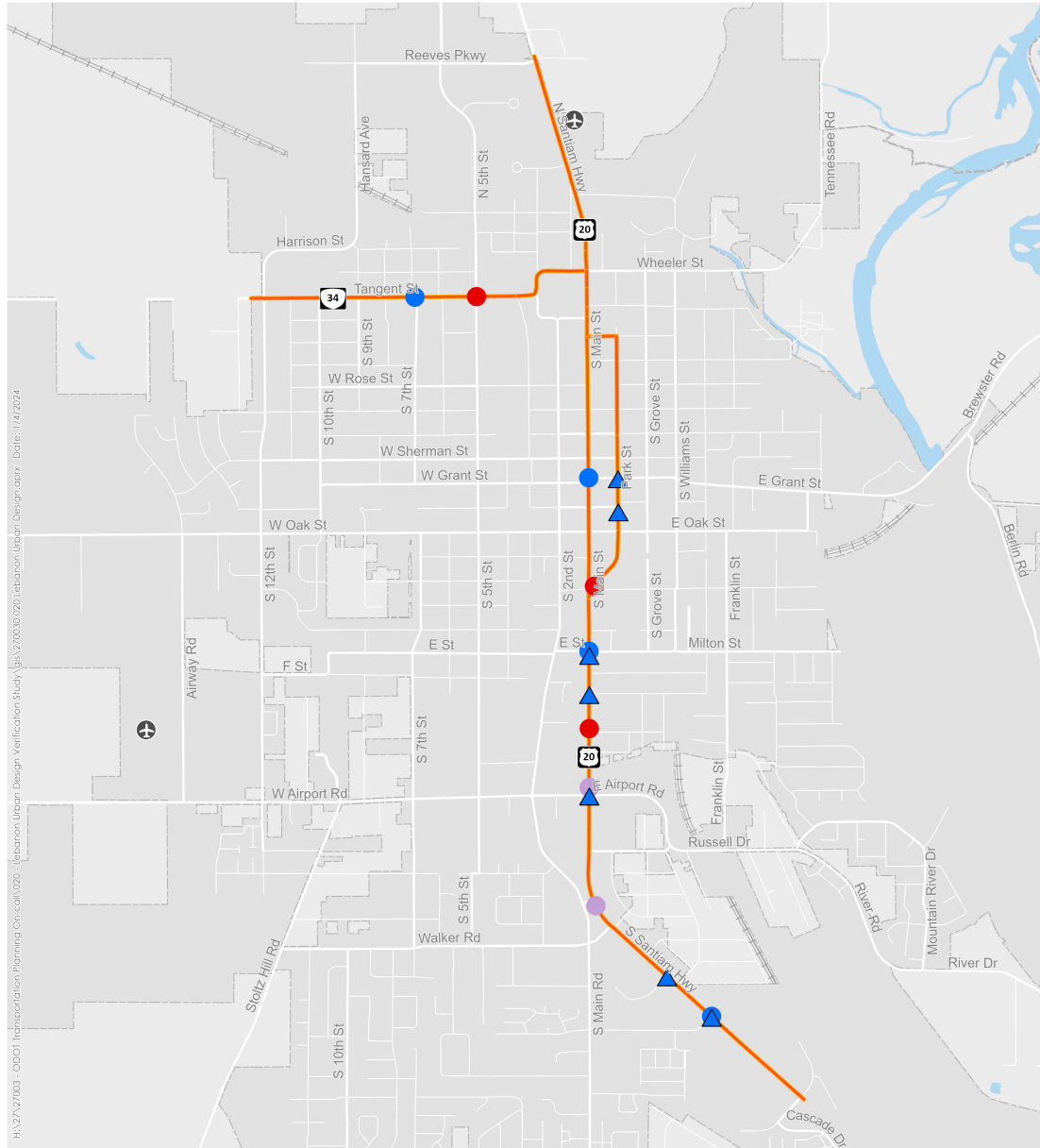
“There aren’t any signals to aid crossing nearby, so what is a pedestrian supposed to do?”

- Community Member

Table 2: Number of Walking and Biking Crashes By Severity (2016 to 2020)

Crash Severity	U.S. 20	OR 34
Fatal	0	0
Severe Injury	2	1
Moderate Injury	2	0
Minor Injury	10	1
Property Damage Only (PDO)	0	0
Total	14	2

Note: Crash data for 2021 and 2022 were not available during the safety analysis but have since been made available. Final 2021 data and preliminary 2022 data show two crashes involving people walking and two crashes involving people biking between January 1, 2021 – December 31, 2022 on U.S. 20 or OR 34 in Lebanon. A minor injury pedestrian crash occurred at the intersection of Wheeler Street and U.S. 20, and a fatal pedestrian crash occurred at the intersection of Russell Drive and U.S. 20. A moderate injury bike crash occurred near the intersection of Airport Road and U.S. 20, and a minor injury bike crash occurred near the intersection of 5th Street and OR 34.



- | Crashes by Severity - Bicyclist | | Crashes by Severity - Pedestrian | |
|---------------------------------|-----------------|----------------------------------|-----------------|
| ▲ | Minor Injury | ● | Minor Injury |
| ▲ | Moderate Injury | ● | Moderate Injury |
| ▲ | Severe Injury | ● | Severe Injury |



**Reported Crashes by Mode and Severity
 Lebanon, Oregon**

Figure 4: Reported Crashes by Mode and Severity

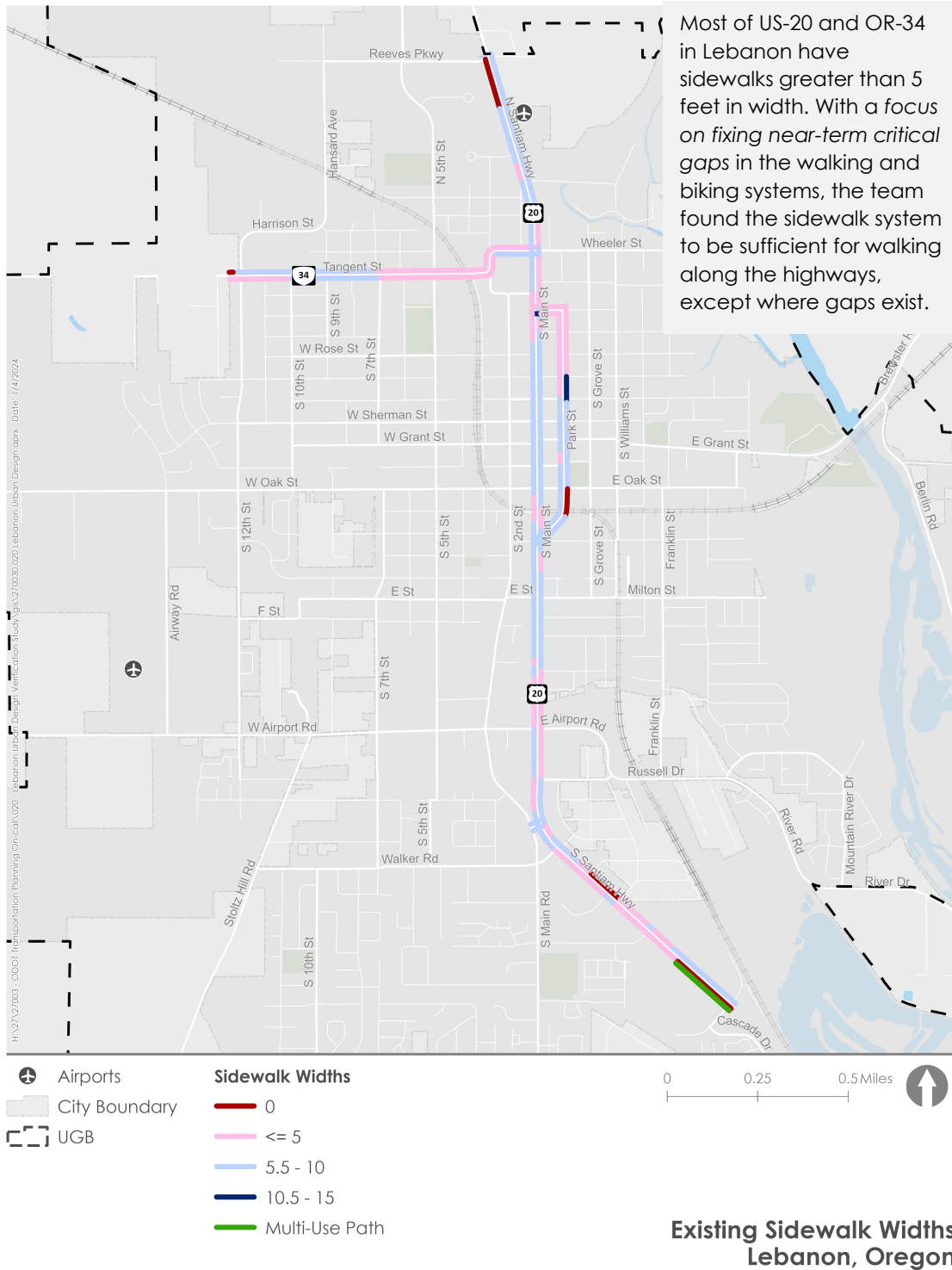


Figure 5: Existing Sidewalk Widths

WALKING IN LEBANON: CROSSINGS



Photo: Kittelson and Associates, Inc.

Providing enhanced crossings like signals, flashing beacons, lighting, signs, and striping advises drivers that someone may be crossing. In areas with closely spaced land uses, there is usually a more frequent desire to cross the road and therefore enhanced crossings should be provided more regularly than in areas with fewer destinations. Table 3 provides the recommended target spacing ranges for each land use in our study area. Note that per the Highway Design Manual, these targets are a starting point. The density of land uses and pedestrian generators and their locations should be analyzed to determine if a lesser or greater spacing is needed. Figure 6 presents enhanced or marked crossing locations in Lebanon along U.S. 20 and OR 34.

The team found that **there is a lack of comfortable, enhanced crossings in the study area, especially on the southern portion of U.S. 20 and on Park Street.** Distances between crossings exceed ODOT recommendations, and past crashes and public input confirms that people need to cross in locations where enhanced crossings are not currently provided. Some existing marked crossings are still uncomfortable and could be improved with additional enhancements. For instance, there is an existing marked crossing at 2nd Street and OR 34 where additional enhancements may further improve the crossing due to factors such as road curves; higher traffic speeds and volumes; and a higher percentage of older adults and children crossing due to surrounding land uses.

Table 3. Target Crossing Spacing Based on Urban Context

Urban Context	Target Spacing Range (feet)
Traditional Downtown/CBD	250 - 550
Urban Mix	250 - 550
Commercial Corridor	500 - 1,000
Residential Corridor	500 - 1,000

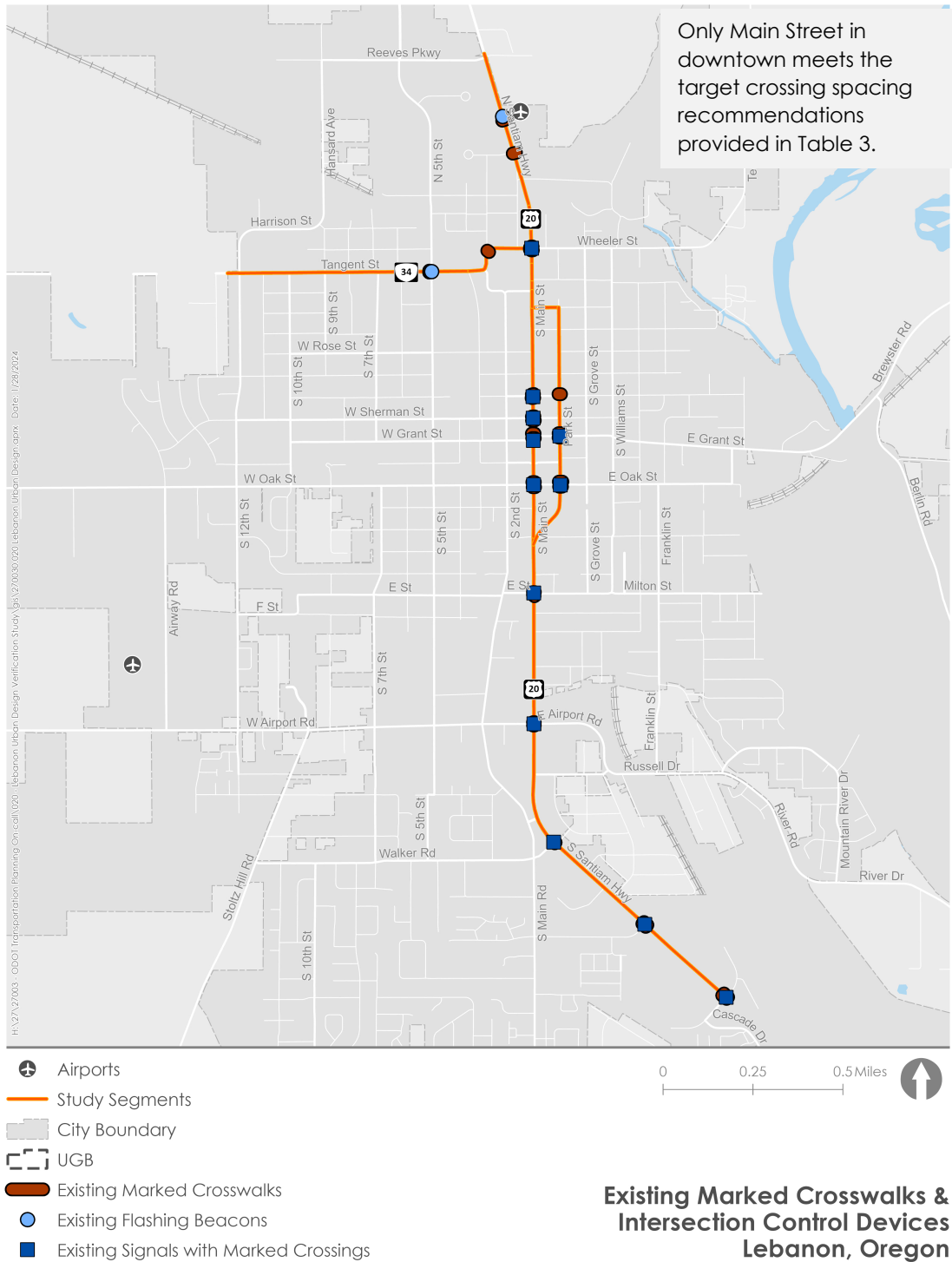


Figure 6: Existing Marked Crosswalks and Intersection Control Devices

BIKING IN LEBANON



**Existing Bicycle Lane Widths
 Lebanon, Oregon**

Figure 7: Existing Bicycle Lane Widths

WHAT ABOUT PARKING?



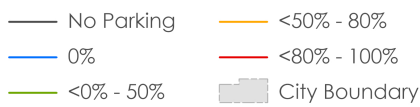
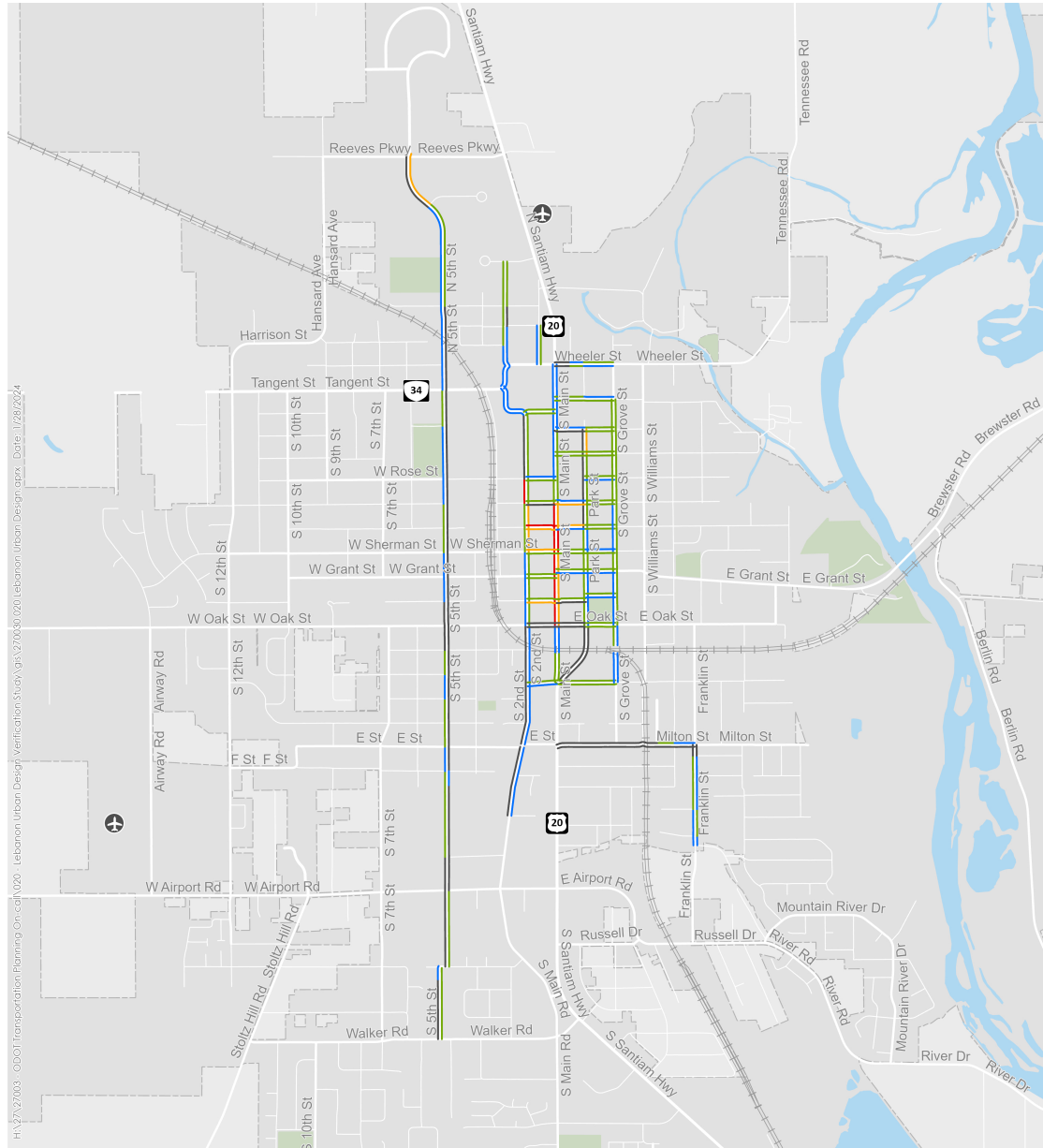
Photo: Kittelson and Associates, Inc.

Removing parking can free up space for other street uses, including new bike lanes. The team conducted a parking assessment during the mid-day and evening to understand the opportunities and tradeoffs around parking removal.

Key findings included:

- Parking utilization on **Main Street is greater than 80%** on some blocks during the midday.
- **Parking utilization is between 0 – 50%** on Park Street on all blocks except one. The low parking utilization leaves a wide roadway that encourages speeding and makes crossing difficult for people walking and biking. Consolidating parking to one side of Park Street would allow space for a northbound bicycle facility and encourage more appropriate vehicle speeds.
- **Parking utilization is consistently higher on 2nd Street than 5th Street.**

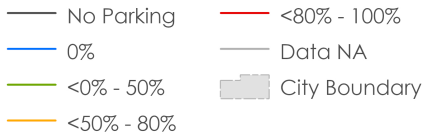
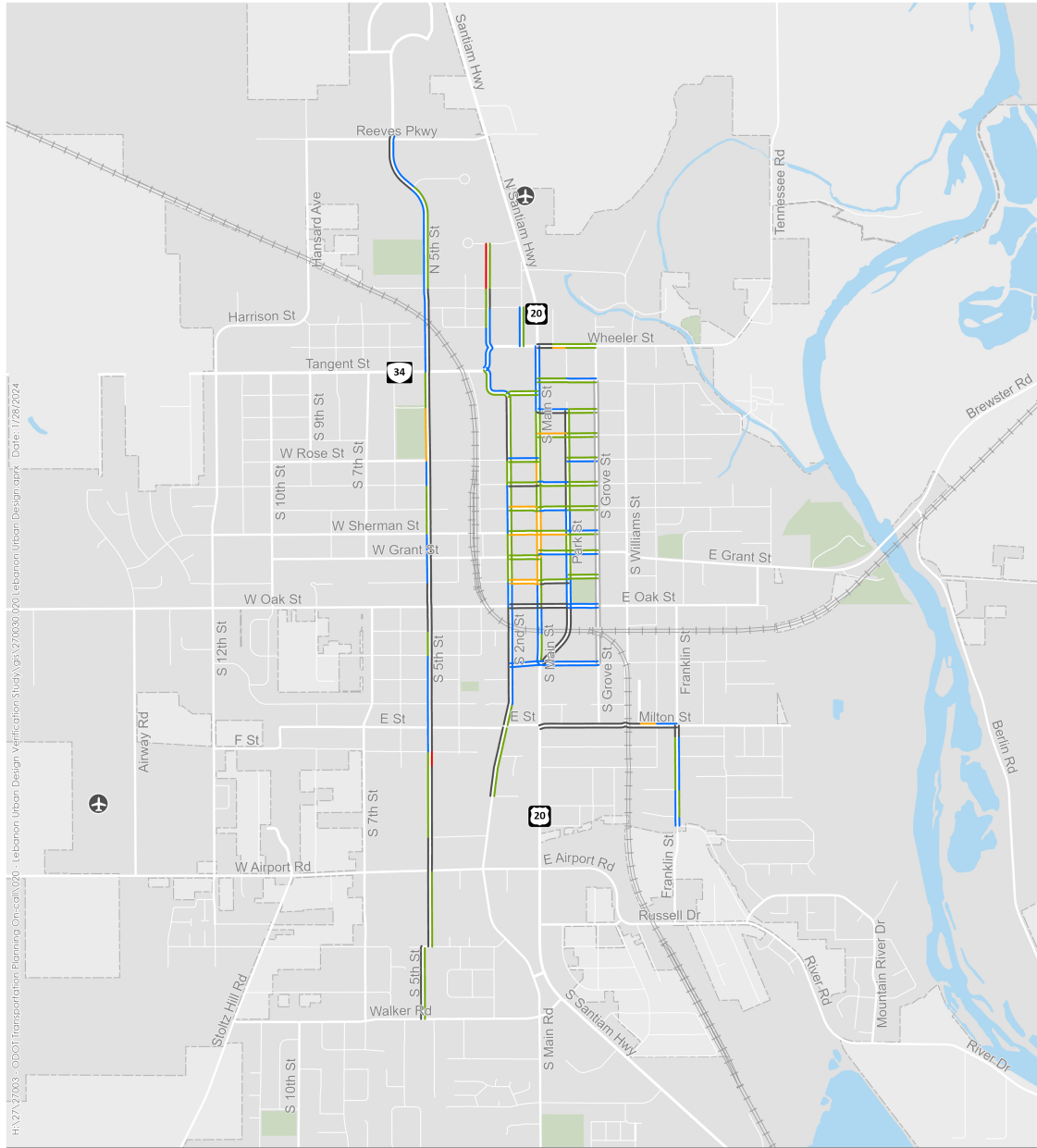
In cases where parking is removed, the strong grid network in Lebanon creates connectivity and street parking options- so that most people will not need to park more than one block away from their destination.



**Parking Utilization - Midday
 Lebanon, Oregon**



Figure 8: Parking Utilization in the Mid-Day



**Parking Utilization - Evening
 Lebanon, Oregon**



Figure 9: Parking Utilization in the Evening

TRAFFIC OPERATIONS AND FREIGHT



TRAFFIC OPERATIONS

A transportation operations analysis was conducted to inform how key intersections along U.S. 20 and OR 34 operate today, as well as provide insight on daily speeds and volumes on the highways and parallel streets. The analysis results identify potential opportunities and impacts for walking and biking facilities, and further inform the design concept presented in later sections of this Study. A summary of the findings is provided below, and additional details are documented in Appendix II.

All-day tube counts were collected for 2nd Street, 5th Street, Franklin Street, and Carolina Street to determine the appropriate bicycle facilities for those roadways. The analysis showed that:

- For 2nd Street, the preferred facility is a buffered bike lane north of Oak Street and a protected facility south of Airport Road.
- For 5th Street, the preferred facility is a buffered bike lane north of Oak Street and a shared lane or marked bicycle south of Airport Road.
- For Franklin Street, the preferred facility is a shared lane, consistent with the preferred facility on Grove Street.

In addition, all-day tube counts showed that there was a low left turn volume from Carolina Street onto Main Street, and hence a low need for a separated left turn lane.

An intersection operations analysis was conducted for existing and proposed changes to four key intersections:

- **U.S. 20 and OR 34-Wheeler Street:** Currently operates at a level-of-service (LOS) B; however, it has an intersection V/C ratio that exceeds the ODOT mobility target of a v/c of 0.70.

- Proposed changes to remove the southbound and northbound left turn lanes were evaluated, but both turn lanes were ultimately retained to provide phase separation between the left turns and crossing pedestrians.
- **Park Street and Grant Street:** Currently operates at a LOS B and meets ODOT mobility targets.
 - A proposed change to remove the dedicated northbound right turn lane was evaluated and the intersection was found to still meet ODOT mobility targets. This change was recommended in order to provide a buffered bike facility along Park Street and encourage design that matches the downtown, urban nature of the corridor.
- **Main Street-Park Street and Emore Street:** Currently operates at a LOS B and meets ODOT mobility targets.
 - Proposed intersection control types (signal and roundabout) were evaluated, but the existing configuration was ultimately retained, with the addition of RRFBs due to the near-term implementation focus for this Urban Design Verification.
- **U.S. 20 and Market Street:** Currently operates at a LOS A and meets ODOT mobility targets.
 - A proposal to remove the eastbound left turn was evaluated to create room for a bicycle facility. In both the AM and the PM peak hours, the intersection v/c ratio increases with this change (AM Peak: 0.59 to 0.80; PM Peak: 0.69 to 0.70). The alternative is to widen the intersection to add bicycle facilities. The project team recommends left turn lane removal to minimize impacts to neighboring properties, but if removal of the left turn lane is not allowed, widening will need to occur to support this key biking connection. This connection was identified by the project team and supported by public comment.

FREIGHT

Reduction Review Routes are identified freight routes that may not permanently have their vehicle-carrying capacity reduced unless safety or access considerations require the reduction, or a local government requests an exemption, and the Commission determines it is in the best interest of the state and freight movement is not unreasonably impeded. Examples of reductions in horizontal carrying capacity include curb extensions, medians, and protected bike lanes. Examples of reductions in vertical carrying capacity include overhead masts. Both OR 34 and U.S. 20, including the couplet, are Reduction Review Routes.

The pinch points, or narrowest existing sections, along U.S. 20 in Lebanon are:

- Southbound: **26 feet** curb to curb (MP 13.27); while it is not a pinch point, in the southern section of the study area the southbound direction is **36 – 37 feet** tubular marker to curb (MP 14.05 – 14.11)
- Northbound: **25-26 feet** tubular marker to curb (MP 14.05 – 14.11); while it is not a pinch point, in the northern section of the study area the northbound direction is **32 ft** wide (MP 12.93 - 13.21)

The pinch points along OR 34 are:

- Westbound: **20 feet** curb to edge of pavement (MP 15.64 – MP 15.70); while it is not a pinch point, in the eastern part of the corridor, the narrowest section is **30 feet** curb to curb (MP 17.80)
- Eastbound: **30 feet** bridge rail to bridge rail (MP 0.00 – MP 0.20) considering the future Van Buren Bridge widths and **30 feet** curb to curb (MP 17.80)

The project team considered these pinch points when developing solutions to avoid creating narrower segments than these existing pinch points. However, while not creating new pinch points, the use of curb extensions, medians, protected bike lanes, and overhead RRFBs can reduce the horizontal or vertical vehicle carrying capacity of the highway.

SOLUTIONS OVERVIEW

BIKING SOLUTIONS



Photo: Kittelson and Associates, Inc.

BIKING ON OR 34

OR 34 already has standard bike lanes (striped bike lanes with no vertical or horizontal separation) within the study area, but protected bike lanes (striped bike lanes with vertical and horizontal separation) are needed to get to a low-stress bike facility based on the traffic speeds and volumes. Although it will not provide a completely low-stress facility, OR 34 can be restriped to provide buffered bike lanes (striped bike lanes with horizontal separation) in the near-term.

BIKING ON U.S. 20

Public and City input, including considerations around parking utilization and traffic volumes, led the project team to **focus on improving routes parallel to U.S. 20** south of OR 34 instead of reorganizing Main Street and Santiam Highway to provide bike facilities. Both 5th Street and Grove Street already have some bike facilities—but both need some changes to provide a more connected, comfortable network to support biking off of the highway. To support these parallel routes, bike connections need to be made to the highway, as well as on some connecting city streets.

Low parking utilization on Park Street provides space that may be repurposed to provide a buffered or protected bike lane. Consolidating parking and adding the bike lane can encourage slower speeds more appropriate for the downtown environment while providing a bike connection.

Figure 10 provides key considerations and recommendations for bicycle facilities to support the goals of this project in Lebanon, and Figure 12 provides the parking implications. Figure 11 provides the full map of proposed bike facilities. These consider the recommended bike treatment based on the FHWA Bikeway Design Guide and ODOT Highway Design Manual as well as constraints like pinch points and space feasibility. Based on the guidance identified above, speeds and volumes on Park Street, for example, would necessitate a protected bike facility throughout, but the narrowing of the roadway doesn't allow for bike lane protection through road reconfiguration north of Ash Street without creating a new freight pinch point. Figure 11 therefore only shows a protected/buffered bike lane south of Ash Street on Park Street.

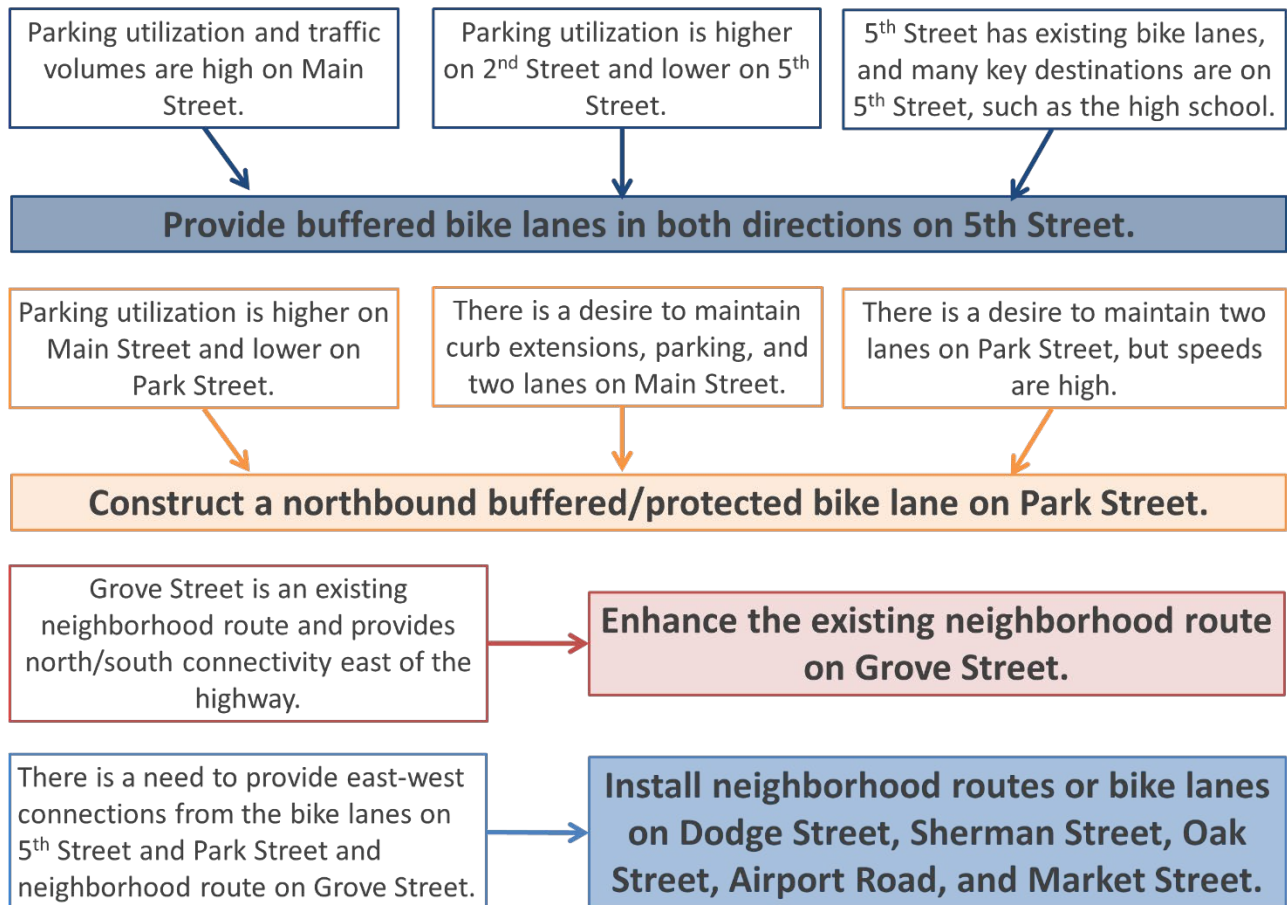


Figure 10: Key Considerations for Bike Solutions Supporting U.S. 20

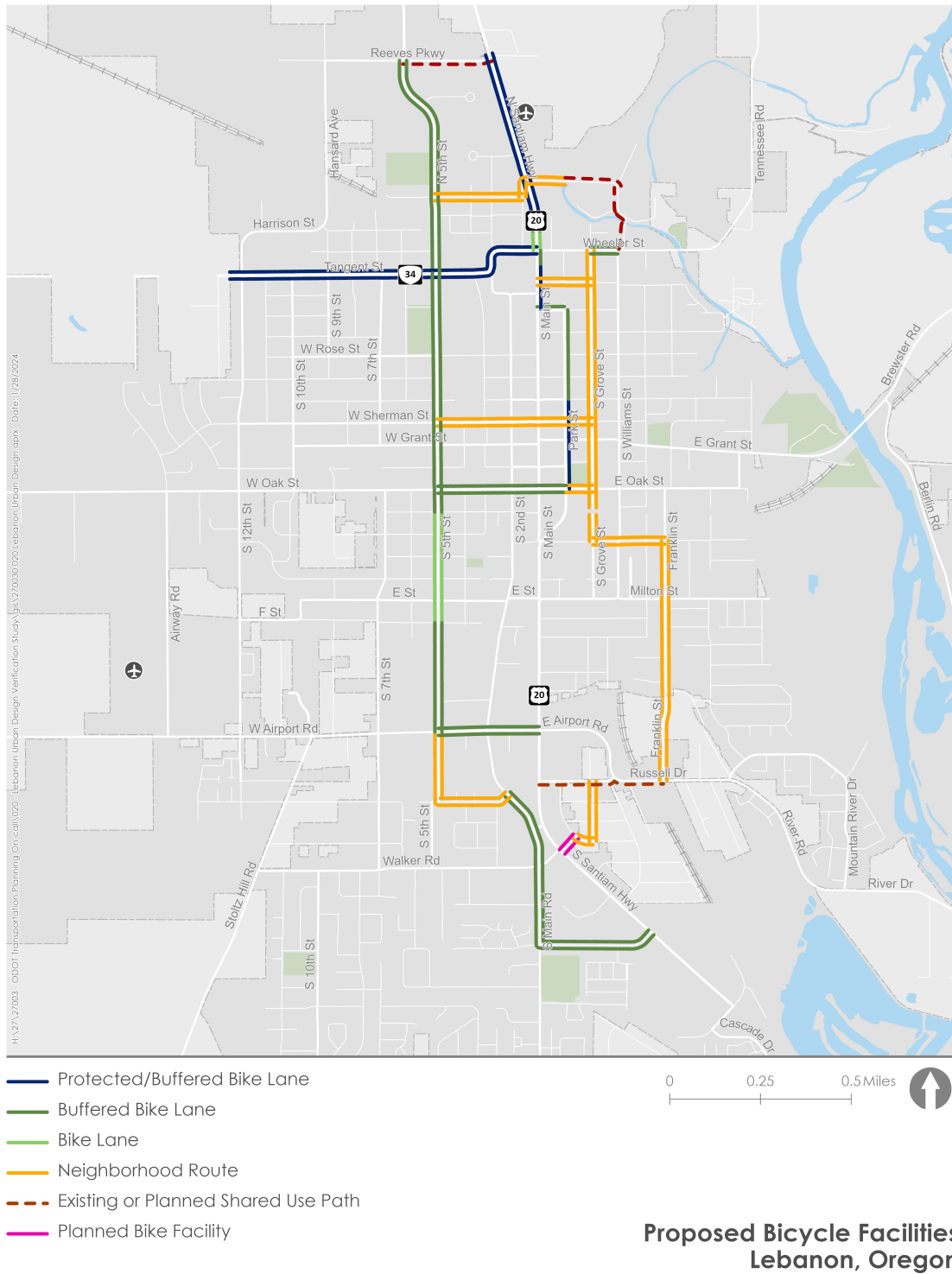


Figure 11: Proposed Bicycle Facilities

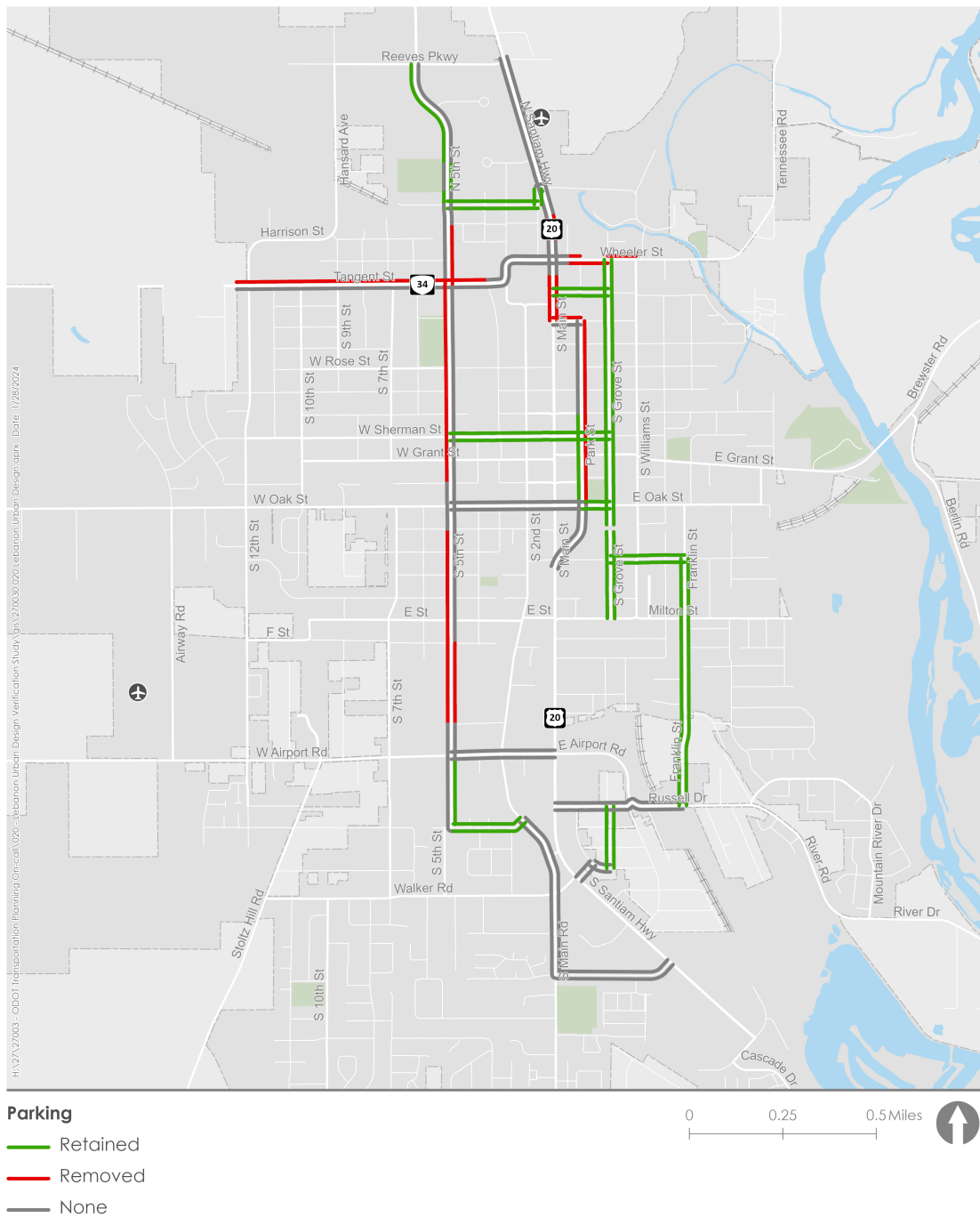


Figure 12: Proposed Parking Changes

PEDESTRIAN SOLUTIONS

While sidewalk additions were not identified as a key near-term need through this project because of existing sidewalks, enhanced crossings were identified as a need. The team identified targeted locations to provide crossing enhancements to make it easier and safer to walk and bike across the highways in Lebanon. Many past walking and biking crashes involved people walking and biking at non-enhanced crossing locations, and providing enhancements can create visibility to indicate to drivers that someone is crossing at that location.

The team identified likely crossing enhancement locations based on public input, crash history, field observations, access to key destinations, and target crossing spacing recommendations from the ODOT Highway Design Manual. The type of crossing recommended is based on the speeds, number of lanes, and volumes of adjacent vehicles. Generally, as speeds, volume of motor vehicles, and number of travel lanes to cross increase, the greater the visibility of the enhancement should be.

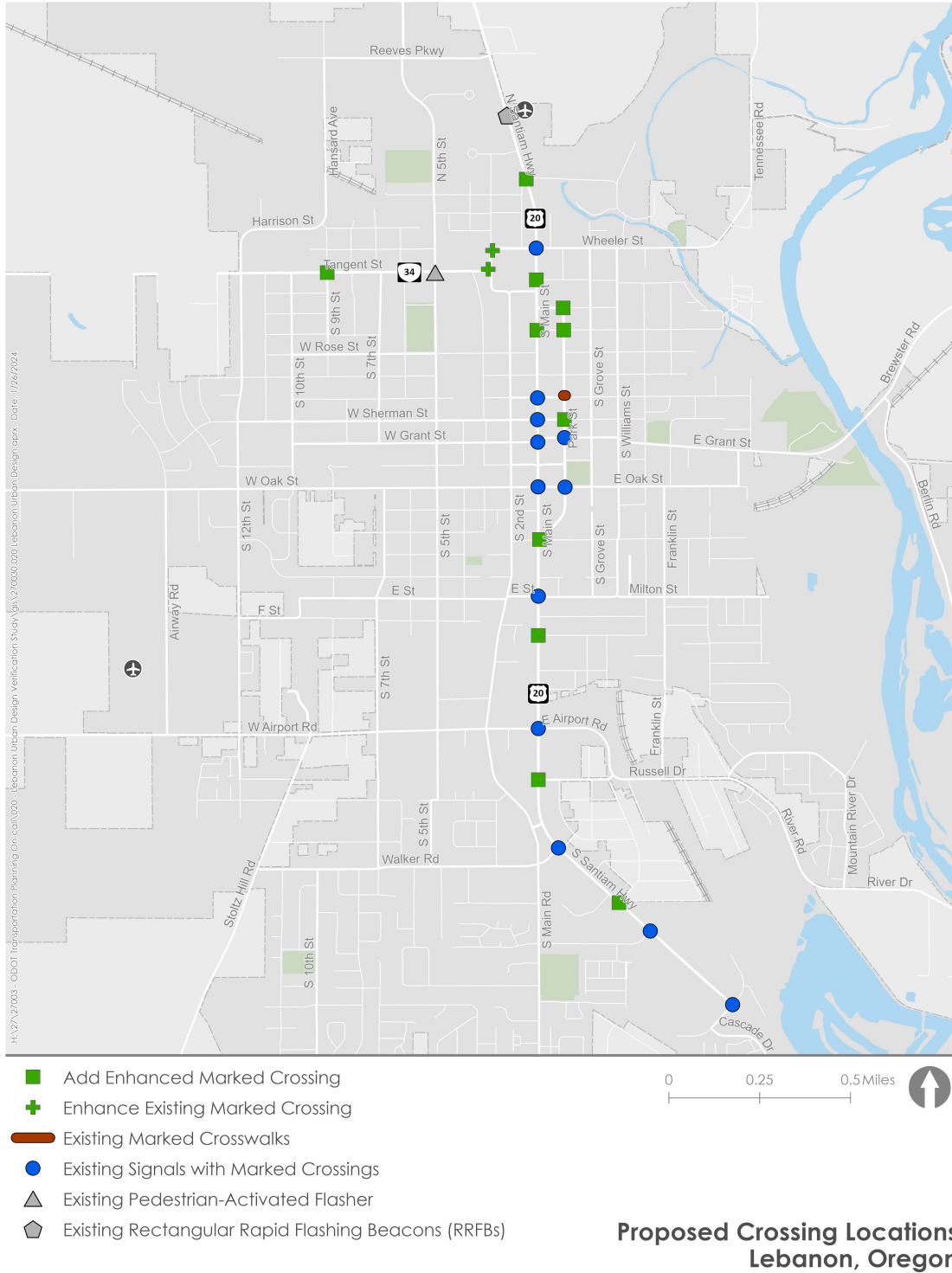


Figure 13: Recommended Crossings

PROJECT CONCEPT DESIGNS

Based on the suggested considerations on urban context, parking demands, traffic operations, safety, public feedback, and City/ODOT input, the project team finalized the preferred solutions. This section presents a project list and concept sheets for each location of recommended improvements.

In addition to the location-specific recommendations outlined below, systemic recommendations include requiring bike parking with new development, adding leading pedestrian intervals at all signals, and adding passive pedestrian detection at corners with signals that have higher volumes of people walking. Highest priority locations for leading pedestrian intervals (LPIs) include U.S. 20 (Santiam Highway)/Airport Road based on public feedback, 5th Street/Airport Road based on proximity to the school, U.S. 20 and OR-24 based on crash data, and U.S. 20 (Park Street)/Oak Street based on proximity to the transit stop. LPIs should be paired with audible pedestrian pushbuttons so that people with low or no vision can be informed of the advance walk time.

To accommodate for freight on the Reduction Review Routes, none of the presented designs further reduce pinch points for the corridors. Horizontally protected bike lanes, curb extensions, and medians are presented so that they do not further reduce horizontal pinch points from the existing conditions on the corridor. However, these elements may reduce vehicle carrying capacity. Vertically, overhead RRFBs are the only recommended treatment that would overhang the highways. ODOT design guidance is that these should be 18' minimum to 19' maximum from the ground to the bottom of equipment on mast arms for both traffic signals and RRFBs, so these will not create new pinch points shorter than existing signals.

OR 34 PROJECTS AND CONCEPT DESIGNS

Improving the bike infrastructure along OR 34 through upgrading to protected or buffered bike lanes would increase safety and comfort for bicyclists and motorists. Based on speeds and volumes, design guidance recommends protected bike lanes throughout the corridor. There is not currently maintenance funding to maintain protected bike lanes, so wider buffered bike lanes should be implemented in the near-term and separation should be added in time when there is funding to maintain them.

There are several constraints for implementing protected bike lanes on OR 34. Driveways throughout will create constraints on locations where protection can be added. The eastbound freight pinch point of 30' means that protection can only be added on one side or the other, *not both*, at any given point and there are some narrower sections of the corridor where protection is not recommended at all.

Figure 14A presents OR 34 from 12th Street to 6th Street. From 12th Street to Hansard Avenue, minor lane narrowing to 11' travel lanes through restriping would be necessary to provide a buffer on the existing bike lane. Note that narrowing lanes may also have the benefit of lowering speeds to be more appropriate for this urban context. East of Hansard Avenue, parking removal is recommended to provide space for buffered to protected bike lanes. It is recommended to have additional follow-up with these neighbors before restriping to discuss the tradeoffs between parking removal and the safety improvements associated with improved bicycle facilities. Parking utilization is generally low on adjacent side streets, which could accommodate the additional parking demand from OR 34.

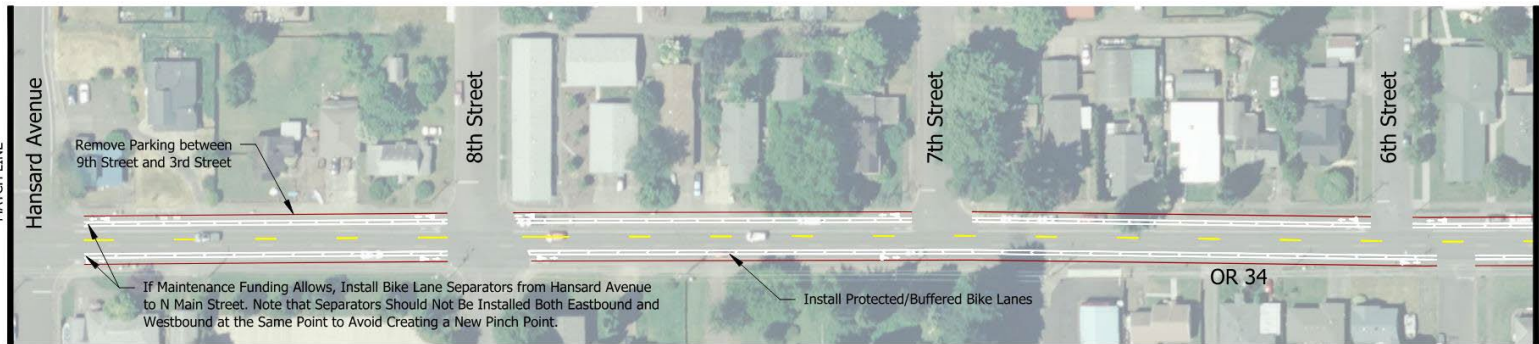
Figure 14B presents OR 34 from just east of 6th Street to the intersection with U.S. 20. From 6th Street to just west of the railroad tracks where parking removal is recommended to provide space for buffered to protected bike lanes. From the railroad tracks to U.S. 20, restriping can add a buffer to the existing bike lane. While narrowing travel lanes to 11' can encourage slower speeds and better represent the urban nature of the corridor, this restriping west of the railroad tracks can be done without needing to narrow to narrower than 12' lanes. In addition to these bike facility recommendations, crossing enhancements at 2nd Street both north and south are recommended. The project list and further crossing details are provided in the Enhanced Crossing Projects and Concept Designs section of this document.

Table 4: OR 34 (Tangent Street) Projects



Project ID	Concept ID	Project Name	Street(s)	Start	End	Project Description	Cost	Jurisdiction	Notes
T-1	14A, 14B	OR 34 (Tangent Street)	OR 34 (Tangent Street)	12th Street	U.S. 20 (Main Street)	Restripe to narrow the lanes and provide buffered bike lanes. When maintenance funding allows, add separators to the buffer to provide a protected bike lane in areas with space.	\$1,705,000	ODOT	Parking removal will be needed along some stretches of the corridor and additional outreach is recommended to the adjacent neighbors to discuss the change to parking on adjacent side streets before implementation.

Note: Crossing projects are not included in this table. See Table 8 for details on crossing projects.

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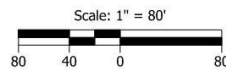


LEGEND

-  Existing Curb
-  Striping for Connector Streets

NOTES

1. Proposed Crosswalk Striping Shown is in Addition to Any Existing Crosswalk Striping
2. Consider Leading Pedestrian Intervals at Signalized Intersections
3. Concepts Shown Maintain 30' or More Clear Width to Avoid Adding New Pinch Points to the Corridor



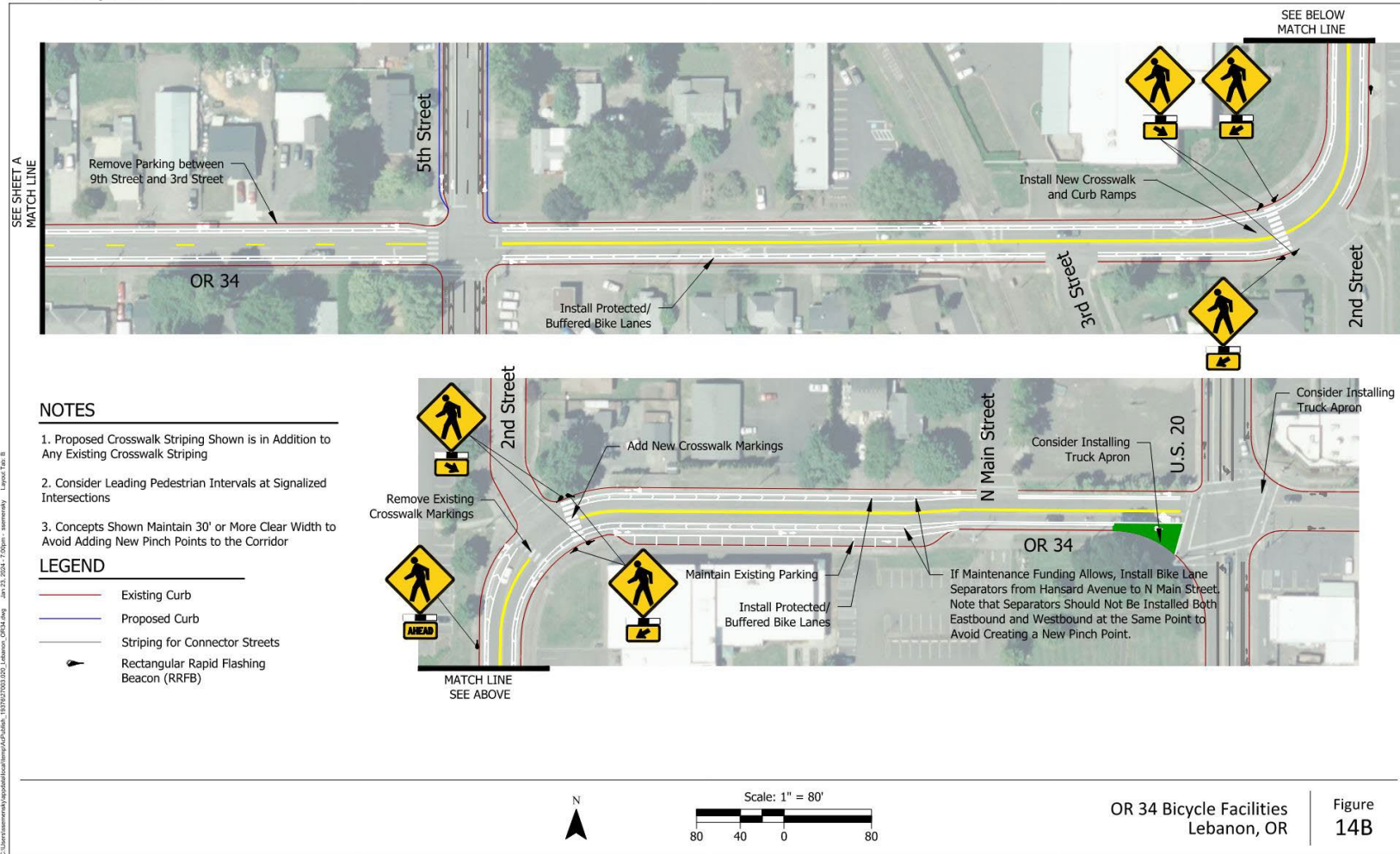
OR 34 Bicycle Facilities
 Lebanon, OR

Figure
 14A



Figure 14A: OR 34 Bicycle Facilities Sheet A

Lebanon Urban Design Verification



OR 34 Bicycle Facilities
 Lebanon, OR | Figure 14B

Figure 14B: OR 34 Bicycle Facilities Sheet B

U.S. 20 (MAIN STREET, PARK STREET, AND SANTIAM HIGHWAY) PROJECTS AND CONCEPT DESIGNS



Photo: Kittelson and Associates, Inc.

While parallel biking routes are recommended for most of U.S. 20, there are several sections of U.S. 20 that should still be improved with biking facilities. From OR 34/Wheeler Street to Reeves Parkway, the roadway should be restriped to form continuous, upgraded bike lanes.

Figure 15A presents U.S. 20 from Reeves Parkway to south of Industrial Way. There are already striped bike lanes through this stretch of highway, and with restriping those can be widened to buffered/ protected bike lanes in the future. Crossing enhancements are shown at Industrial Way to support crossing spacing targets and connections to the parallel bikeways that can be accessed from the N Main Street to Mary Street connection to the 5th Street Bikeway and the Industrial Way connection to the Grove Street Bikeway. Note that the crossing is placed on the south side of the intersection to allow for southbound left turns onto Industrial Way. To facilitate bicyclists reaching the crossing enhancements, a short section of a two-way path connection is included. E Burnside Street and SE 30th Avenue in Portland, OR provides an example of an implemented similar treatment. The project list and further crossing details are provided in the Enhanced Crossing Projects and Concept Designs section of this document.

Figure 15B presents U.S. 20 from south of Industrial Way to the intersection with Carolina Street. While protected bike facilities are recommended throughout and should be included if reconstruction occurs, restriping provides space for buffered/ protected bike lanes until the addition of the turn lane at the intersection of U.S. 20/OR 34. At this intersection, there is only space for a standard bike lane. The left turn lane was maintained to provide separate pedestrian crossing phase from the southbound left turning phase.

South of OR 34/Wheeler Street, the southbound bike recommendation is to use one of the parallel routes: the 5th Street Bikeway to the west or the Grove Street Bikeway to the east. The bike route wayfinding sign pointing to OR 34 from U.S. 20 southbound intends to direct bicyclists to this route because there is not a receiving southbound bike lane on the other side of the intersection. A northbound buffered/protected

bike facility is recommended on U.S. 20 from OR 34/Wheeler Street on Main Street to Carolina. Parking is not allowed for the majority of this segment but will need to be removed for a short section between Carolina Street and Dodge Street.

An enhanced crossing is presented at Dodge Street. The project list and further crossing details are provided in the Enhanced Crossing Projects and Concept Designs section of this document.

Figure 16A and 16B show the Carolina Street and Park Street sections of U.S. 20 from Main Street to Oak Street. A northbound buffered facility should be added from the intersection of Oak Street and Park Street to the intersection of Carolina Street and Main Street, and when maintenance funding allows, protection should be added in the segment from Ash Street to Oak Street. North of Ash Street there is not space to add bike protection without reducing the pinch point, so therefore just restriping to buffered bike lanes is recommended north of Ash Street.

On Carolina Street, a near-term project is recommended to remove one travel lane and stripe a westbound buffered bike lane. Low left turning traffic volumes at Carolina Street and Main Street mean that there should be negligible traffic impacts with this change. Parking is not currently allowed for most sections of Carolina Street between Main Street and Park Street. The parking that does exist on the north side of the street will need to be removed, but parking may be added on the south side of the street due to the removal of the second travel lane.

There is concern about northbound left-turning trucks running onto the curb and sidewalk at the intersection of Carolina Street and Park Street. The project team ran turning templates and found that with correct positioning, large trucks (WB-67) should be able to make this turn without conflicting with the curb. The consolidation to one lane northbound and the removal of parking south of the intersection should help encourage trucks to take the full space for turning, which may help reduce the conflicts with the curb. Large turning trucks will need to travel into the bike lane to make the turn, creating potential safety conflicts with vulnerable road users. Therefore, a construction project is recommended to construct a shared-use path on the north side of Carolina Street to reduce potential safety conflicts with people biking and turning trucks. The recommended pedestrian crossing at this intersection should be placed just south of the intersection to reduce potential conflicts with turning trucks and pedestrians or the crossing signs and equipment.

On Park Street, consolidating parking to the west side of the roadway will open space for a northbound buffered/protected bike lane on the east side. This would benefit the community by slowing traffic speeds, improving safety for bicyclists and pedestrians, and providing another important north-south biking connection through the downtown area. The addition of curb extensions will also help slow speeds and improve the visibility and comfort of pedestrians crossing. To minimize impacts to stormwater, designs that do not impede stormwater flow, like the trench drain implemented at the curb extension in front of Banks High School, may be considered. The right turn lane at Grant Street is shown as removed in the concepts, and traffic analysis showed minimal impacts to traffic operations with this change.

South of Ash Street, protected bike facilities can be added without reducing the pinch point for freight except at adjacent curb extensions, so bike lane separators are not shown in these areas. North of Ash Street, the roadway widths are reduced to eleven and half feet and a buffered bike lane is recommended to provide comfort for bicyclists while maintaining clear space for freight. In addition, pedestrian crossing islands are recommended at E Sherman Street. At this intersection with Sherman Street, twenty-five feet of clear space should still be maintained as to not create a new pinch point along the corridor, which will require the curb extension and/or the bike lane to be narrower to allow for the six foot wide pedestrian crossing island.

Enhanced crossings are recommended in several sections along Park Street and details are provided in the Enhanced Crossing Projects and Concept Designs section of this document.

Table 5: U.S. 20 (Santiam Highway/Main Street/Park Street) Projects

Project ID	Concept ID	Project Name	Street(s)	Start	End	Project Description	Cost	Jurisdiction	Notes
S-1	15A, 15B	U.S. 20 from Reeves Parkway to Wheeler Street/Tangent Street	U.S. 20 (Santiam Highway/ Main Street)	Reeves Parkway	Wheeler Street/ Tangent Street	Restripe to add buffered bike lanes in the near term. Transition to standard bike lanes just north of the intersection with Tangent Street to provide space for turn lanes. If reconstruction occurs at this intersection in the future, reconstruct to provide buffered bike lanes to the intersection. When maintenance funding allows, add separators to the buffer to provide a protected bike lane. Provide southbound bike route signage directing bicyclists onto Tangent Street and 5th Street	\$1,236,000	ODOT	Cost estimate includes concrete traffic separators
S-2	15B	U.S. 20 (Santiam Highway/Main Street) from Wheeler Street/Tangent Street to Carolina Street	U.S. 20 (Main Street)	Wheeler Street	Carolina Street	Restripe to provide a northbound buffered bike lane. When maintenance funding allows, add separators to the buffer to provide a protected bike lane.	\$350,000	ODOT	Cost estimate includes concrete traffic separators
S-3	16A, 16B	U.S. 20 (Carolina Street/Park Street) from Main Street to Oak Street	U.S. 20 (Carolina Street/ Park Street)	Main Street	Oak Street	Restripe to consolidate parking to the west side of the street and provide a northbound buffered bike lane on the east side of the street. When maintenance funding allows, add separators to the buffer to provide a protected bike lane south of Ash Street. When funding allows, reconstruct to provide a shared use path connection for the first 150 feet of Carolina Street (nearest Park Street) to provide greater separation for bicyclists from larger turning vehicles.	\$1,278,000	ODOT	Cost estimate includes concrete traffic separators

Project ID	Concept ID	Project Name	Street(s)	Start	End	Project Description	Cost	Jurisdiction	Notes
S-4	16B	Curb Extensions	U.S. 20 (Park Street)	N/A	N/A	Add curb extensions to the west side of the street at Ash Street, Sherman Street, Grant Street, Maple Street, and Oak Street.	\$250,000	ODOT	
S-5	Not pictured	Prohibit Left Turns from S Main Road	U.S. 20 and South Main Road	N/A	N/A	Prohibit left turns from S Main Road onto U.S. 20 (convert to right in/left in/right out).	\$10,000	ODOT	

Note: Crossing projects are not included in this table. See Table 8 for details on crossing projects.

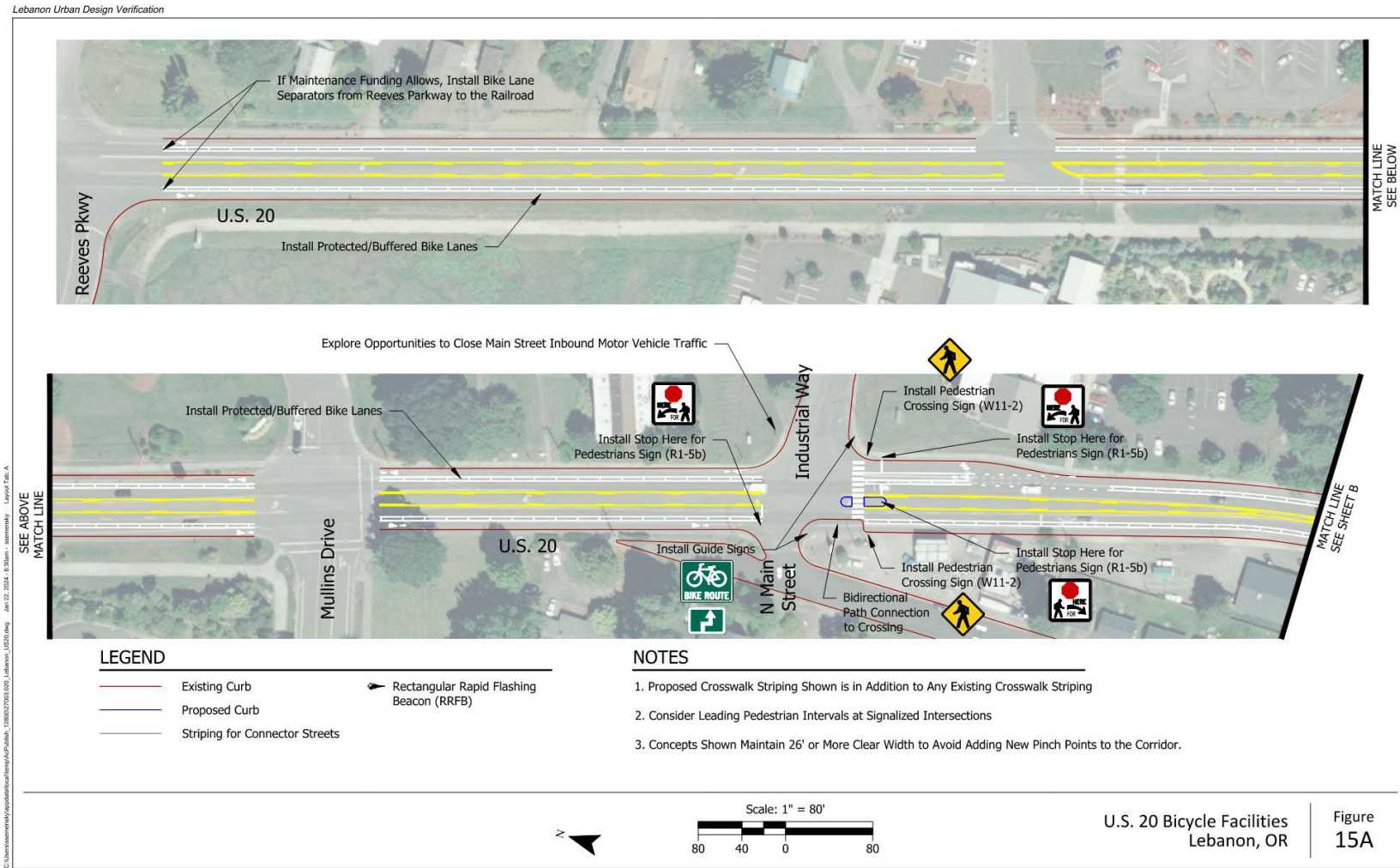


Figure 15A: U.S. 20 Bicycle Facilities Sheet A

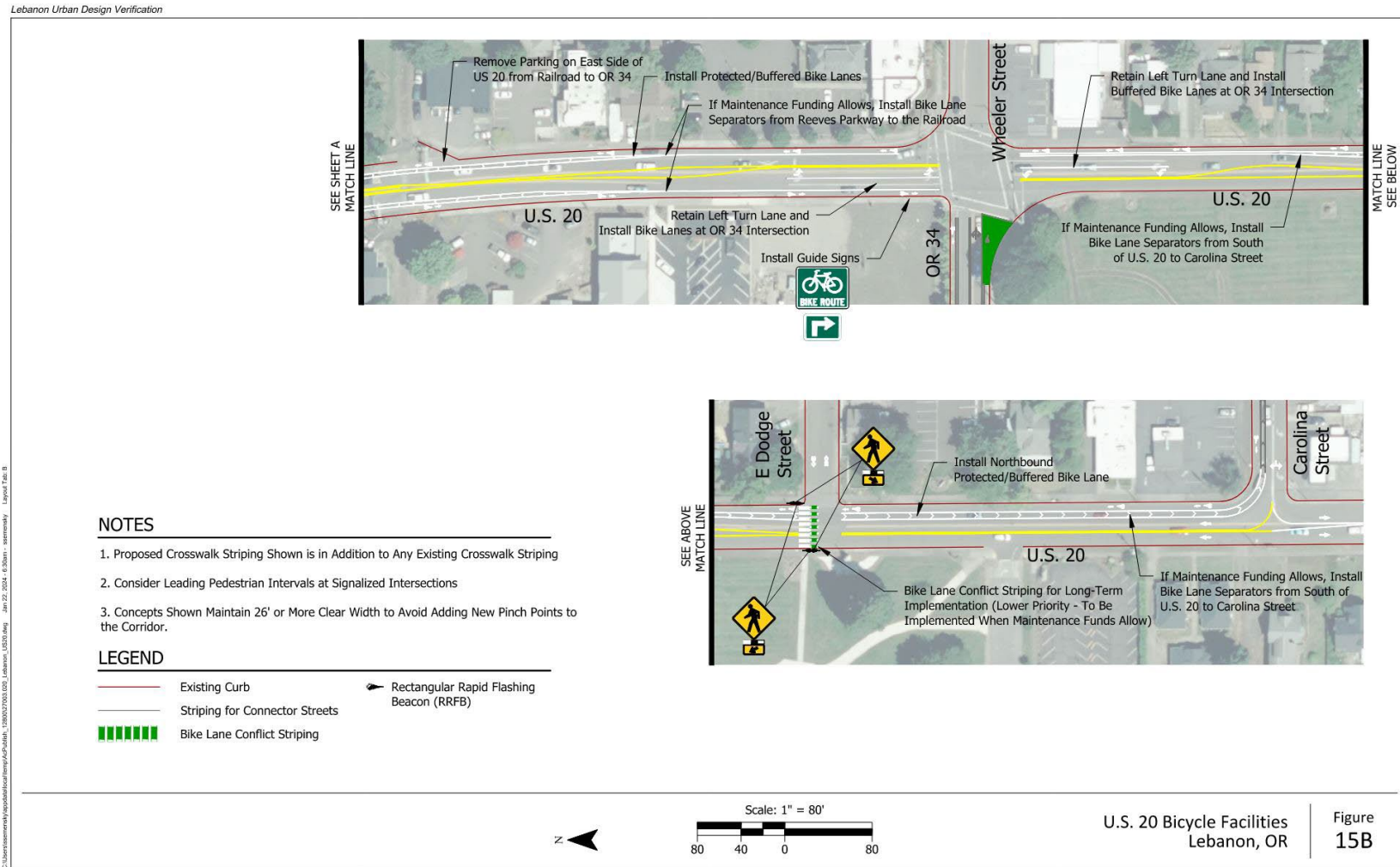
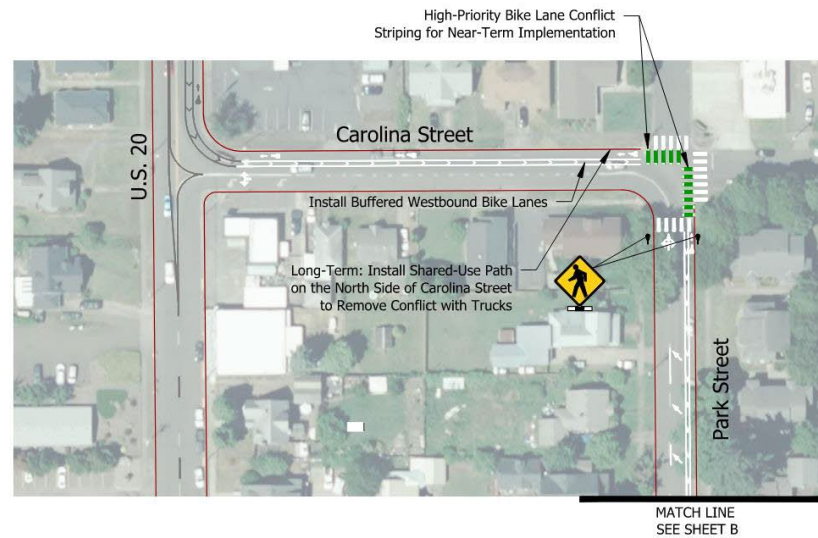


Figure 15B: U.S. 20 Bicycle Facilities Sheet B



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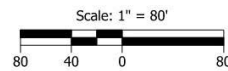


LEGEND

-  Existing Curb
-  Striping for Connector Streets
-  Bike Lane Conflict Striping
-  Rectangular Rapid Flashing Beacon (RRFB)

NOTES

1. Proposed Crosswalk Striping Shown is in Addition to Any Existing Crosswalk Striping
2. Concepts Shown Maintain 26' or More Clear Width to Avoid Adding New Pinch Points to the Corridor



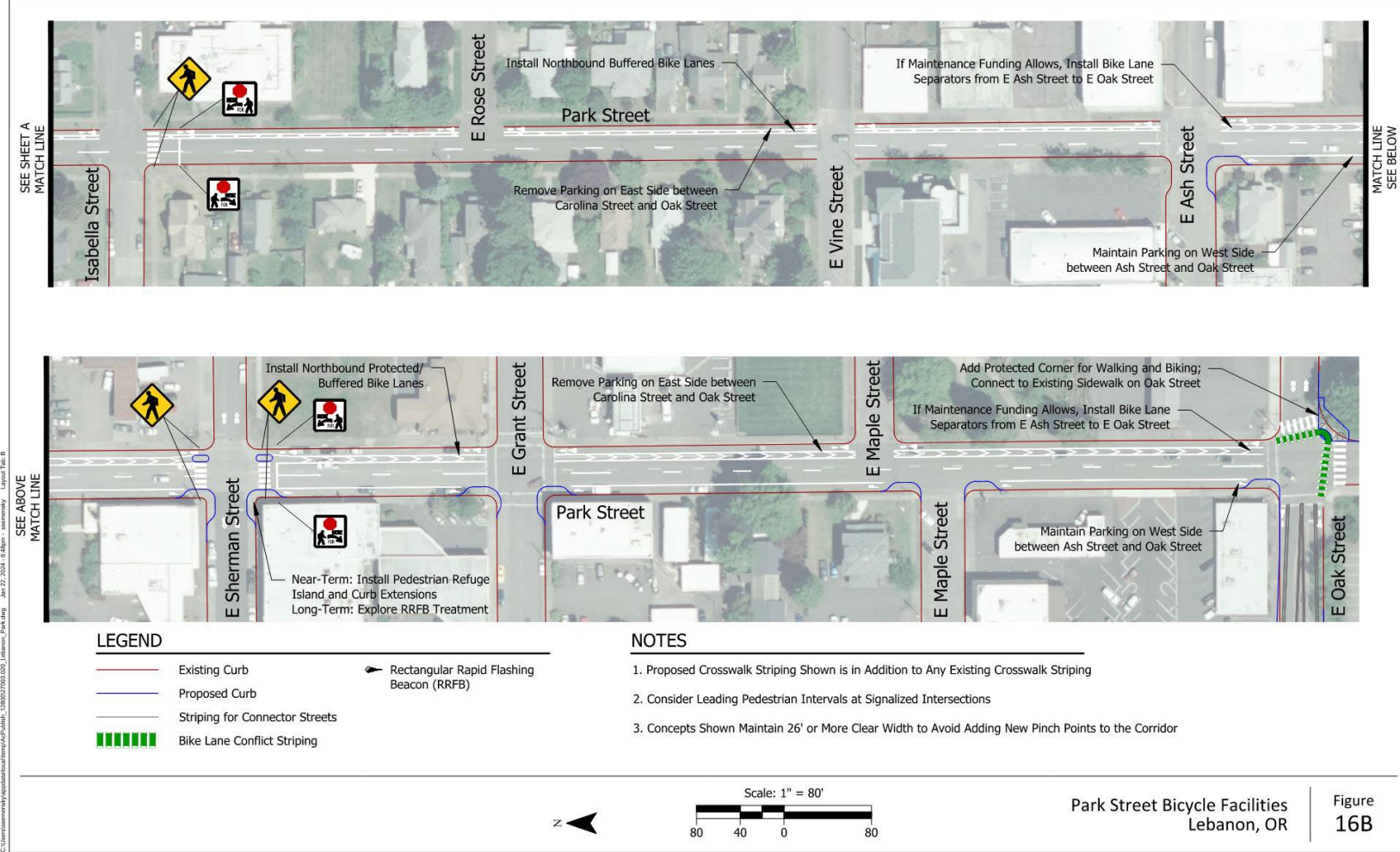
Park Street Bicycle Facilities
 Lebanon, OR

Figure
 16A



Figure 16A: Park Street Bicycle Facilities Sheet A

Lebanon Urban Design Verification



KITTELSON & ASSOCIATES

Park Street Bicycle Facilities
 Lebanon, OR
 Figure 16B

Figure 16B: Park Street Bicycle Facilities Sheet B

5TH STREET BIKEWAY PROJECTS AND CONCEPT DESIGNS

As a parallel route to the busy U.S. 20 highway, 5th Street provides a lower-stress biking environment with its lower speeds and traffic volumes. Enhancements to 5th Street will create an important north-south biking connection through town. Bike lanes already exist on 5th, but these bike lanes are substandard and should be upgraded to buffered lanes to provide comfortable travel for all ages and abilities. The street connects to important destinations like Lebanon High School and has lower parking utilization, making parking removal easier than on 2nd Street or Main Street. Note that the proposed parallel routes (5th Bikeway and Grove Street Bikeway) are on City streets and these projects would be the responsibility of the City. Without these parallel routes, bike facilities should be included on the highway where absent.

5th Street was identified as the key parallel route to improve as an alternative to making major changes like parking removal and/or removing a travel lane on U.S. 20 to provide bicycle facilities. If improvements are not made to 5th Street, these decisions regarding U.S. 20 need to be revisited.

While the following concepts are not all on 5th Street, they all support a more robust 5th Street Bikeway as a parallel route to the highway.

Figures 17A and 17B present the corridor from Reeves Parkway to just north of OR 34 (Tangent Street). For this section, a buffered bike lane can be striped throughout. North of Mary Street, parking on one side (as existing) and buffered bike lanes can fit within the existing curb. South of Mary Street, parking will need to be removed or the street will need to be widened to provide parking and buffered bike lanes. The City has a planned reconstruction of 5th Street south of Mary Street, and 5th Street may be widened during this time to provide parking and buffered bike lanes. If parking is provided in the future, there may not be space for a landscape strip between the sidewalk and roadway.

Figure 17C presents a neighborhood bikeway connection on Mary Street and N Main Street to U.S. 20. This continues across U.S. 20 on Industrial Way to ultimately connect to the Grove Street Bikeway.

Figures 17D, 17E, and 17F present the corridor from just north of OR 34 (Tangent Street) to Airport Road. Parking will need to be removed from this section to provide space for the bike lane improvements. With the reconfiguration, buffered bike lanes can fit throughout except in constrained sections, where a standard bike lane can be provided.

There are two sections along 5th Street that will require a phased approach for implementation. The first involves the section adjacent to Century Park, where community members expressed concern with removing parking. For this reason, a standard bike lane and parking (the existing configuration) is recommended to remain along the block adjacent to Century Park until parking on Carolina Street just north of the park can be reconfigured to angled parking to make up for the lost parking capacity on 5th Street. The second location involves the intersection with Airport Road. This is an important connection for people biking to school, but there is not space to maintain the turn lane at Airport Road and provide an on-street bike facility. Widening is recommended through that section to provide both.

Figures 17G, 17H and 17I present the 5th Street Bikeway south of Airport Road. Through this section, the bikeway goes from 5th Street to Kees Street to S Main Street to Market Street. It is recommended to create a shared use path connection from Market Street to the existing path just south of Market Street on U.S. 20. As documented in the Lebanon TSP, this path will ultimately connect to the southern Urban Growth Boundary.

This connection is a shared street/neighborhood bikeway on 5th Street and Kees Street. Restriping to 10 foot travel lanes (which aligns with the Lebanon TSP) is needed on S Main Street to provide buffered bike lanes on this stretch. Removal of the two-way left turn lane on Market Street and turn lanes at S Main Street/Market Street and U.S. 20/Market Street are recommended to provide bike facilities on Market Street. The bike connection on Market Street was a key connection recommended by community members. Operational analyses show minimal impact to operations on Market Street with these changes.

Figures 17J and 17K present the connection from U.S. 20 to the 5th Street Bikeway via Oak Street and Airport Road. The Oak Street connection will require reconstruction and is therefore likely a longer-term implementation project. It is recommended to provide sharrows and signing onto Sherman Street as a bikeway connection to the highway and beyond to the Grove Street Bikeway in the meantime. A protected corner is recommended at the intersection of Park Street and Oak Street to help support pedestrian crossings at the intersection and support an eastbound to northbound left turn movement for bicyclists. Restriping on Airport Road to narrow lanes and provide buffered bike lanes can occur in the near-term.



Photo: Kittelson and Associates, Inc.

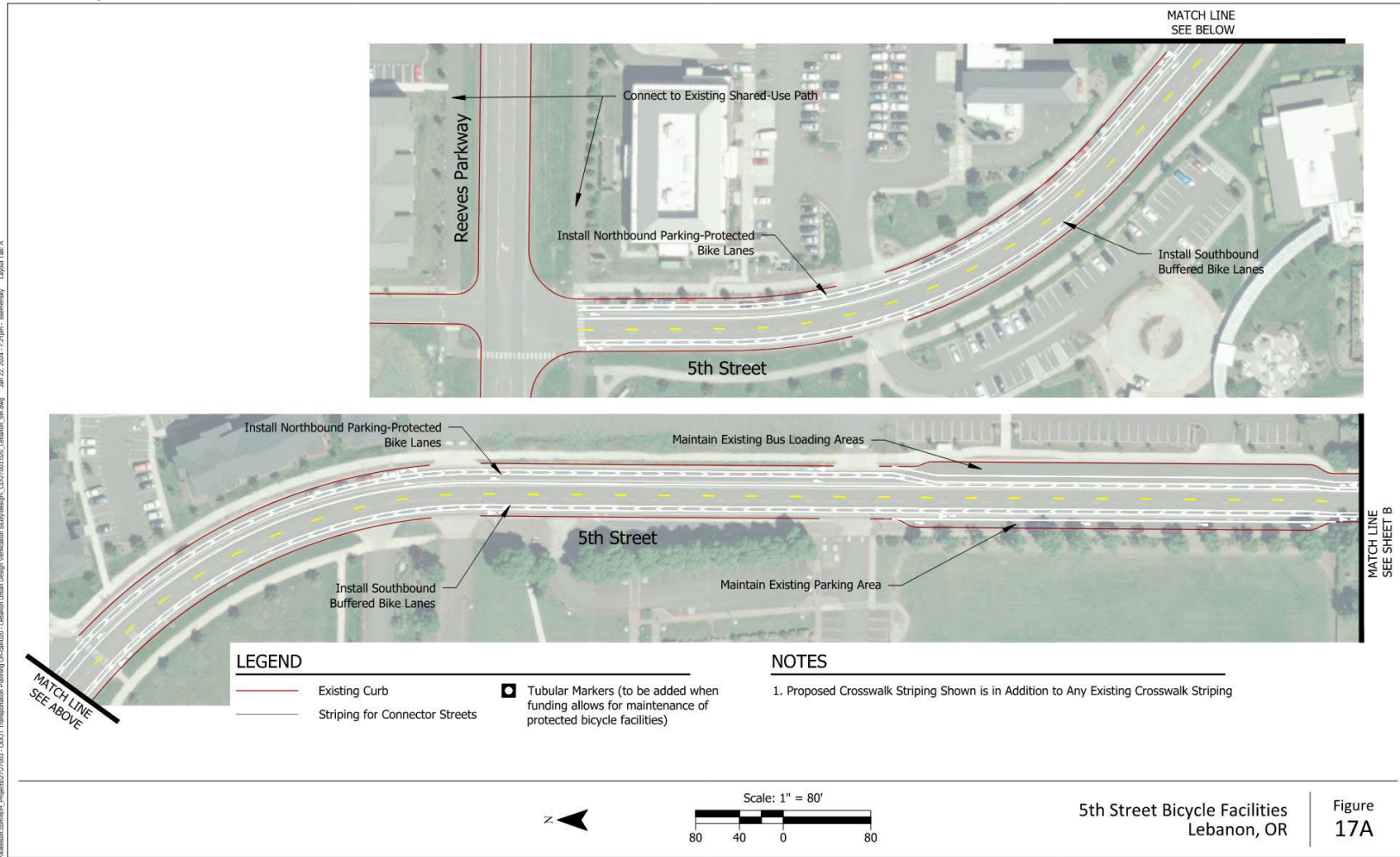
Table 6: 5th Street Bikeway Projects

Project ID	Concept ID	Project Name	Street(s)	Start	End	Project Description	Cost	Jurisdiction	Notes
F-1	17A, 17B, 17D, 17E, 17F, 17G	5th Street Bike Facilities	5th Street	Reeves Parkway	Kees Road	Restripe to add buffered bike lanes on 5th Street from Reeves Parkway to W Maple Street, then bike lanes to F Street, and buffered bike lanes from F Street to Airport Road. Provide sharrows from Airport Road to Kees Street. Will require parking removal in some stretches. Reconfigure parking on the north side of Century Park to angled parking to account for loss of parking on 5th Street. Will require widening at Airport Road to provide turn lanes and bike lanes. This can be implemented in phases as appropriate.	\$4,287,000	City of Lebanon	Potential for Safe Routes to School funding due to direct connection to Lebanon High School; cost estimate assumes full grind and inlay but does not include parking reconfiguration at Century Park.
F-2	17G	5th Street Connection: Kees Street	Kees Street	5th Street	S Main Street	Restripe to add sharrows and signs for a neighborhood route connection	\$30,000	City of Lebanon	
F-3	17G, 17H	5th Street Connection: S Main Street	S Main Street	Kees Street	Market Street	Restripe to add buffer to bike lane; will require narrower (9.5' - 10') lane widths.	\$871,000	City of Lebanon	
F-4	17I	5th Street Connection: Market Street	Market Street	S Main Street	Santiam Highway	Restripe to add buffered bike lanes and remove the turn lanes on Market Street, including the center turn lane, turn lanes at S Main Street, and turn lanes onto Santiam Highway. Operations analysis shows little to no operational impact with right turn lane removal at Santiam Highway.	\$644,000	City of Lebanon	Public input identified this as a high priority connection.

Project ID	Concept ID	Project Name	Street(s)	Start	End	Project Description	Cost	Jurisdiction	Notes
F-5	17C	5th Street Connection: W Mary Street and N Main Street	W Mary Street and North Main Street	5th Street	Santiam Highway	Restripe to add sharrows and signs for a neighborhood route connection between 5th Street and U.S. 20.	\$45,000	City of Lebanon	This project will be most useful if phased with the recommended crossing enhancements at U.S. 20/Industrial Way.
F-6	17D	5th Street Connection: Sherman Street	Sherman Street	5th Street	Grove Street	Restripe to add sharrows and signs for a neighborhood route connection between 5th Street and Grove Street.	\$68,000	City of Lebanon	This is a high priority for near-term implementation, as the Oak Street connection will likely take longer to implement, making this Sherman Street connection more critical. This project will be most useful if phased with the recommended crossing enhancements at Park Street.
F-7	17J	5th Street Connection: Oak Street	Oak Street	5th Street	Park Street	Widen to add buffered or protected bike lanes from 5th Street to Park Street. Provide protected SE corner at Park Street to facilitate bicyclists making a left onto Park Street.	\$1,800,000	City of Lebanon/O DOT at intersections with Main Street and Park Street	
F-8	17K	5th Street Connection: Airport Road	Airport Road	5th Street	Santiam Highway	Restripe to provide buffered bike lanes.	\$530,000	City of Lebanon	

Note: There is currently no City funding available for the projects listed in the table. Completion of these projects would only happen if funding becomes available.

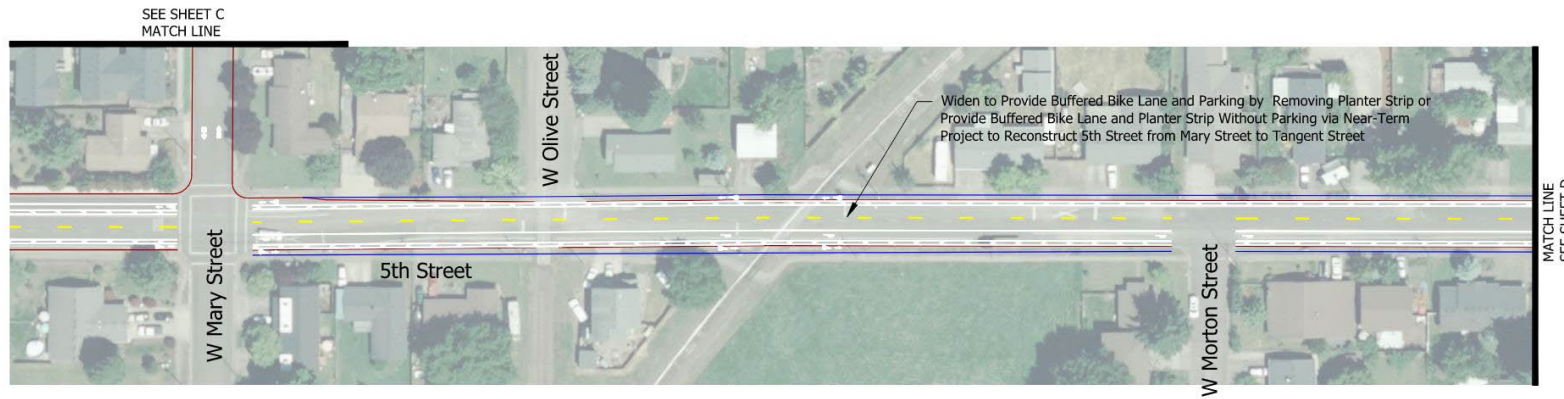
Lebanon Urban Design Verification



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Figure 17A: 5th Street Bicycle Facilities Sheet A

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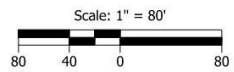


LEGEND

- Existing Curb
- Proposed Curb
- Striping for Connector Streets
- Rectangular Rapid Flashing Beacon (RRFB)

NOTES

1. Proposed Crosswalk Striping Shown is in Addition to Any Existing Crosswalk Striping
2. Consider Leading Pedestrian Intervals at Signalized Intersections



5th Street Bicycle Facilities
 Lebanon, OR

Figure
 17B



Figure 17B: 5th Street Bicycle Facilities Sheet B

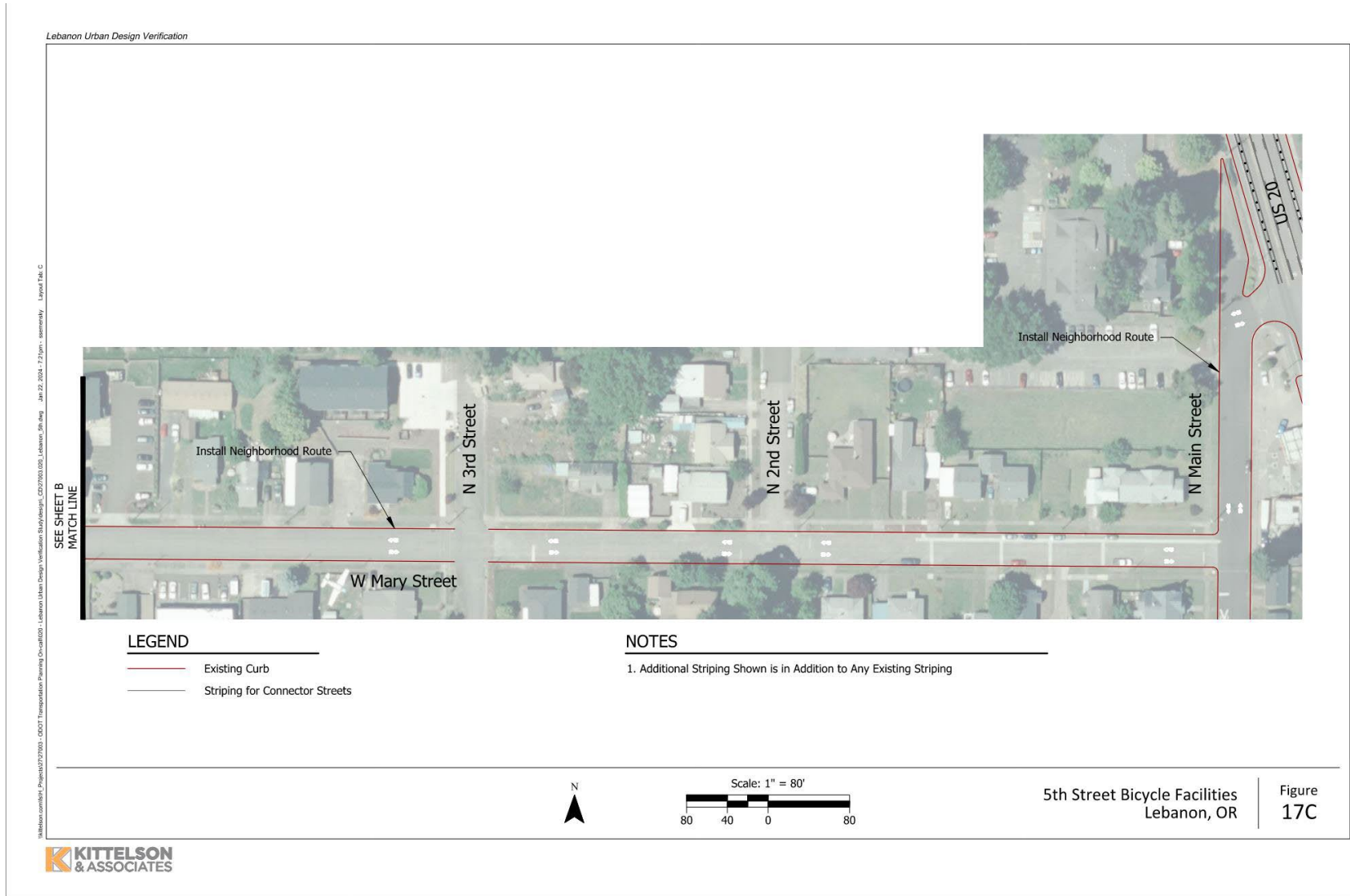


Figure 17C: 5th Street Bicycle Facilities Sheet C

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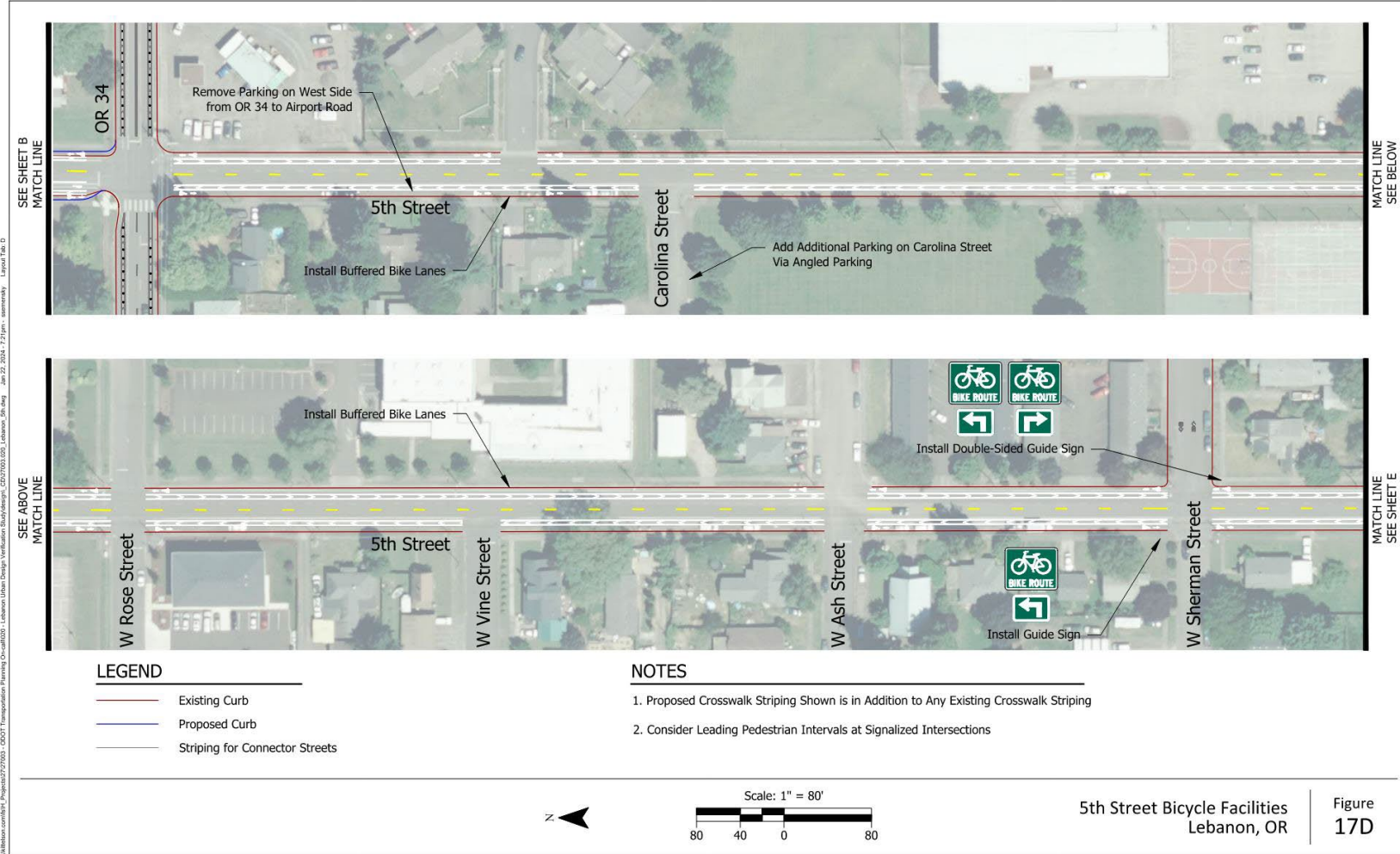


Figure 17D: 5th Street Bicycle Facilities Sheet D

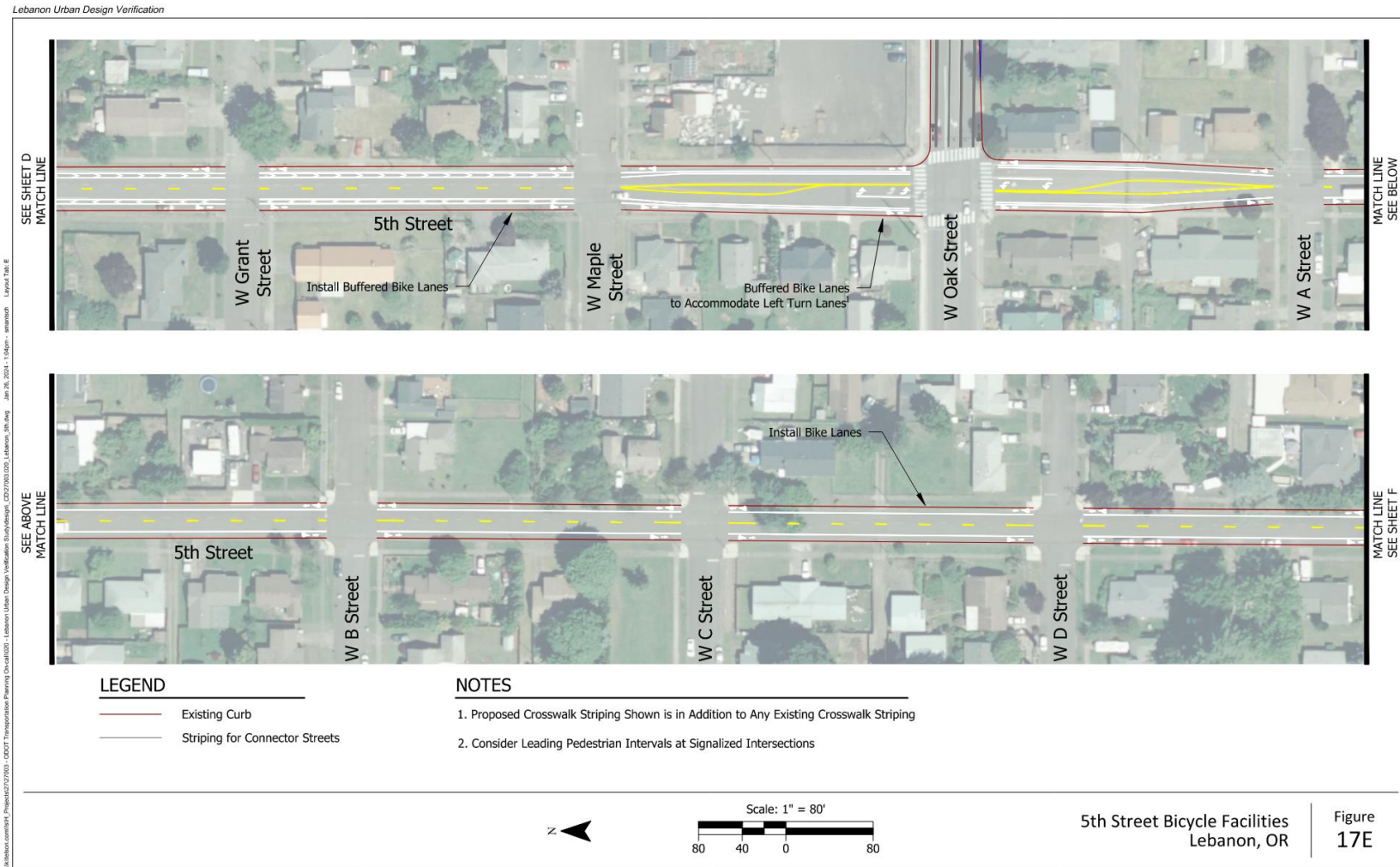


Figure 17E: 5th Street Bicycle Facilities Sheet E

Lebanon Urban Design Verification

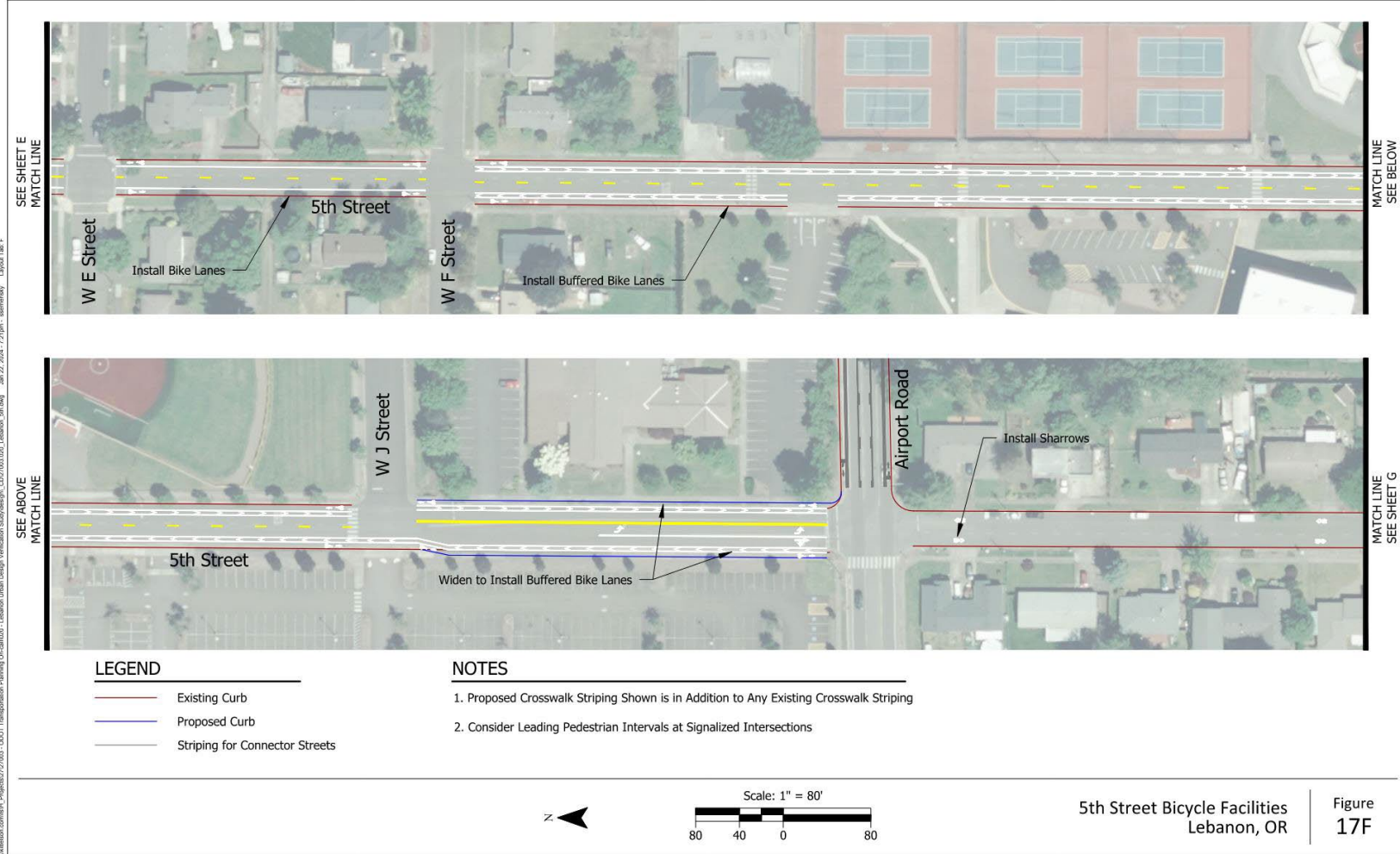


Figure 17F: 5th Street Bicycle Facilities Sheet F

Lebanon Urban Design Verification

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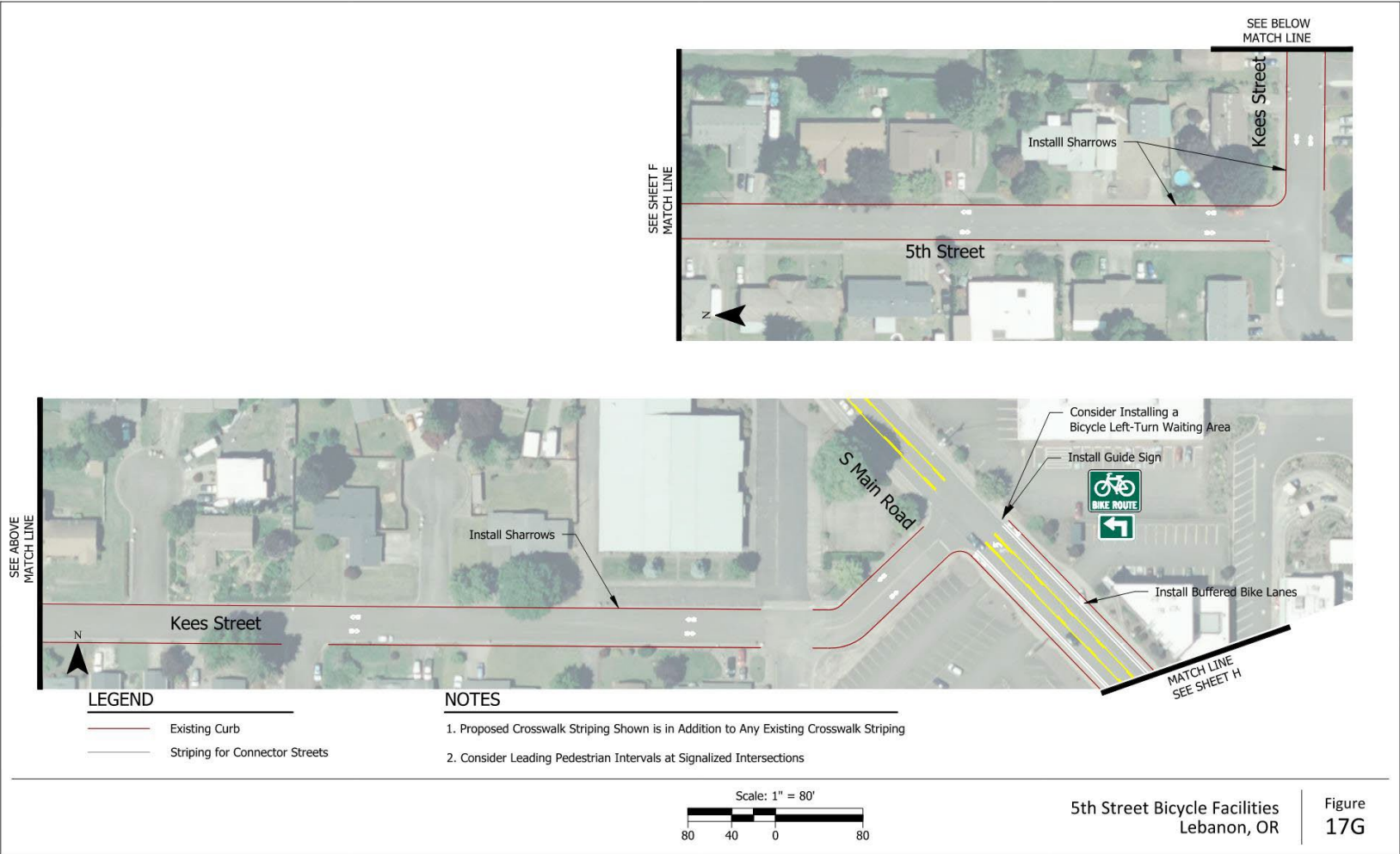


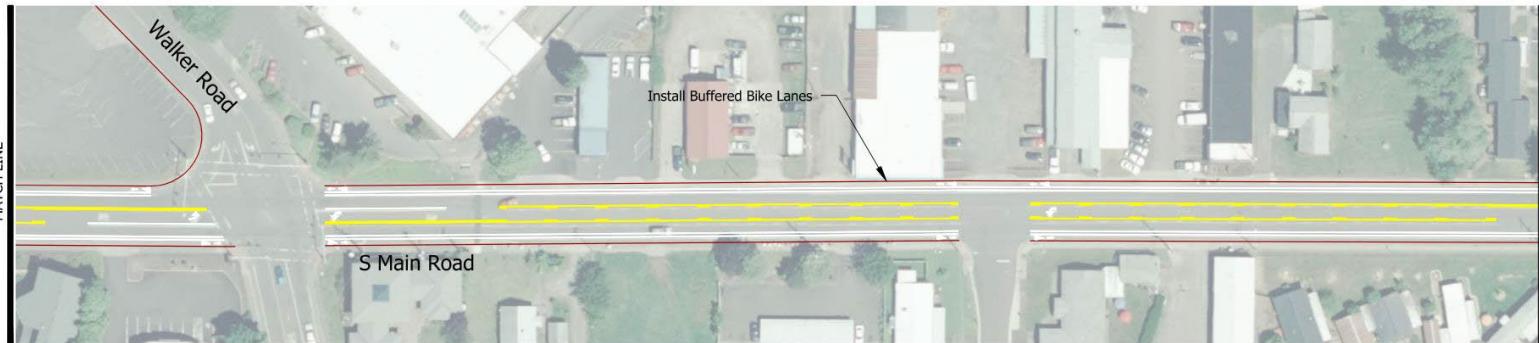
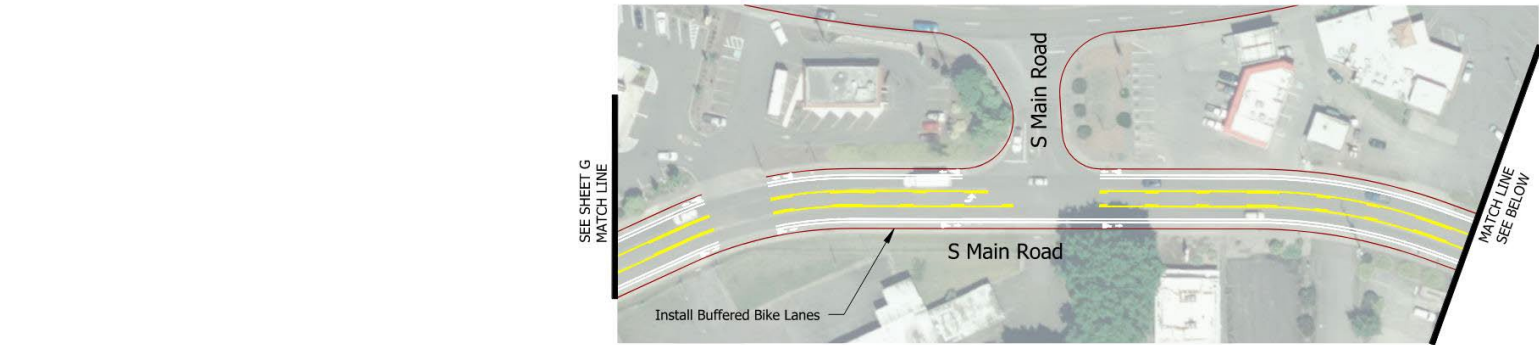
Figure 17G

Figure 17G: 5th Street Bicycle Facilities Sheet G



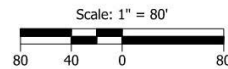
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- LEGEND**
- Existing Curb
 - Striping for Connector Streets

- NOTES**
1. Proposed Crosswalk Striping Shown is in Addition to Any Existing Crosswalk Striping
 2. Consider Leading Pedestrian Intervals at Signalized Intersections



5th Street Bicycle Facilities
 Lebanon, OR

Figure
 17H



Figure 17H: 5th Street Bicycle Facilities Sheet H

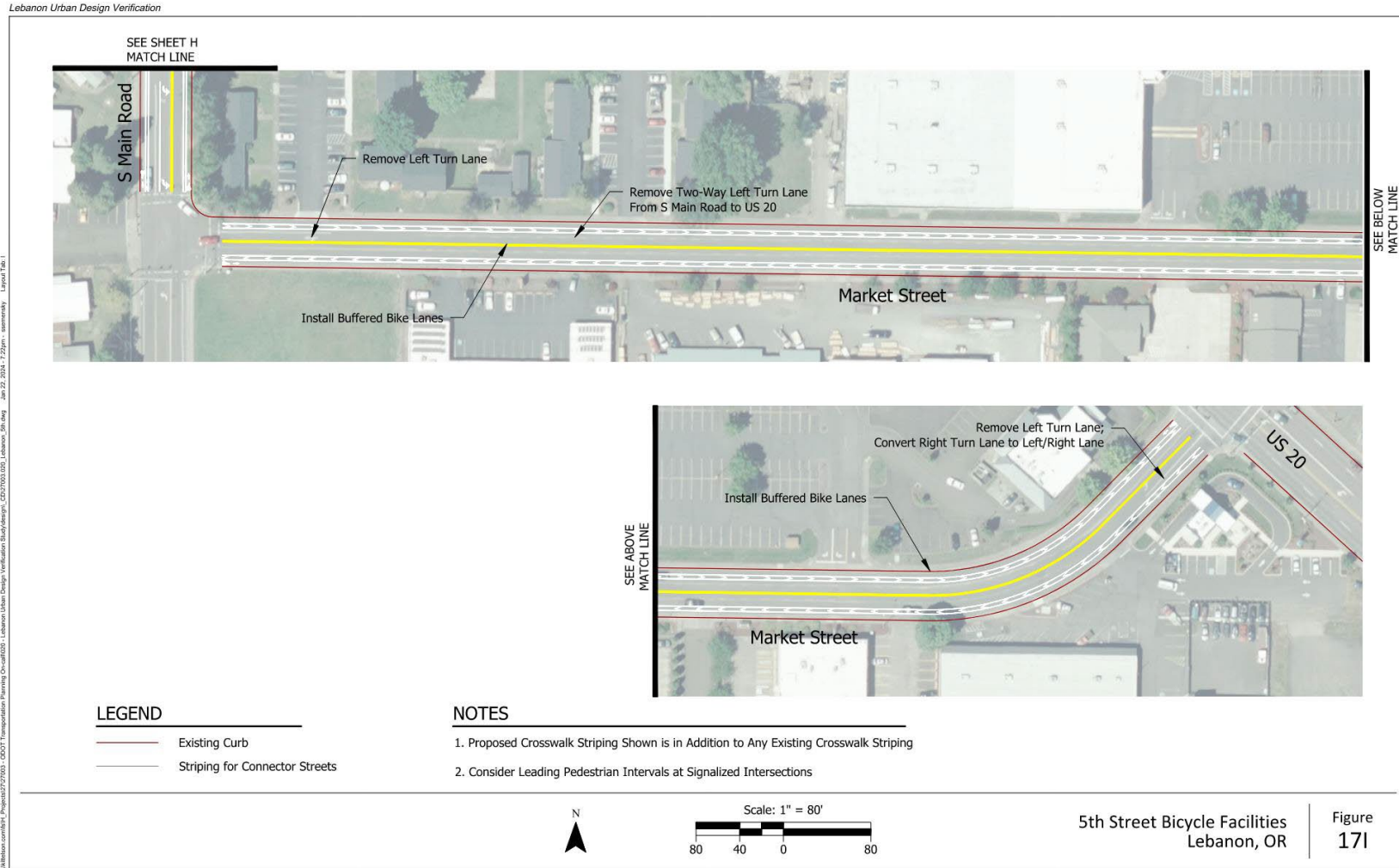


Figure 171: 5th Street Bicycle Facilities Sheet I

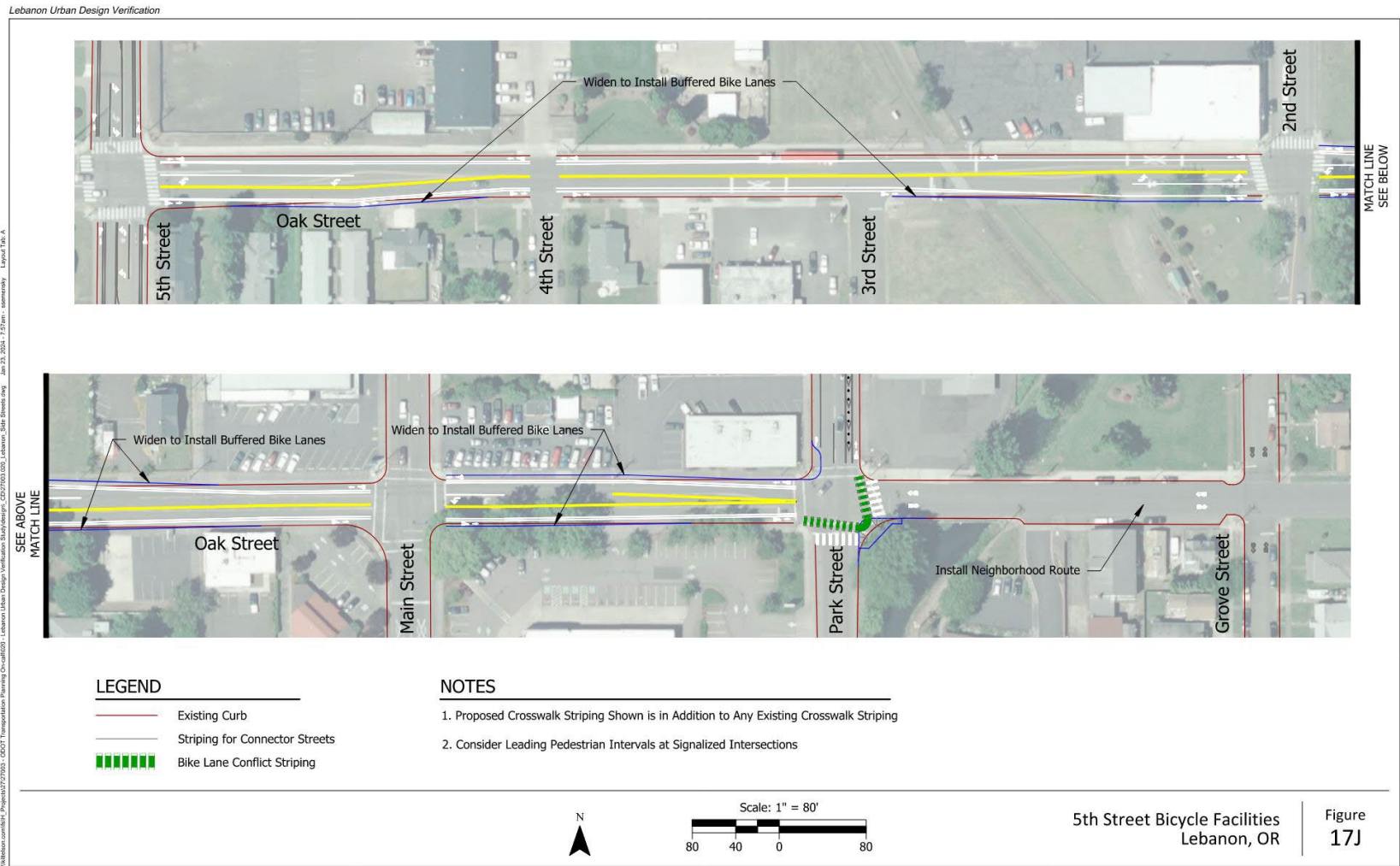
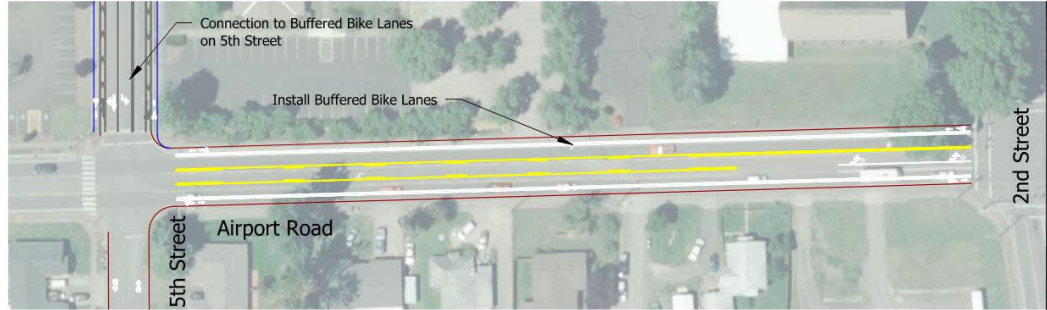


Figure 17J: 5th Street Bicycle Facilities Sheet J

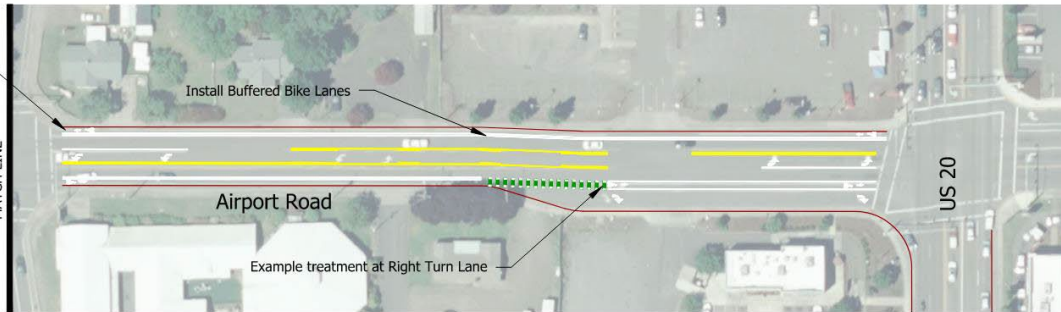


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Perform Safety and Operational Analysis to Evaluate Ability to Remove Left Turn Lanes to Provide Wider Bike Connection

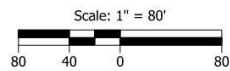


LEGEND

-  Existing Curb
-  Striping for Connector Streets
-  Bike Lane Conflict Striping

NOTES

1. Proposed Crosswalk Striping Shown is in Addition to Any Existing Crosswalk Striping
2. Consider Leading Pedestrian Intervals at Signalized Intersections



5th Street Bicycle Facilities
Lebanon, OR

Figure
17K



Figure 17K: 5th Street Bicycle Facilities Sheet K

GROVE STREET BIKEWAY PROJECTS AND CONCEPT DESIGNS

As a parallel route to the busy U.S. 20 highway, Grove Street provides a lower-stress biking environment for those to the east of the highway. Bike route signage already exists in some locations on Grove Street, but there are some additional treatments recommended to improve the wayfinding for the parallel route and to improve the visibility of the bike route. Enhancements to Grove Street will create an important north-south biking connection through town to the east of U.S. 20.

While the following concepts are not all on Grove Street, they all support a more robust Grove Street Bikeway as a parallel route to the highway.

Figures 18A and 18B present the northern connection to and from U.S. 20. The connection is made via a shared street/neighborhood bikeway on Industrial Way that connects to the existing and proposed trail system. That trail system is anticipated to get the bicyclists to the intersection of Williams Street and Wheeler Street. If the trail system is not constructed, neighborhood bikeway treatments (sharrows and signage) should be provided all the way to Wheeler Street.

Speeds and volumes are higher on Wheeler Street and it is a freight route, so buffered bike lanes are recommended to make the connection to Grove Street. This will require parking removal for the short section of Wheeler Street.

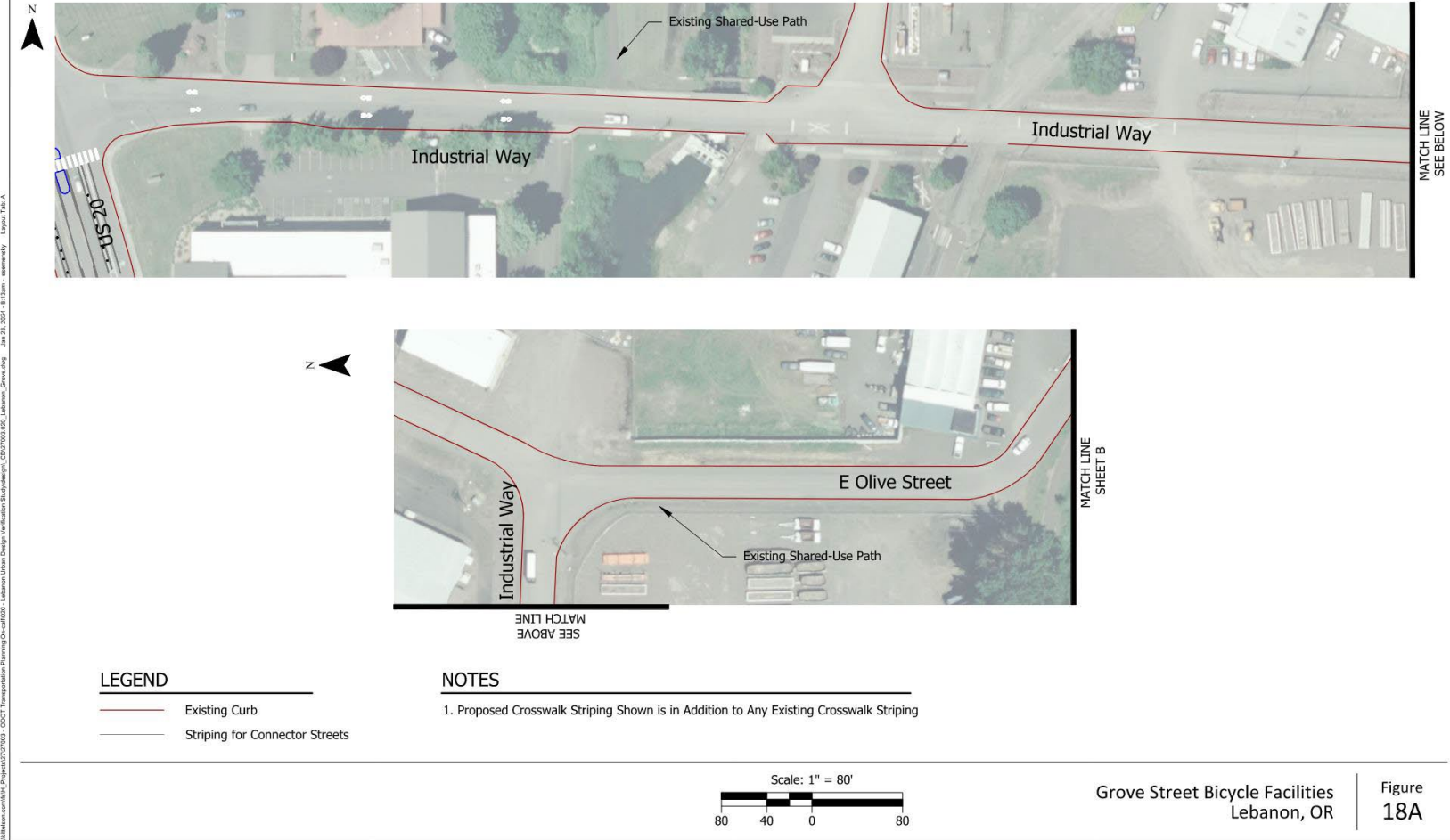
Figures 18C, 18D, 18E, and 18F present neighborhood bikeway treatments on Grove Street, Elmore Street, and Franklin Street to the path connection on Russell Drive. In the future, as volumes increase on Franklin Street with development, bike lanes should be provided instead.

Figures 18G and 18H show the connection with the shared use path on the south side of Russell Street, wayfinding from those facilities to Willow Street, then neighborhood bikeway treatments on Willow Street, Primrose Street, and Dewey Street. When Dewey Street is realigned with Walker Road, bike lanes should be provided on Dewey Street. If improvements are made on Walker Road, too, adding bike facilities would provide a full connection between the Grove Street Bikeway and the 5th Street Bikeway.

Table 7: Grove Street Bikeway Projects

Project ID	Concept ID	Project Name	Street(s)	Start	End	Project Description	Cost	Jurisdiction	Notes
G-1	18A	Industrial Way Connection	Industrial Way	U.S. 20 (Main Street)	Albany/Santiam Canal Trail	Provide sharrows on Industrial Way near Santiam Highway and bike route wayfinding connecting to the existing and planned shared use path connections from Industrial Way to Wheeler Street.	\$12,000	City of Lebanon	
G-2	18B	Wheeler Street Connection	Wheeler Street	Williams Street	Grove Street	Remove parking and provide buffered bike lanes on Wheeler Street from Williams to Grove Street.	\$152,000	City of Lebanon	
G-3	18C, 18D, 18E, 18F, 18G	Grove Street/Elmore Street/Franklin Street Bikeways	Grove Street/Elmore Street/Franklin Street	Wheeler Street	Russell Drive	Restripe to add sharrows and signs for a neighborhood route connection between Wheeler Street and Russell Drive. Provide wayfinding to the shared use path on the south side of the street on Russell Drive.	\$264,000	City of Lebanon	As development occurs on Franklin Street, a bike lane will be necessary to provide proper separation and should be required with development.
G-4	18G, 18H	Russell Drive/Willow Street/Primrose Street/Dewey Street Bikeways	Russell Drive/Willow Street/Primrose Street/Dewey Street	Franklin Street	U.S. 20 (Santiam Highway)	Provide wayfinding on Russell Street then restripe to add sharrows on Willow Street, Primrose Street, and Dewey Street to provide connection to Santiam Highway. When Dewey Street is realigned, provide bike lanes on Dewey Street.	\$79,000	City of Lebanon	

Lebanon Urban Design Verification



Grove Street Bicycle Facilities
 Lebanon, OR

Figure
 18A

Figure 18A: Grove Street Bicycle Facilities Sheet A

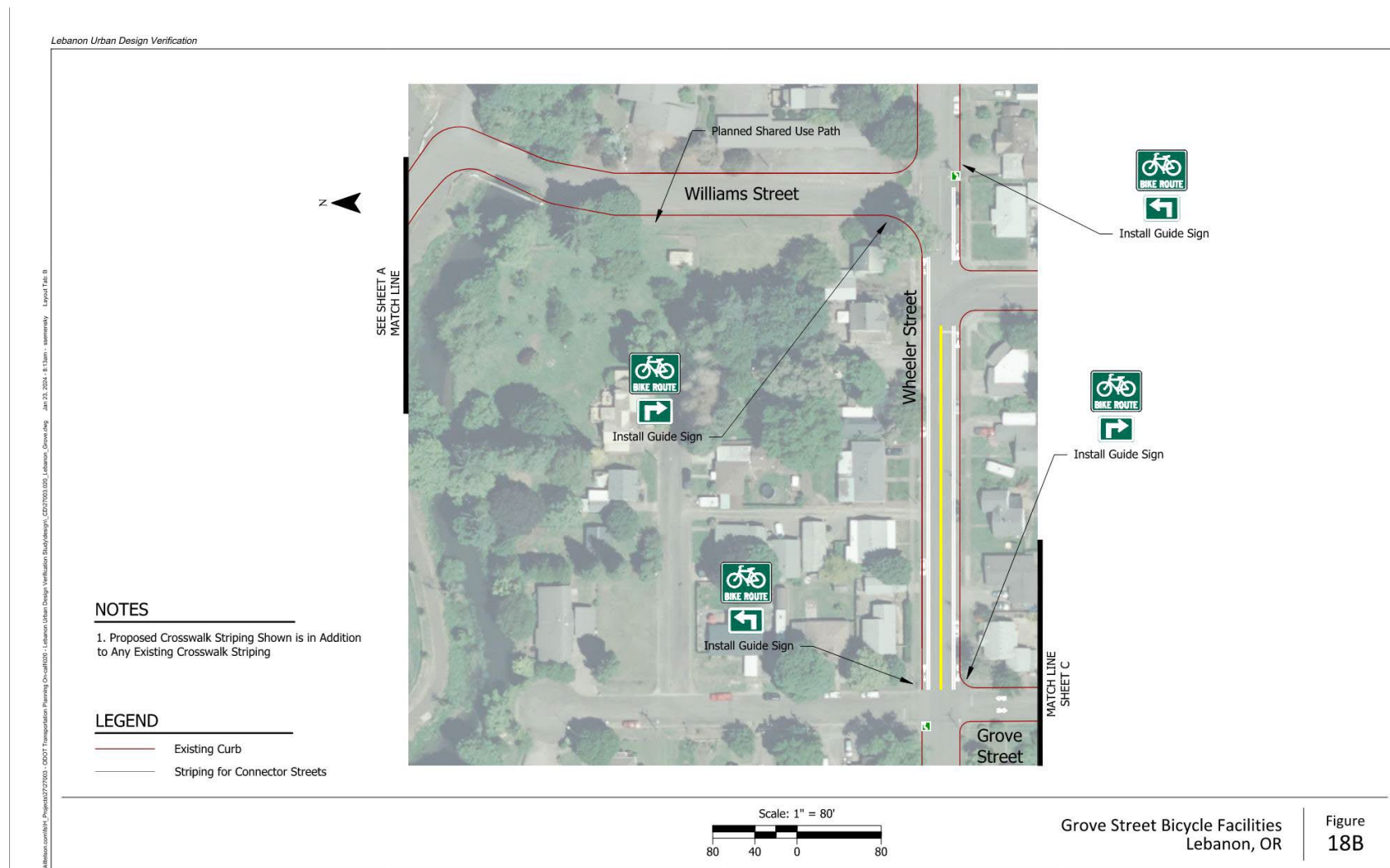


Figure 18B: Grove Street Bicycle Facilities Sheet B

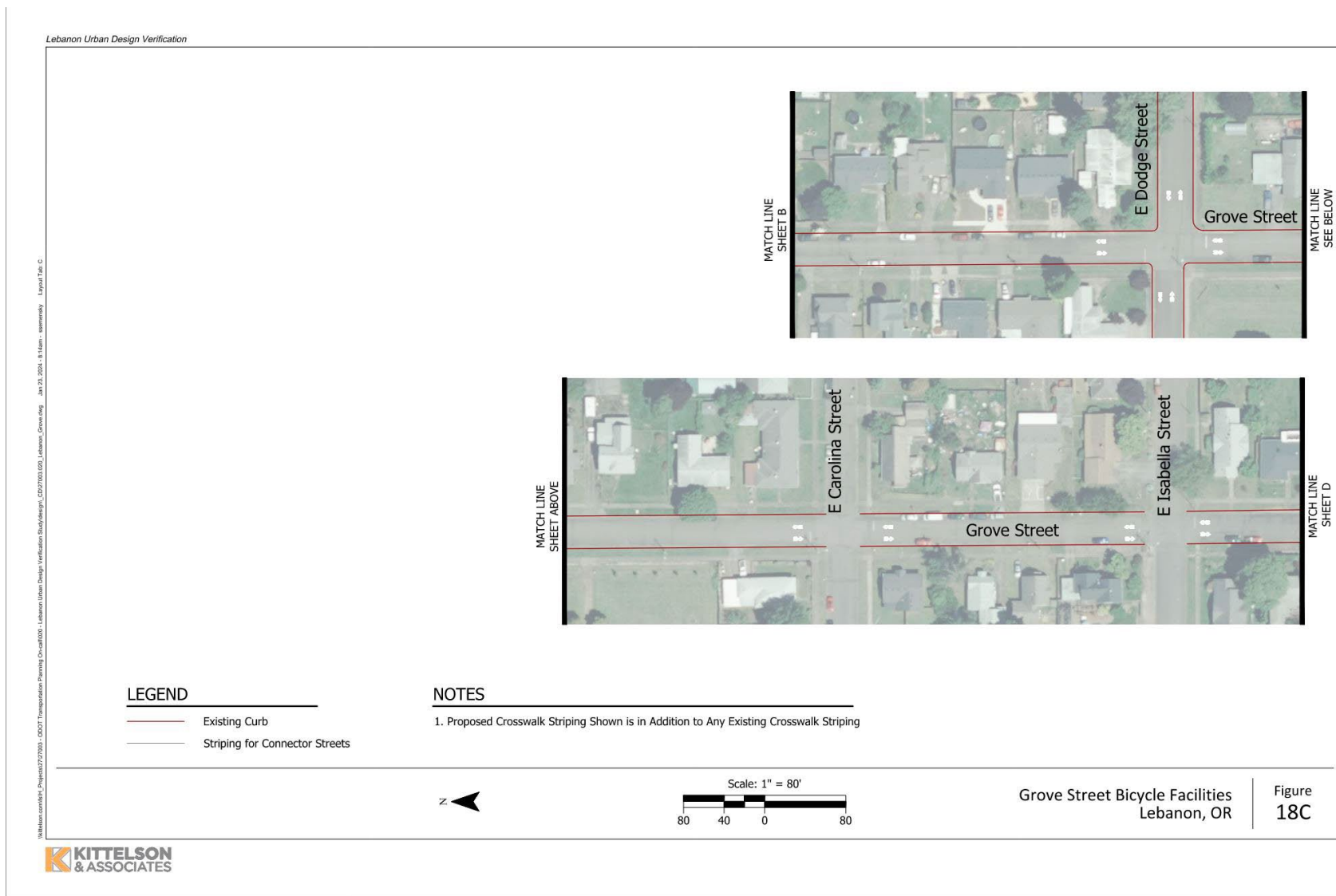


Figure 18C: Grove Street Bicycle Facilities Sheet C

Lebanon Urban Design Verification

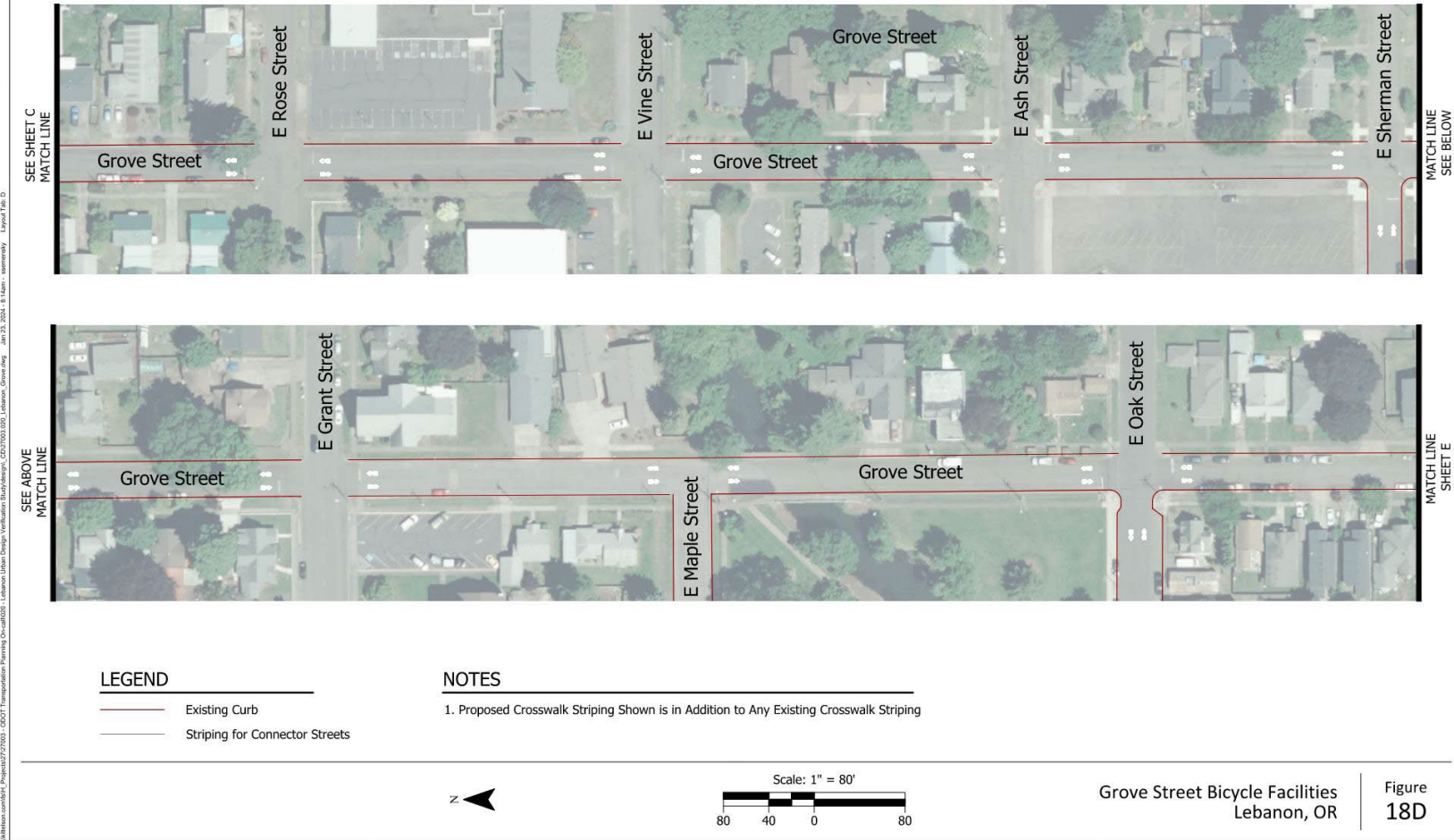


Figure 18D: Grove Street Bicycle Facilities Sheet D

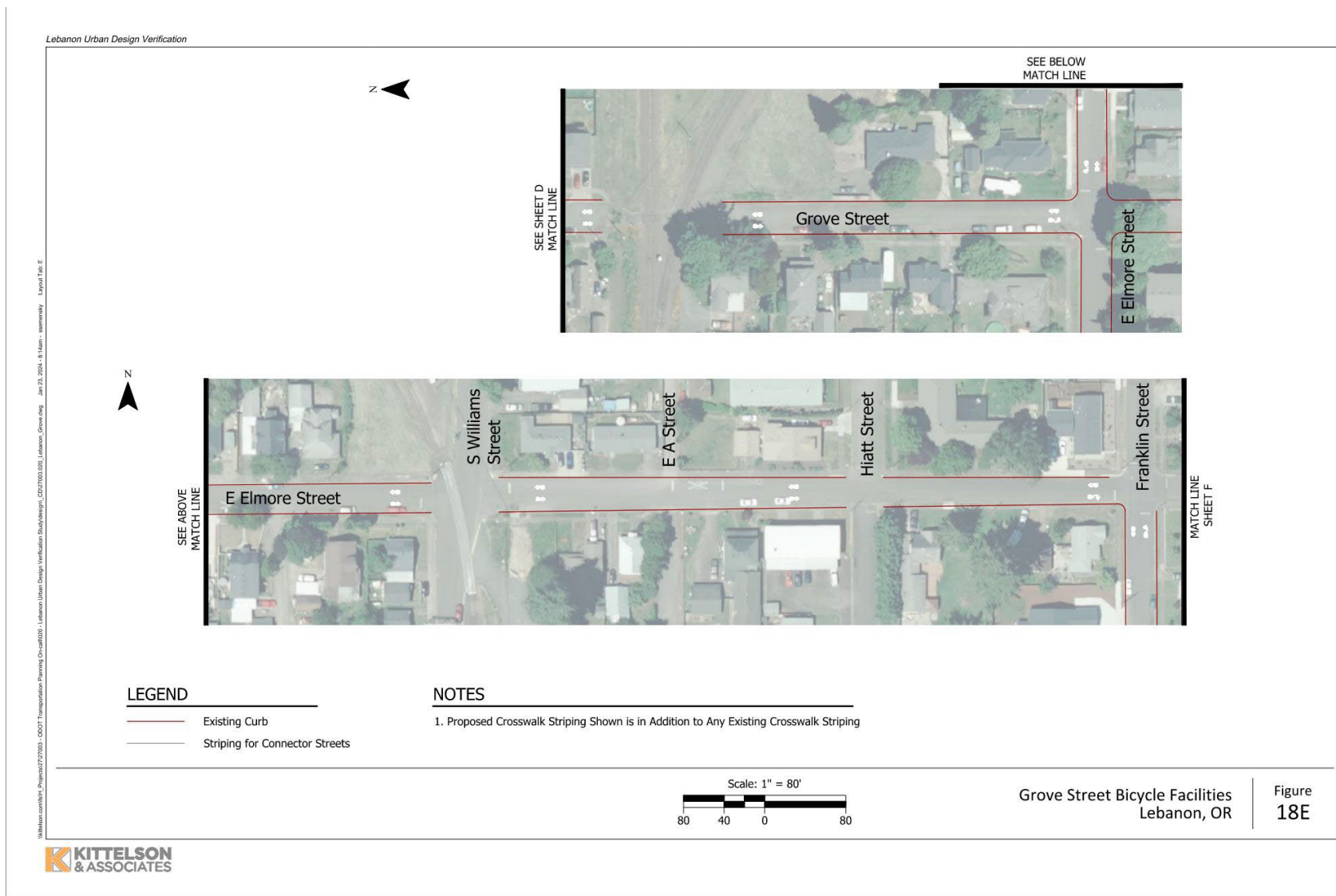


Figure 18E: Grove Street Bicycle Facilities Sheet E

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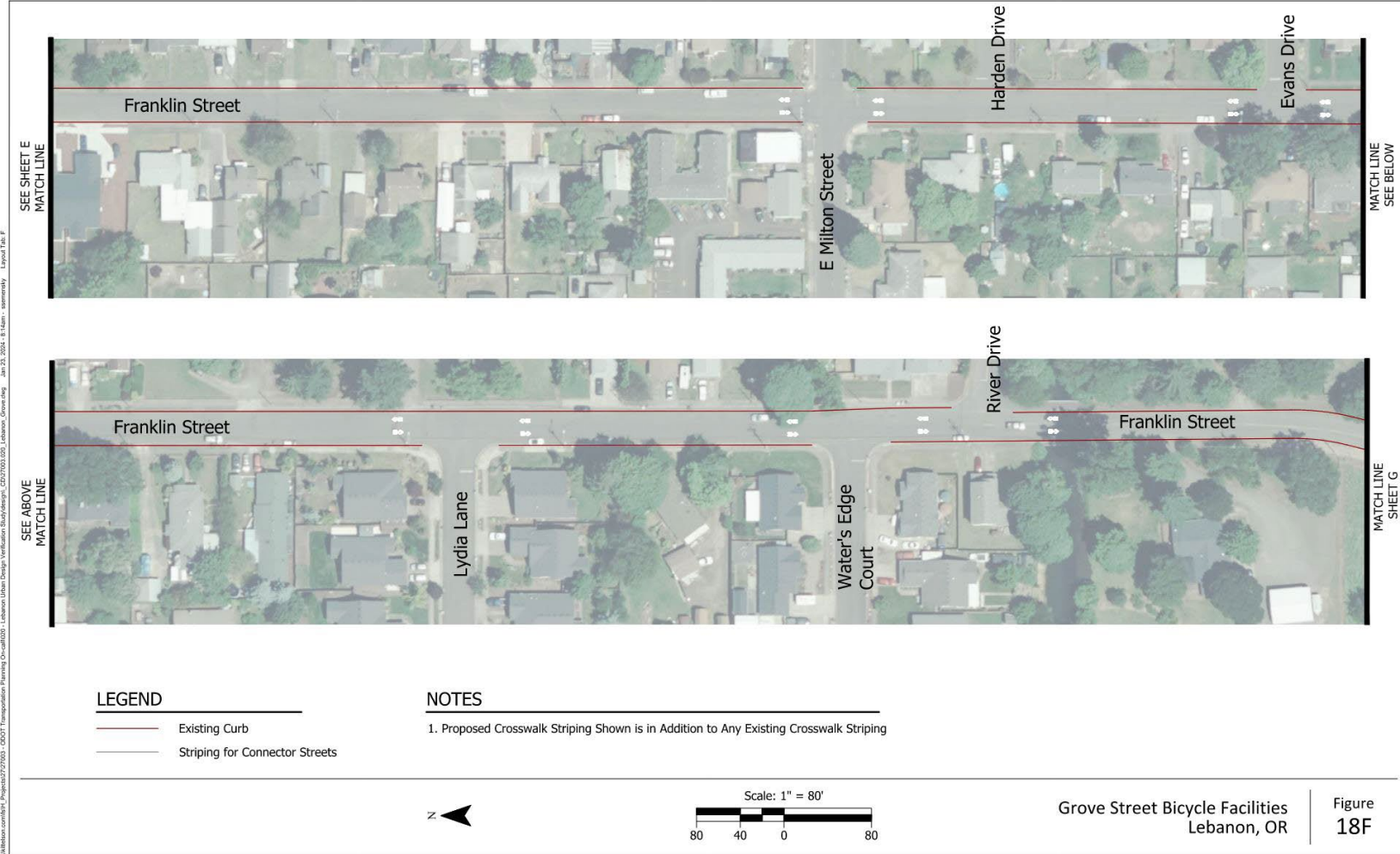


Figure 18F: Grove Street Bicycle Facilities Sheet F

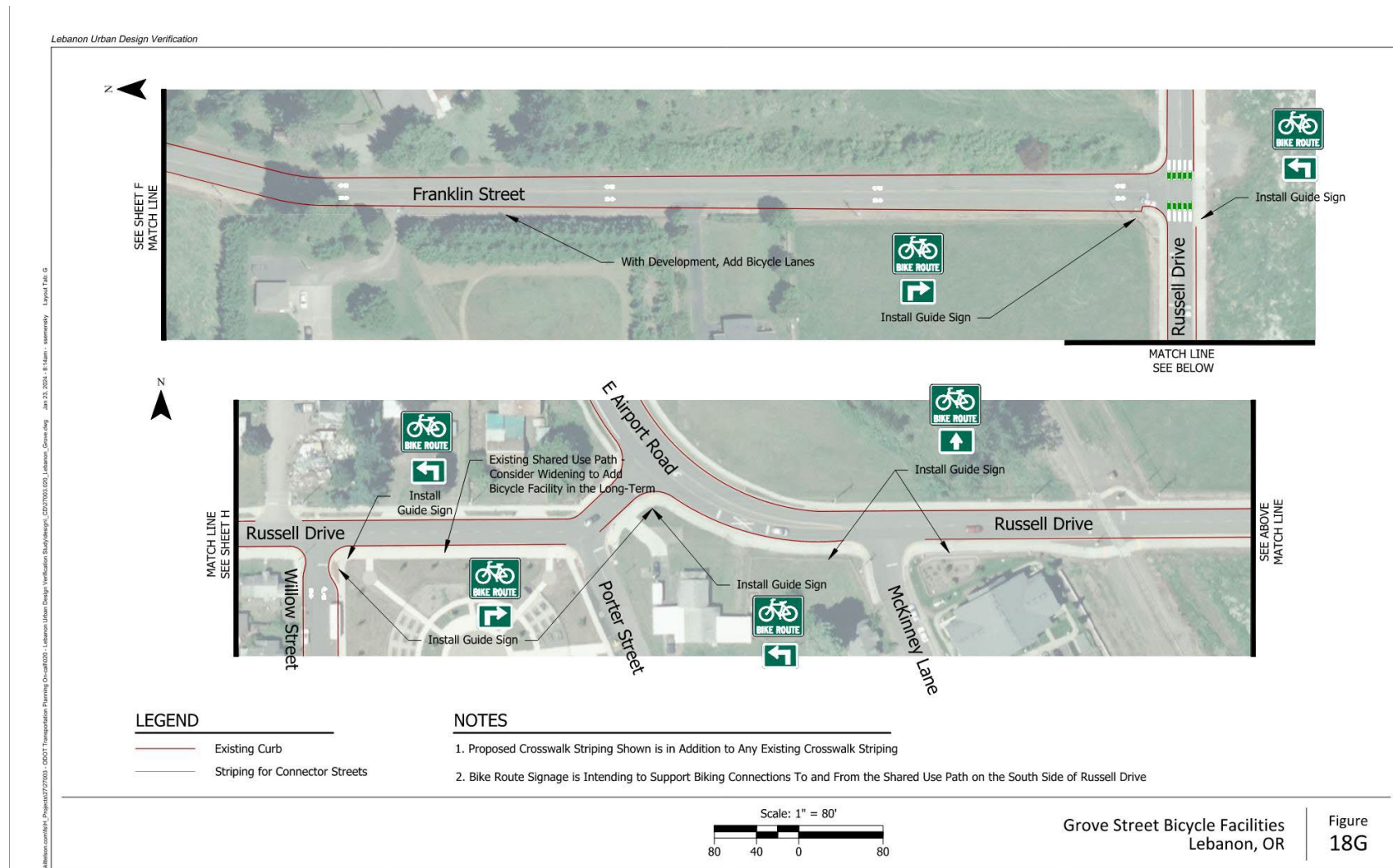


Figure 18G: Grove Street Bicycle Facilities Sheet G

ENHANCED CROSSING PROJECTS AND CONCEPT DESIGNS

Crossing enhancements are recommended at multiple locations within the study area to provide better walking and biking connectivity and access across the highways. Locations were selected based on target crossing spacing for the urban context, nearby land uses and origin/destination patterns, and public input. Crossing enhancement recommendations are based on speeds, volumes, field observations, and context for each location. Crossing treatments were selected for each location based on the number of lanes crossed, traffic volumes and speeds, and surrounding context. Most recommendations are directly based on ODOT's crossing enhancement guidance (ODOT Traffic Manual, Table 310.3-A), and this guide should be referenced when making final design decisions. However, the presented enhancements at 2nd Street on OR 34 are higher visibility than typical treatments for the context because of the proximity to the Senior Center and Library and therefore the higher number of children and older adults that will be using the crossings.

Both side-mounted and overhead-mounted enhanced crossings are recommended, depending on the context of the crossing. Overhead mounts are most appropriate at locations with longer crossing distances or higher volumes and/or speeds. Side-mounted enhanced crossings are considerably less costly but are less visible in areas with higher speeds and volumes, especially with multiple lanes. Final designs should be based off ODOT's recommended crossing treatments (ODOT Traffic Manual, Table 310.3-A).

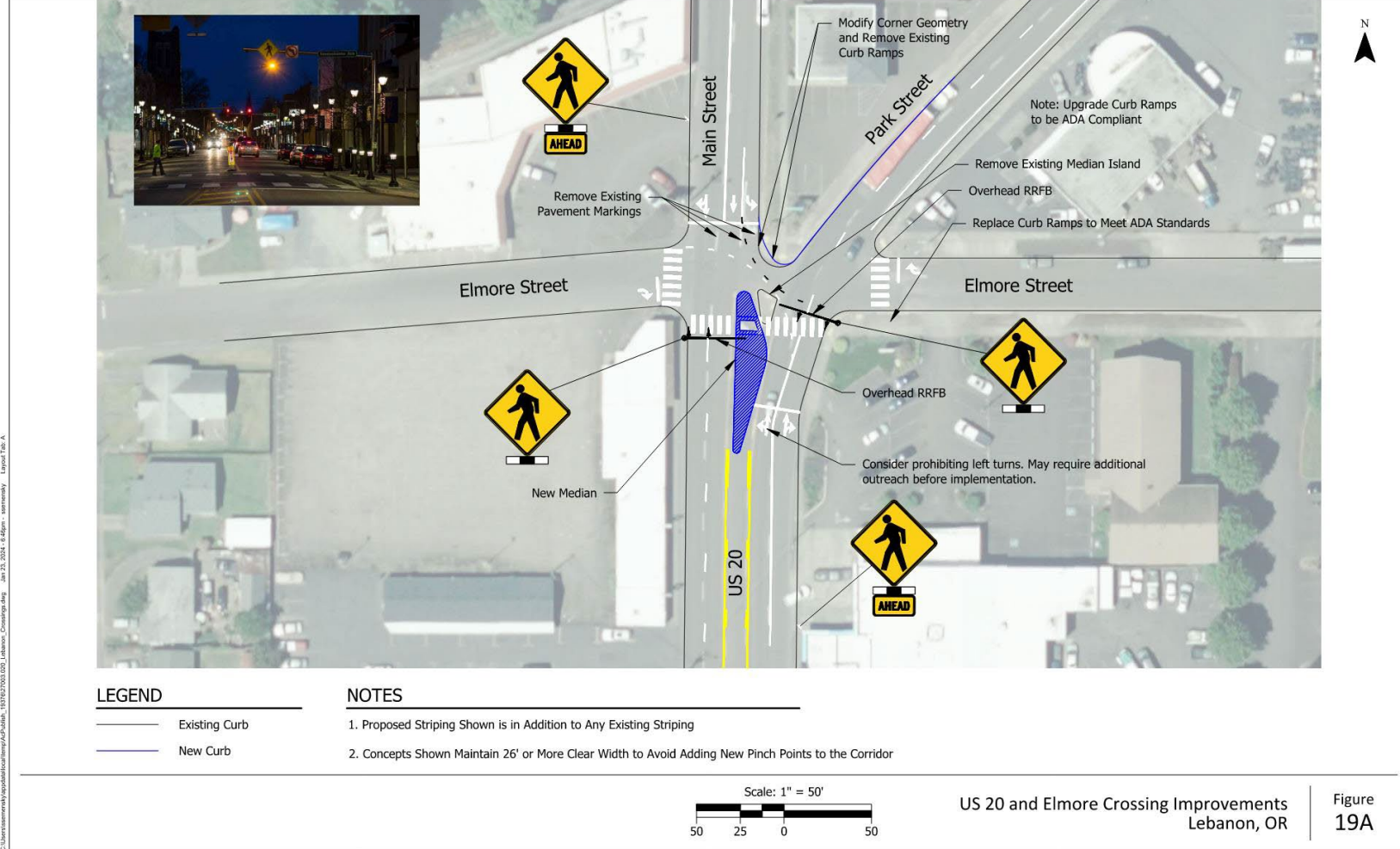
Note that the jurisdiction responsible for maintenance of the crossing enhancements will be determined when the project is funded for construction but has historically been a local jurisdiction responsibility.



Table 8: Crossing Projects

Project ID	Concept ID	Project Location	Project Description	Cost	Jurisdiction
C-1	19A	U.S. 20 (Main Street) and Elmore Street	Provide overhead RRFB with median refuge island at the intersection. Hazardous waste treatment may be necessary with any foundation work deeper than 5 feet. An additional \$50,000 is assumed in cost estimate for hazardous waste removal. Reference: Web Documents for Union Cleaners II (state.or.us), Residual Risk Assessment Report, Figure 4.	\$900,000	ODOT
C-2	19B	OR 34 (Tangent Street) and 2nd Street	Provide side mounted RRFBs on the approaches to 2nd Street both north and south of 2nd Street. Provide an advanced warning flasher on the westbound approach to the intersection with 2nd Street north of OR 34.	\$350,000	ODOT
C-3	19C	U.S. 20 (Santiam Highway) and Industrial Way/N Main Street	Provide signing and striping and median refuge island at the southern leg of the intersection with Industrial Way. Consider closing left-in access N Main Street to support lower volumes on the proposed bike route. Do not provide bike lane protection adjacent to the median to avoid creating a pinch point for freight vehicles.	\$200,000	ODOT
C-4	19D	OR 34 (Tangent Street) and 9th Street/Hansard Avenue	Provide side mounted RRFBs to support pedestrian crossings north/south at the intersection.	\$200,000	ODOT
C-5	19E	U.S. 20 (Main Street) and Dodge Street	Provide side mounted RRFBs to support pedestrian and bicycle crossings between the library area and neighborhoods to the east. Provide green skip striping to support bicycle crossing movements.	\$200,000	ODOT
C-6	19F	U.S. 20 (Main Street) and Isabella Street	Provide side mounted RRFBs to support pedestrian crossings east/west at the intersection.	\$200,000	ODOT
C-7	19G	U.S. 20 (Park Street) and Isabella Street	Provide side mounted RRFBs to support pedestrian crossings east/west at the intersection.	\$200,000	ODOT
C-8	19H	U.S. 20 (Park Street) and Sherman Street	Provide curb extensions, pedestrian refuge islands between the bike lane and travel lanes, and signing and striping to support east/west pedestrian and bicycle crossings.	\$250,000	ODOT
C-9	19I	U.S. 20 (Santiam Highway) and Jennings Street	Provide overhead RRFB with median refuge island at the intersection.	\$850,000	ODOT
C-10	19J	U.S. 20 (Santiam Highway) and Russell Drive	Provide overhead RRFB with median refuge island at the intersection.	\$850,000	ODOT
C-11	19K	U.S. 20 (Santiam Highway) and Truman Street	Provide overhead RRFB with median refuge island at the intersection.	\$850,000	ODOT
C-12	19L	U.S. 20 (Park Street) and Carolina Street	Provide side mounted RRFBs to support pedestrian crossings east/west at the intersection.	\$200,000	ODOT

Lebanon Urban Design Verification



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Figure 19A: U.S. 20 and Elmore Crossing Improvements

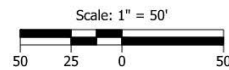
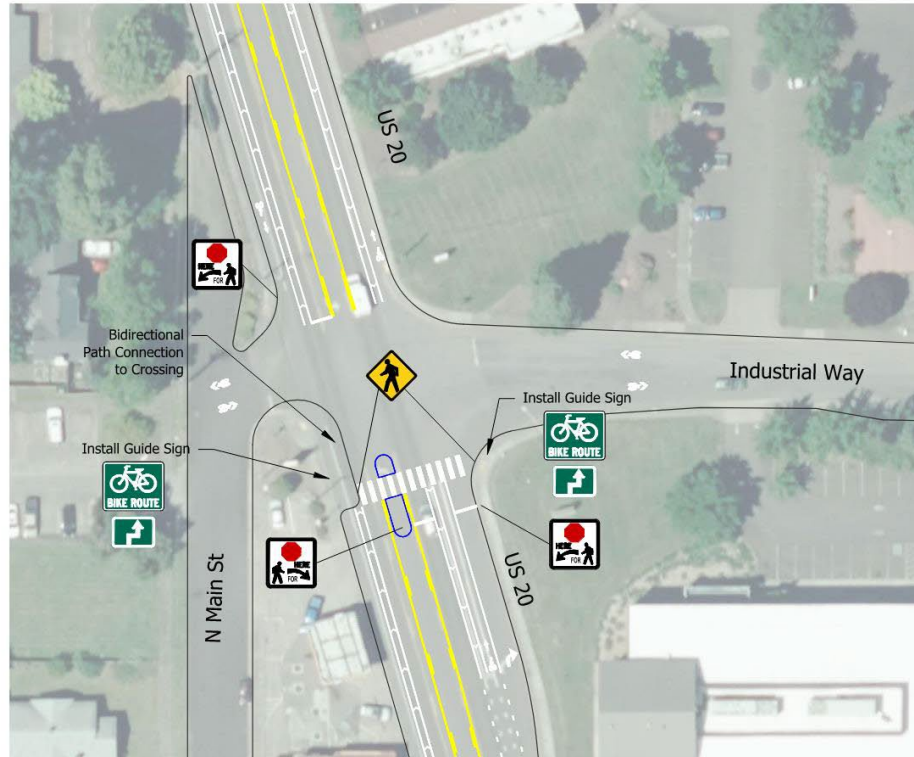
Lebanon Urban Design Verification

NOTES

1. Proposed Striping Shown is in Addition to Any Existing Striping
2. Concepts Shown Maintain 26' or More Clear Width to Avoid Adding New Pinch Points to the Corridor

LEGEND

-  Existing Curb
-  New Curb



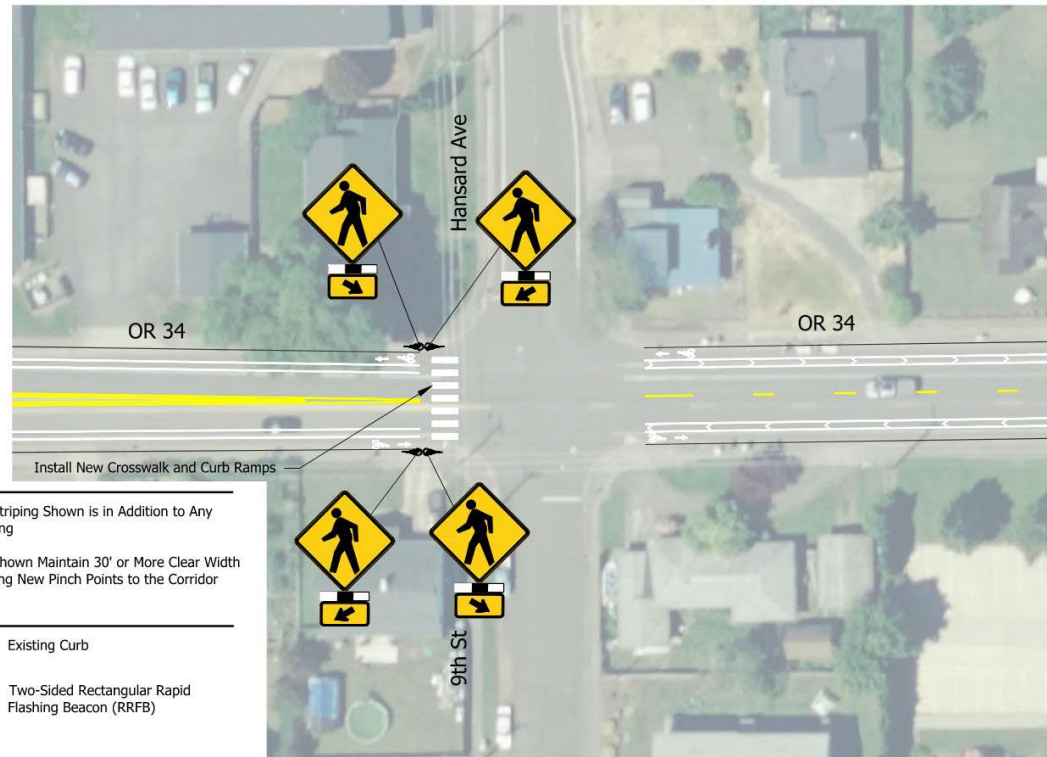
US 20 and Industrial Way Intersection Improvements
 Lebanon, OR

Figure
 19C



Figure 19C: U.S. 20 and Industrial Way Intersection Improvements



Lebanon Urban Design Verification



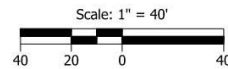
NOTES

1. Proposed Striping Shown is in Addition to Any Existing Striping
2. Concepts Shown Maintain 30' or More Clear Width to Avoid Adding New Pinch Points to the Corridor

LEGEND

-  Existing Curb
-  Two-Sided Rectangular Rapid Flashing Beacon (RRFB)

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OR 34 and 9th St Intersection Improvements
 Lebanon, OR

Figure
 19D



Figure 19D: OR 34 and 9th Street Intersection Improvements

Lebanon Urban Design Verification

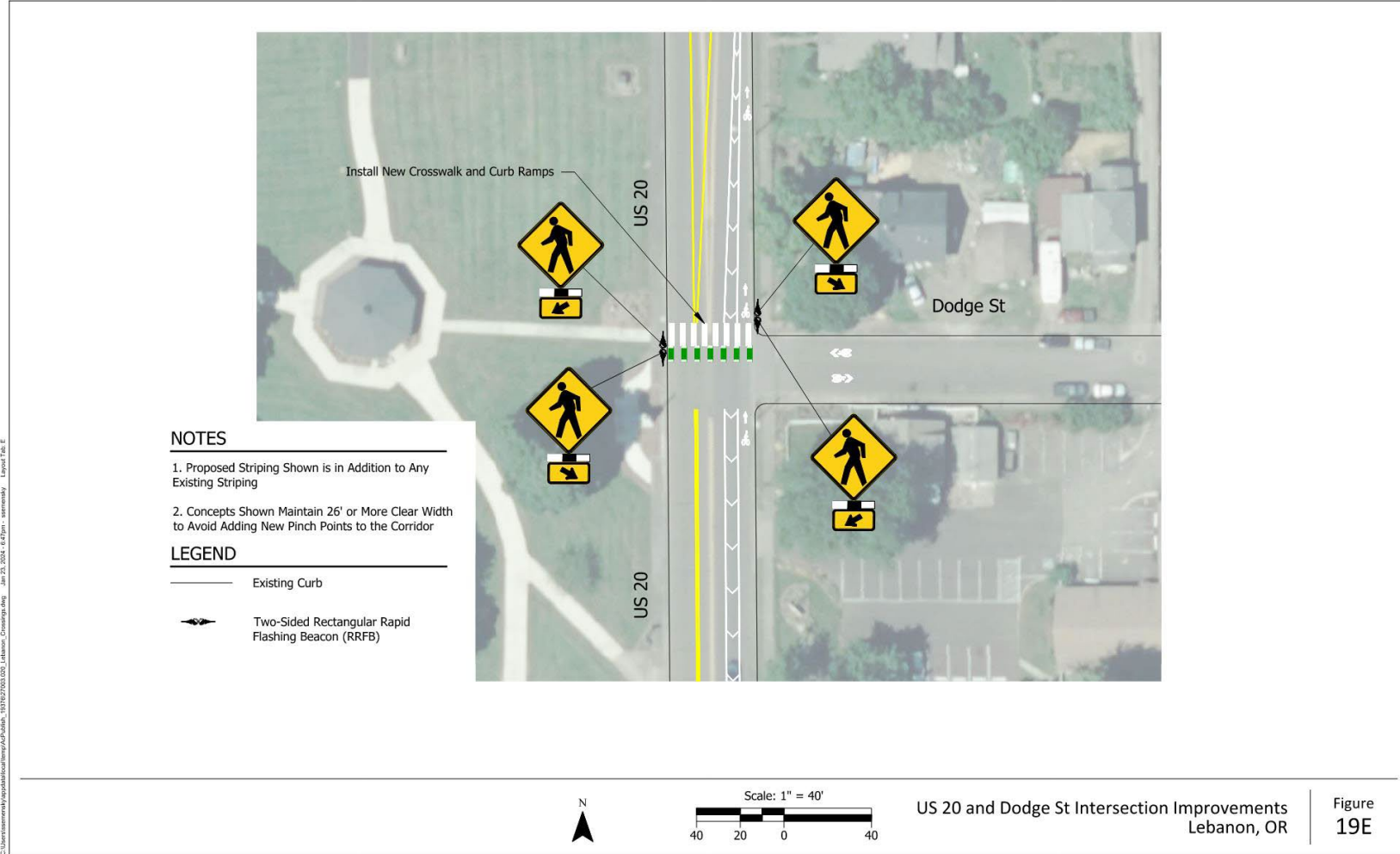


Figure 19E: U.S. 20 and Dodge Street Intersection Improvements



Figure 19F: U.S. 20 and Isabella Street E Intersection Improvements

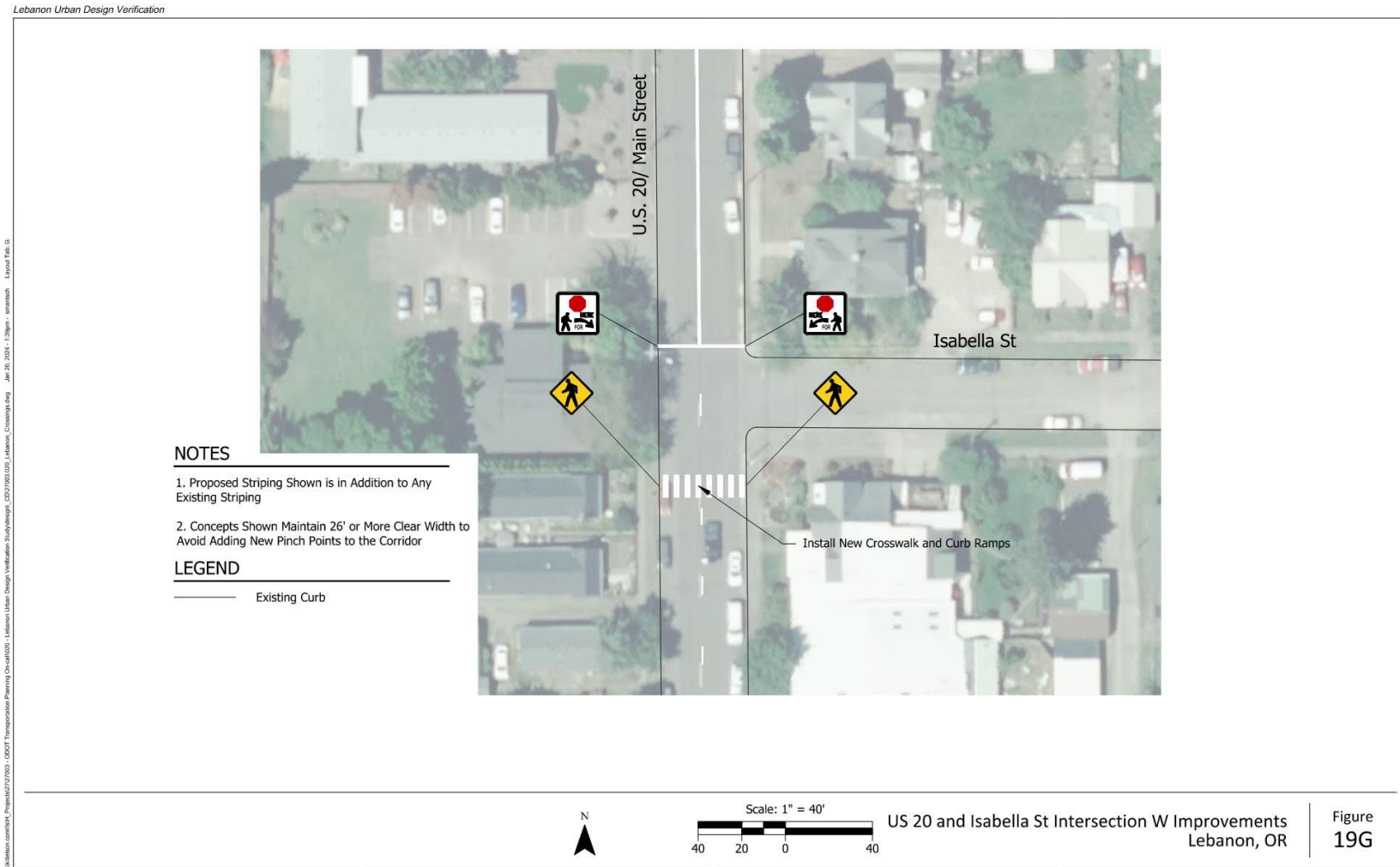
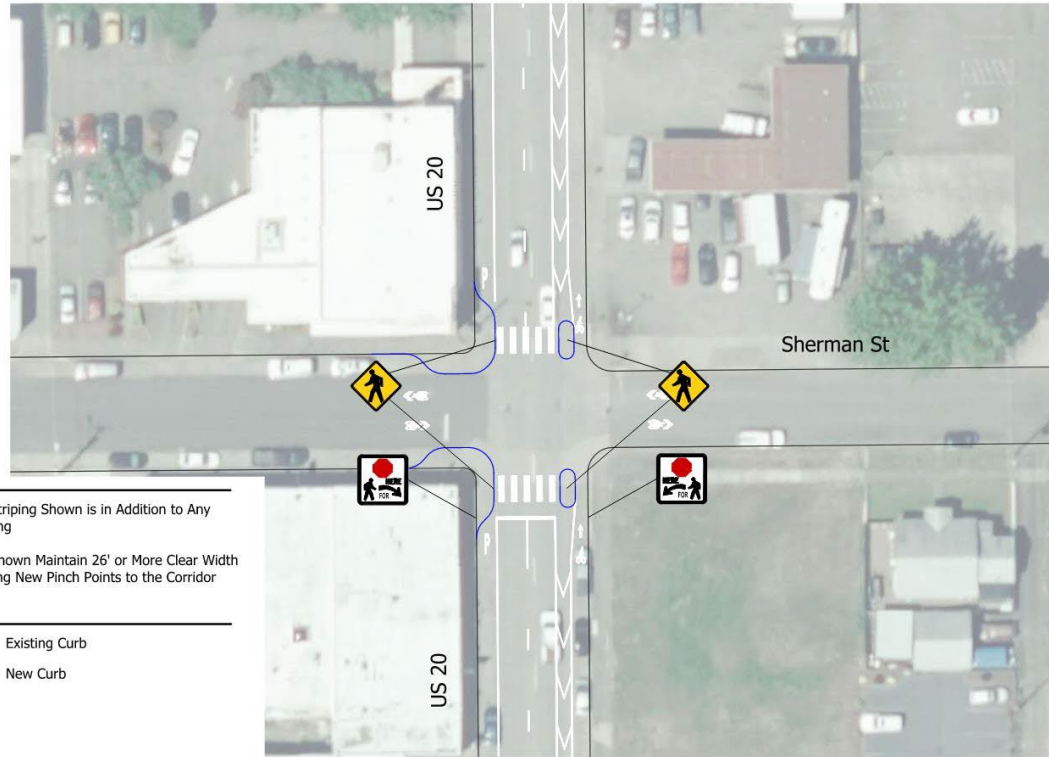


Figure 19G: U.S. 20 and Isabella Street W Intersection Improvements

Lebanon Urban Design Verification

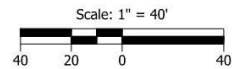


NOTES

1. Proposed Striping Shown is in Addition to Any Existing Striping
2. Concepts Shown Maintain 26' or More Clear Width to Avoid Adding New Pinch Points to the Corridor

LEGEND

- Existing Curb
- New Curb



US 20 and Sherman St Intersection Improvements
Lebanon, OR

Figure
19H



Figure 19H: U.S. 20 and Sherman Street Intersection Improvements

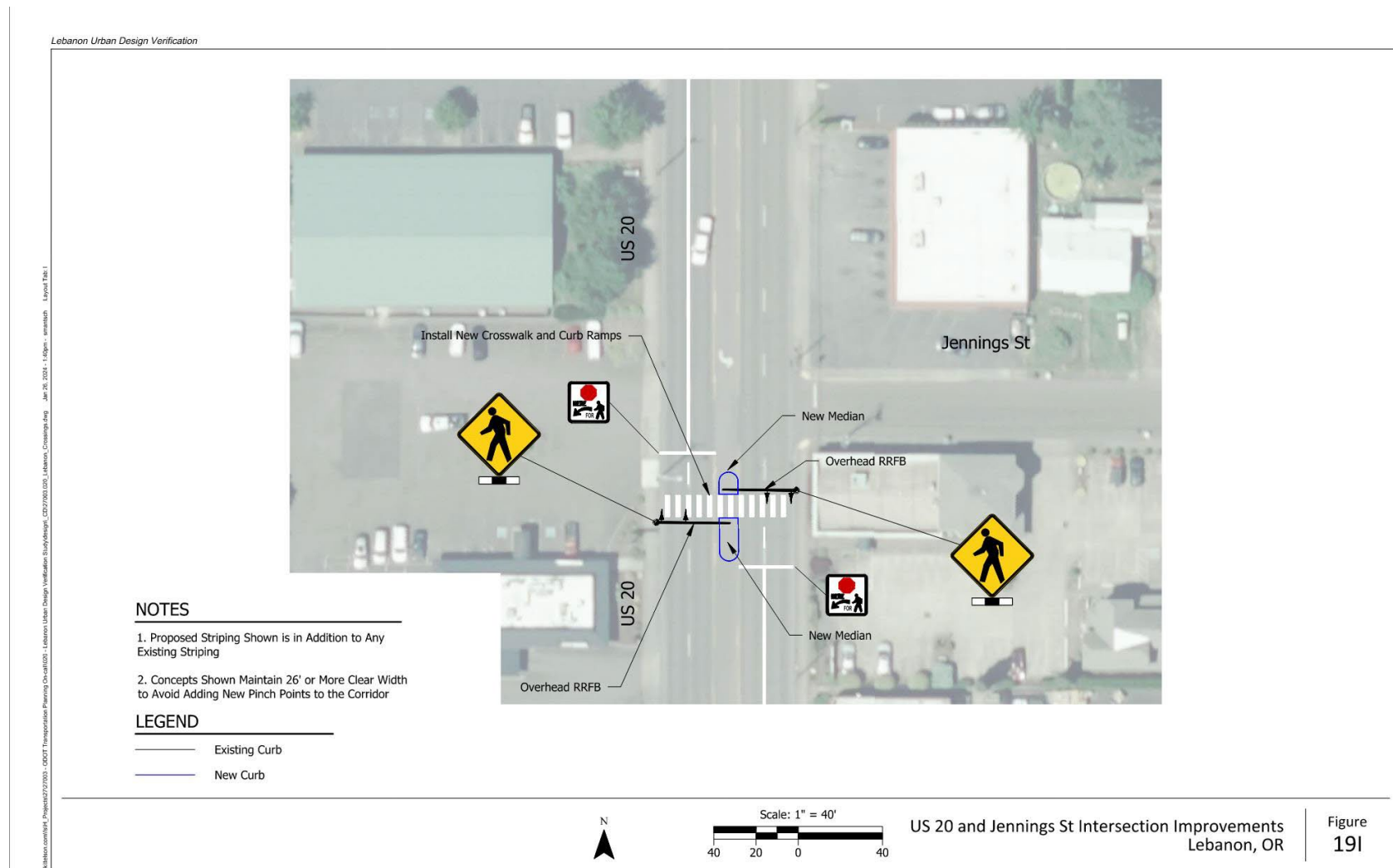
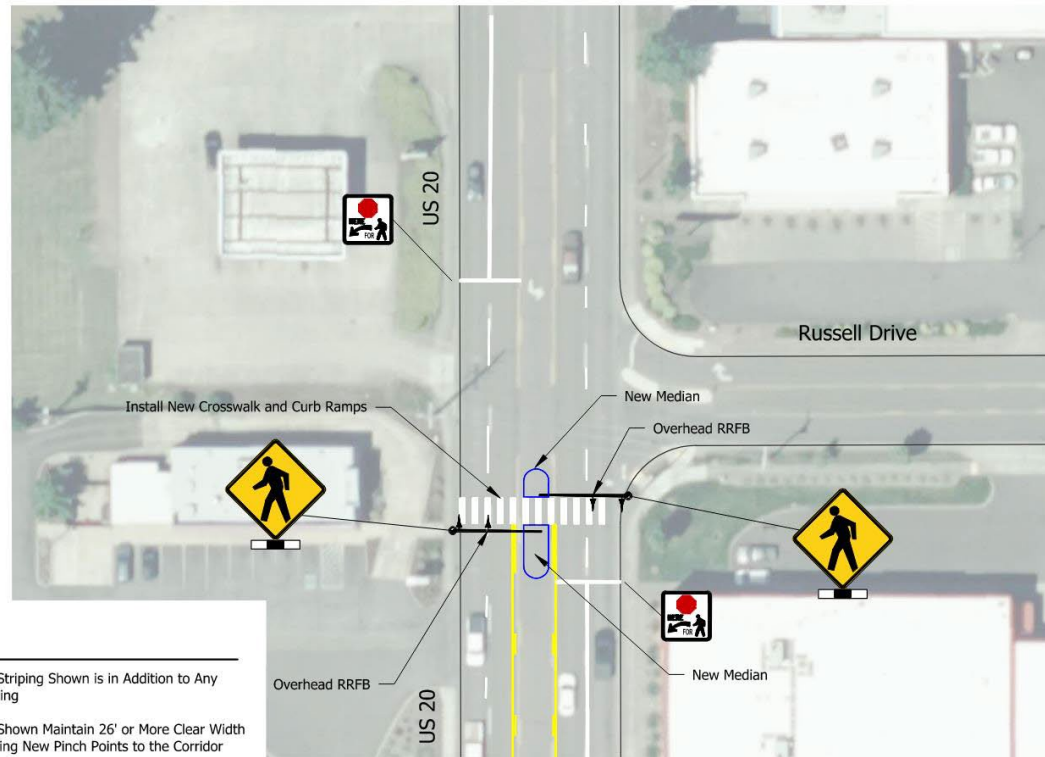


Figure 19I: U.S. 20 and Jennings Street Intersection Improvements

Lebanon Urban Design Verification

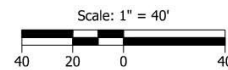


NOTES

1. Proposed Striping Shown is in Addition to Any Existing Striping
2. Concepts Shown Maintain 26' or More Clear Width to Avoid Adding New Pinch Points to the Corridor

LEGEND

- Existing Curb
- New Curb



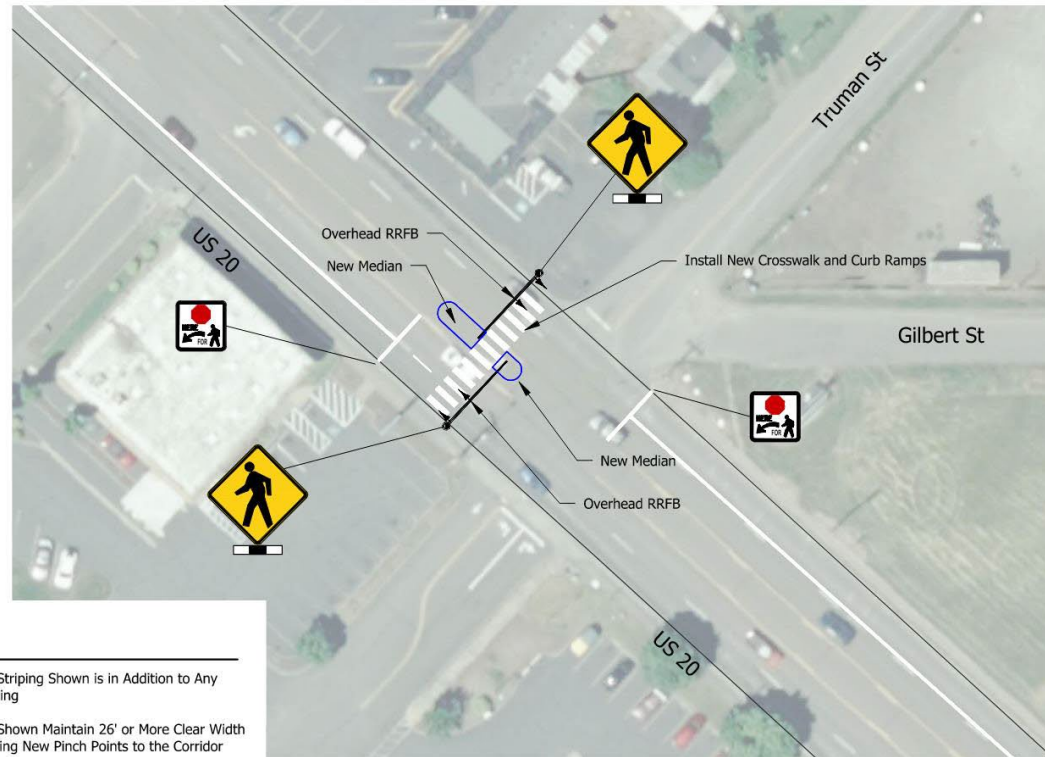
US 20 and Russell Dr Intersection Improvements
 Lebanon, OR

Figure
 19J



Figure 19J: U.S. 20 and Russell Drive Intersection Improvements

Lebanon Urban Design Verification

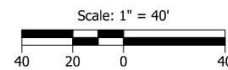


NOTES

1. Proposed Striping Shown is in Addition to Any Existing Striping
2. Concepts Shown Maintain 26' or More Clear Width to Avoid Adding New Pinch Points to the Corridor

LEGEND

- Existing Curb
- New Curb



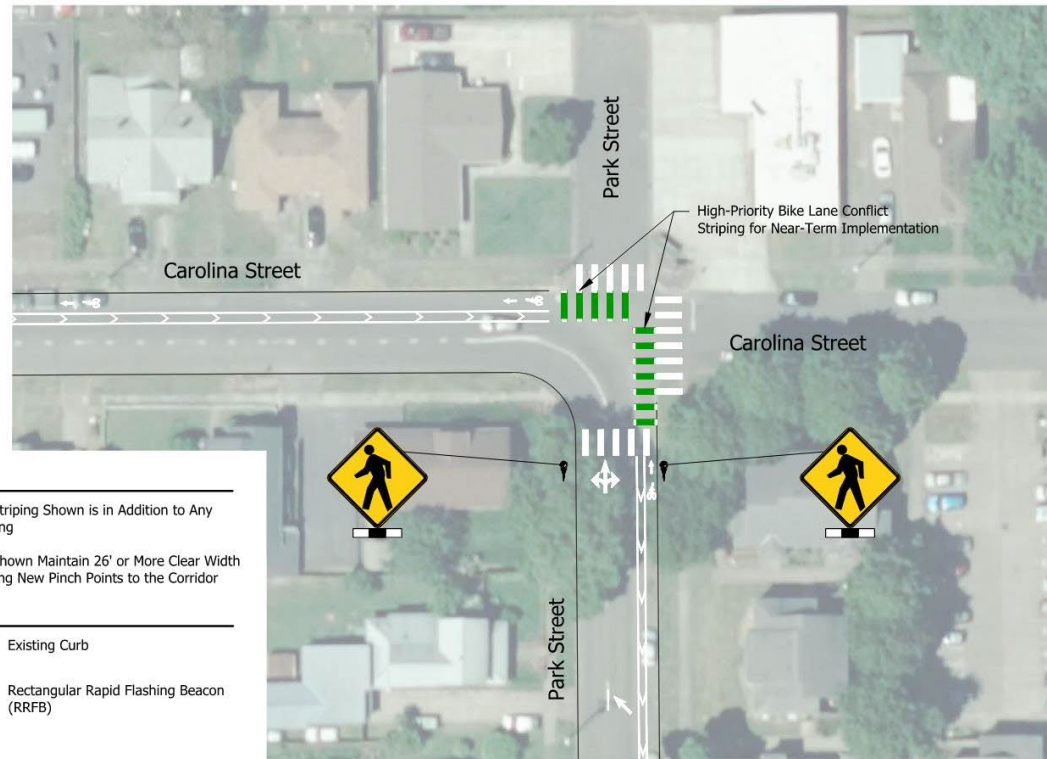
US 20 and Truman St Intersection Improvements
 Lebanon, OR

Figure
 19K



Figure 19K: U.S. 20 and Truman Street Intersection Improvements

Lebanon Urban Design Verification



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Park and Carolina Intersection Improvements
Lebanon, OR

Figure
19L



Figure 19L: Park Street and Carolina Street Intersection Improvements

IMPLEMENTATION

ODOT's current funding process focuses primarily on "Fix-It" projects that preserve the transportation system, while long-range planning activities result in general project lists lacking implementation details. This disconnects planning from on-the-ground projects. The Urban Design Verification process bridges this gap by suggesting specific solutions for future Fix-It projects. Table 9 outlines potential upcoming ADA upgrade locations and the relationship to our proposed projects. Table 10 identifies projects listed in the City of Lebanon's Transportation System Plan and Capital Improvement Plan so that the recommendations in this Urban Design Verification are implemented with those projects. In addition, if pavement repaving work is performed in the study area, projects should be implemented during that repaving process.

Table 9: Potential ADA Upgrade Locations

Source	Potential ADA Improvements	Relation to Solutions
ADA Scoping	Upgrade ADA push buttons and install ADA ramps at the signalized intersection at U.S. 20/OR 34	Implement the recommended intersection improvements in tandem with ADA upgrades. Provide green high visibility bike lane striping on OR 34; restripe new configuration within 250' of intersection; provide bike route sign southbound to westbound from U.S. 20 to OR 34.
ADA Scoping	Upgrade ADA push buttons and ADA ramps at U.S. 20/Walker Road	Restripe the Dewey approach with bike lanes. <i>Consider implementing these upgrades with the upcoming CIP project to realign Dewey Street and Walker Road.</i>
ADA Scoping	Upgrade ADA push buttons at U.S. 20 and Market Street	Coordinate restriping improvements on Market Street with ADA upgrades. Restripe the approaches to include buffered bike lanes to the north and south.
ADA Scoping	Upgrade ADA push buttons and ADA ramps at OR 34 and 5 th Street	<i>Consider implementing these upgrades with the City's upcoming project to provide a traffic signal at this intersection and/or upcoming project to reconstruct 5th Street north of Tangent.</i>
ADA Scoping	Install ADA ramps at U.S. 20 and Dodge Street	Implement the recommended crossing enhancements (striping, signs, and RRFB installations) in tandem with ADA upgrades.
ADA Scoping	Install ADA ramps at U.S. 20 and Carolina Street	Implement the recommended crossing enhancements (striping, signs, and RRFB installations) in tandem with ADA upgrades.
ADA Scoping	Install ADA ramps at U.S. 20 and Isabella Street	Implement the recommended crossing enhancements (striping, signs, and RRFB installations) in tandem with ADA upgrades.

Source	Potential ADA Improvements	Relation to Solutions
ADA Scoping	Install ADA ramps at U.S. 20 and Elmore Street	Implement the recommended crossing enhancements (striping, signs, and overhead RRFB installations) in tandem with ADA upgrades.
ADA Scoping	Install ADA ramps at U.S. 20 and Jennings Street	Implement the recommended crossing enhancements (striping, signs, and overhead RRFB installations) in tandem with ADA upgrades.
ADA Scoping	Install ADA ramps at U.S. 20 and Russell Drive	Implement the recommended crossing enhancements (striping, signs, and overhead RRFB installations) in tandem with ADA upgrades.
ADA Scoping	Install ADA ramps at U.S. 20 and Truman Street	Implement the recommended crossing enhancements (striping, signs, and overhead RRFB installations) in tandem with ADA upgrades.
ADA Scoping	Install ADA ramps at OR 34 and 2 nd Street	Implement the recommended crossing enhancements (striping, signs, and RRFB installations) in tandem with ADA upgrades.
2022 ODOT Pavement Conditions Report	<p>“Poor” pavement conditions on U.S. 20 south of Olive Street (including both couplet roadway)</p> <p>“Very Poor” pavement conditions on Park Street from Vine Street to Grant Street</p> <p>“Poor” pavement conditions on OR 34 from the railroad crossing to U.S. 20</p>	If pavement improvement projects are implemented along these streets, proposed striping should be implemented in tandem.

Table 10: Lebanon TSP and CIP Projects

Source	Project Name	Relation to Solutions
Lebanon Capital Improvement Plan (2022 – 2027)	Dewey Street and U.S. 20 Realignment	Connect Grove Street Bikeway to highway via this project. Implement a bike lane connection on Dewey Street when it is reconstructed.
Lebanon Capital Improvement Plan (2022 – 2027)	North 5 th Street (Tangent – Mary)	During the reconstruction, add buffered bike lanes. Consider widening to provide both parking and buffered bike lanes.

Lebanon Capital Improvement Plan (2022 – 2027)	Tangent Street (OR 34) Widening and Intersection Improvements	Implement proposed striping (buffered to protected bike lanes) on OR 34 with this project. Implement proposed enhanced crossings on OR 34 at 2 nd Street with this project.
Lebanon TSP	Neighborhood Traffic Calming Program	Neighborhood routes on 5 th Street, Mary Street, N Main Street, Kees Street, Sherman Street, Industrial Way, Elmore Street, Franklin Street, Willow Street, Primrose Street, Dewey Street, and Grove Street should especially be considered for traffic calming measures.
Lebanon TSP	Wayfinding Signage Program	All bike routes could be considered for wayfinding signage. The 5 th Street and Grove Street Bikeways are especially critical in providing signage, as they act as parallel route to the highway.
Lebanon TSP	U.S. 20/ Airport Road Transit Stop	Striping improvements on Airport Road could happen in tandem with transit stop improvements.
Lebanon TSP	U.S. 20/ Industrial Way intersection improvements	Implement proposed crossing at Industrial Way.
Lebanon TSP	U.S. 20/OR 34 – Wheeler Street intersection improvements	Restriping along U.S. 20 and OR 34 at this intersection could be implemented with this project.
Lebanon TSP	U.S. 20 shared-use path connection between Weldwood Drive and Weirich Drive U.S. 20 shared-use path connection between Weirich Drive and south urban growth boundary	Investigate connection between proposed bike lanes on Market Street and shared-use path connection.
Lebanon TSP	U.S. 20 bicycle improvements between Olive Street and Wheeler Street	Implement proposed bike lanes on U.S. 20.

