US 97 Parkway Plan Phase 2

Investment Strategy

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Draft

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1.0 INTRODUCTION AND PURPOSE

The US 97 Parkway Plan is a multi-phase planning process to improve safety, mobility, and active transportation and transit use on the US 97 Parkway between Tumalo Road and Baker Road, most of which is within the city of Bend, Oregon. The first phase, now complete, focused on developing goals and objectives and understanding existing conditions and plans. The second phase commenced with the development of a project vision and analysis of future conditions. Alternatives were then developed to address the identified needs and evaluated against project goals, objectives and criteria.

This memo builds on the evaluation of alternatives and public input to establish priorities for implementation. The investment strategy will also include next steps and will serve as a roadmap for management of the facility over the next twenty years. Final plan recommendations will be incorporated into the Bend Metropolitan Planning Organization (BMPO)'s Metropolitan Transportation Plan and the City of Bend Transportation System Plan. It will inform and be informed by other regional planning efforts. The final plan will be adopted as an Oregon Department of Transportation (ODOT) Facility Plan by the Oregon Transportation Commission (OTC).

2.0 SUMMARY OF WORK TO DATE

GOALS AND NEEDS

Project goals, objectives and evaluation criteria were previously defined in the Methodology Memorandum.[1] The goals are:

1. Improve safety for all modes
2. Support economic development throughout the region and state
3. Manage transportation mobility into the future
4. Consider accessibility to key destinations now and into the future
5. Facilitate the use of multimodal travel options
6. Enhance the environment
7. Identify cost-effective solutions
8. Develop an implementation plan

Prior to the two levels of alternatives evaluation, existing and future conditions analyses were performed, outlined in Technical Memorandum 2[2] and Technical Memorandum 4[3], respectively.

FIRST LEVEL EVALUATION

Preliminary alternatives were developed to meet these goals starting from a base of existing planned projects and strategies, with additions and refinements as outlined in Technical Memorandum 5[4]. Technical Memorandum 6[5] outlines this process and provides a high-level view of each alternative type, listing source plans (if any), typical cost ranges, applicable locations, and which goals they potentially address.

[1] US 97 Parkway Plan Phase 2: Methodology Memorandum, July 17, 2018
[2] US 97 Parkway Plan Phase 2: Technical Memorandum #2: Existing Conditions
[3] US 97 Parkway Plan Phase 2: Technical Memorandum #4: Future Conditions
[4] US 97 Parkway Plan Phase 2: Technical Memorandum #5 Preliminary Alternatives, February 25, 2019
[5] US 97 Parkway Plan Phase 2: Technical Memorandum #6 First Level Alternatives Evaluation, July 9, 2019

Corridor-wide projects evaluated include:

- Ramp meters at on-ramps throughout the corridor
- Full closure of right-in-right-out (RIRO) accesses, or right-in closures with right-out modification
- On and off ramps improved to standard lengths and geometry
- Active transportation grade-separated crossing improvements
- Transportation systems management and operations (TSMO) projects: weather warning system, variable speed signs, and roadside traveler information dissemination; incident management program; shoulders built to standard widths; enhanced traffic signal operations at ramp terminals and traveler information signing; and traffic signal priority for transit and freight at signalized intersections on US 97.

Other projects that are not corridor-wide are organized by three study areas: North, Central, and South. Types of location-specific projects include auxiliary lanes, frontage roads, lane reconfigurations, roundabouts or signals, intersection and interchange improvements, and overcrossings.

After the First Level Evaluation, the list of alternatives was narrowed down and combined into two bundles of projects to be further analyzed in the Second Level Evaluation.

SECOND LEVEL EVALUATION

The Second Level Evaluation Process applied a more comprehensive assessment of alternatives using a combination of qualitative and quantitative analysis and evaluation criteria. This process is outlined in Technical Memorandum 7[6]. Further analysis of RIRO closure and modification projects is outlined in the RIRO Closure/Modification Alternatives Analysis[7], an appendix of Technical Memorandum 7.

Many of the evaluation criteria presented in the Methodology Memorandum are quantitative and required a more detailed analysis than was conducted during Level 1 screening. The goals, objectives and evaluation criteria applied for Level 2 screening are summarized in Table 1 below. Note that while the evaluation criteria are mostly focused on Parkway performance, some network and local system measures were also considered and provide input into project implementation recommendations.

[6] US 97 Parkway Plan Phase 2: Technical Memorandum #7 Second Level Alternatives Evaluation, November 6, 2019
[7] US 97 Parkway Plan Phase 2: Draft Technical Memorandum – RIRO Closure/Modification Alternatives Analysis, April 16, 2019

Table 1: Level 2 Screening Evaluation Criteria

Goal	Objectives	Evaluation Criteria (Level 2)	Evaluation Method
1. Improve safety for all modes	Reduce the frequency and severity of crashes for all modes with an emphasis on severe and fatal injuries	Reduction in crash frequency (all modes)	HSM Part C / TOPS BC / Crash Modification Factors (CMF)
		Reduction in crash severity (all modes)	HSM Part C / TOPS BC / CMF
2. Support economic development throughout the region and state	Support efficient movement of people, goods and services, and recreational traffic to, within and through the City of Bend	Travel Time Reliability measures on the Bend Parkway (planning time index)	HERS-ST / TOPS BC
		Percent through traffic on congested segments (modeled demand/capacity ratio $\geq$ 1.0) of the Bend Parkway	Travel Demand Model
	Develop strategies to accommodate planned growth through provision of transportation options now, and into the future	Degree to which the alternative enhances travel for multiple modes (qualitative assessment)	Qualitative Assessment
3. Manage transportation mobility into the future	Evaluate the ability to achieve ODOT volume/capacity (V/C) targets and develop alternative mobility measures and targets, where appropriate	Ability to meet ODOT v/c targets	Synchro/Vistro/ HCS Analysis
	Assess impacts on local system	Ability to meet Bend mobility standards (v/c ratios and LOS)	Synchro/Vistro
4. Consider accessibility to key destinations now and in the future	Evaluate and assess reliable travel times between key destinations during peak periods	Travel Time Reliability measures (planning time index) for specific routes during PM peak hour	HERS-ST / TOPS BC
		Peak Hour VMT by street classification	Travel Demand Model
5. Facilitate the use of multimodal travel options	Enhance transit, bicycle and pedestrian facilities along, parallel to, and across, US 97	Number of bike and pedestrian crossing locations on the Bend Parkway with low Level of Traffic Stress (LTS 2 or lower)	Bike/Ped LTS Analysis
		Miles of north-south bike and pedestrian facilities with low Level of Traffic Stress within 0.25 miles of the Bend Parkway	Bike/Ped LTS Analysis
	Look for transportation demand management opportunities	Does the alternative allow for transportation demand management strategies?	Qualitative Assessment
6. Enhance the environment	Reduce emissions through reduction of vehicular delay, improved connections in the local system, and the use of alternative modes	Total PM peak hour vehicle delay (vehicle hours)	Synchro/Vistro Analysis
		Total PM peak hour vehicle miles traveled (regional measure)	Travel Demand Model
	Minimize right of way impacts	Approximate degree of right of way impacts (order of magnitude costs)	Conceptual Layout/ Qualitative Assessment
	Design projects to avoid, mitigate and minimize impacts	Not applicable (design criteria; applies to all projects)	N/A
7. Identify cost effective solutions	Prioritize low cost, high benefit solutions	Total cost	Unit Cost/Planning Level Cost Estimates
		Reduction in delay and crashes	Synchro/Vistro Analysis & HSM Part C/ TOPS BC
	Prioritize solutions that leverage existing planned projects and programs	Does alternative leverage existing planned projects and programs?	Yes/No Assessment

Goal	Objectives	Evaluation Criteria (Level 2)	Evaluation Method
8. Develop an implementation plan	Consider available funding sources and existing planned project and programs	Can the alternative be separated into reasonably fundable and constructible phases?	Qualitative Assessment
	Recommend potential future funding sources	Not applicable (funding sources to be recommended in implementation plan)	Qualitative Assessment
	Include partner commitments to short term actions	Does the alternative have local agency support?	Is included in an adopted or in-process plan demonstrating local support. However, local agencies will need to confirm support through this process.

Based on input from the Technical Advisory Committee each goal was weighted equally, except for safety, which was weighted twice as high as the others. Within each goal, performance measures were scored equally.

The results of the evaluation were organized into scoring bins to simplify comparing outcomes across goal areas. Each candidate project was scored to assess its positive, negative, or neutral impacts relative to the Future No-Build alternative, unless otherwise indicated. A five-step scoring system was used by assigning a value of +2, +1, 0, -1 or -2, according to the scale presented in Table 2.

Table 2: Level 2 Evaluation Scoring Scale

Evaluation Score	Score = 2	Score = 1	Score = 0	Score = -1	Score = -2
Level of support for goals and objectives	Strongly supports	Moderately supports	No significant change	Moderately conflicts	Strongly conflicts

Groups of similar projects, or projects that address the same problem, were identified in Technical Memorandum 6[8]. Within each group projects were scored against the No-Build and compared to each another.

For most of the quantitative measures, the range of values reported were analyzed to determine the averages within the project groups for the positive range, and for negative range. Outcomes that exceeded the averages (whether positively or negatively) were assigned the maximum score, either a +2 or a -2. Outcomes that were numerically below average were assigned either a +1 or a -1. Where no change was expected, a value of 0 was assigned. The exception is Goal 1 (Safety), which was weighted double based on direction from the BMPO Policy Board (+4, +2, 0, -2, -4).

Recommended Projects

The Second Level Screening recommended 11 corridor-wide projects, 8 projects each specific to the Central and South Study Areas, respectively, and only North Corridor Final Environmental Impact Statement (FEIS) projects specific to the North Study Area. Table 3 provides the complete list of

[8] US 97 Parkway Plan Phase 2: Technical Memorandum #6, First Level Alternatives Evaluation

recommended projects, broken down by area. The results were later discussed with project stakeholders, leading to a refinement into a final list of recommended projects. Figures 1-3 show the location of recommended projects in each of the three study areas, differentiated by color according to project type.

Table 3: Recommended Improvement Projects for the US 97 Corridor

Project Category	Projects Recommended for Implementation[1]	Project Number(s)
Corridor-Wide Projects	Install Ramp Meters	C1
	Right-In-Right-Out	C2a - C2h
	Extend acceleration and deceleration lanes	C3a - C3d
	Active transportation crossing improvements	C4a - C4r
	Shoulder width improvements	C5
	Weather warning system	C6
	Variable speed signs	C7
	Incident management	C8
	Enhanced signal operations at ramp terminals	C9
	Traveler information signing	C10
	Roadside Traveler Information Dissemination	C11
North Study Area	FEIS projects	N1
Central Study Area	Butler Market Interchange Improvements	M1
	Revere Avenue Lane Reconfiguration	M2
	Colorado Avenue Signal (or roundabout) at NB ramp	M3
	Colorado Avenue Improvement to SB ramp intersection	M4
South Study Area	Reed Market Refinement Study from Bond Street to 3rd Street	S1
	Dedicated left turn lane Reed Market Rd and 3rd St	S2
	Powers Road Interchange	S3
	China Hat Overcrossing	S4
	IAMP at Baker Rd/Knott Rd interchange	S5
	Murphy Tight Diamond Interchange	S6
	Murphy North Frontage Road	S7
	Murphy South Frontage Road	S8

[1]Following the Second Level Evaluation. Projects are further prioritized for short, medium, and long term in the investment strategy

Murphy Road and Powers Road Improvement Concepts

Technical Memorandum #8[9] focuses on the design options at two locations: where US 97 intersects Powers Road and Murphy Road, respectively. It builds upon analysis performed in Technical Memorandum #7 by developing conceptual interchange/overcrossing designs at these locations and providing additional sensitivity analysis related to the traffic interaction between them. The Memorandum recommended a series of improvements backed by conceptual designs and cost estimates.

Based on the analysis and findings from the memorandum, the following implementation recommendations are made related to the Murphy Road and Powers Road interchanges:

[9] US 97 Parkway Plan Phase 2: Technical Memorandum #8, Murphy Road / Powers Road Improvement Concepts, October 26, 2019

1. The highest priority should be the Murphy interchange. The costs of the tight diamond concept make this improvement relatively feasible, and this connection should help to relieve some of the existing operational issues at the Powers Road/US 97 intersection. Also, closure of the Badger Road and Pinebrook Boulevard RIRO access will only increase traffic at Powers Road/US 97 in absence of a full interchange at Murphy Road. This interchange is likely needed to serve both the Murphy Crossing Urban Renewal District and the SE Area, both of which are likely to develop in the short term. In addition, if the Powers Road interchange needs to be phased for funding purposes, the full access Murphy interchange is critical to serve short term demand while Powers Road access to the Parkway is limited.
2. The next highest priority should be the Powers Interchange, as this location is already under heavy traffic demand. An overcrossing is not the ultimate solution at this location due to negative operational impacts both south at Murphy and north at Reed Market. However, an overcrossing could be implemented in the short term as an initial phase of a full interchange, provided the Murphy interchange is already full access. An interchange at Powers provides connections that could ultimately be connected to a southern river crossing. The final interchange solution at Powers Road should include consideration of the travel demand impacts of a southern river crossing.
3. The north frontage road priority is predicated on the access and circulation strategy that will be implemented with the closure of the Badger Road and Pinebrook Boulevard RIRO access locations. This concept is recommended to be included with the Powers Road interchange at the latest, as that concept requires the closure of the Badger Road RIRO access.
4. The south frontage road is recommended to be implemented when the Murphy Crossing Urban Renewal District begins to develop, or when the “Thumb” develops, or when the China Hat overcrossing is constructed.
5. The west loop frontage road is recommended to be implemented as soon as possible after the construction of the Murphy tight diamond, preferably while the first commercial developments west of the interchange are under construction.

Figure 1: Locations of Recommended Projects from Second Level Screening, North Study Area

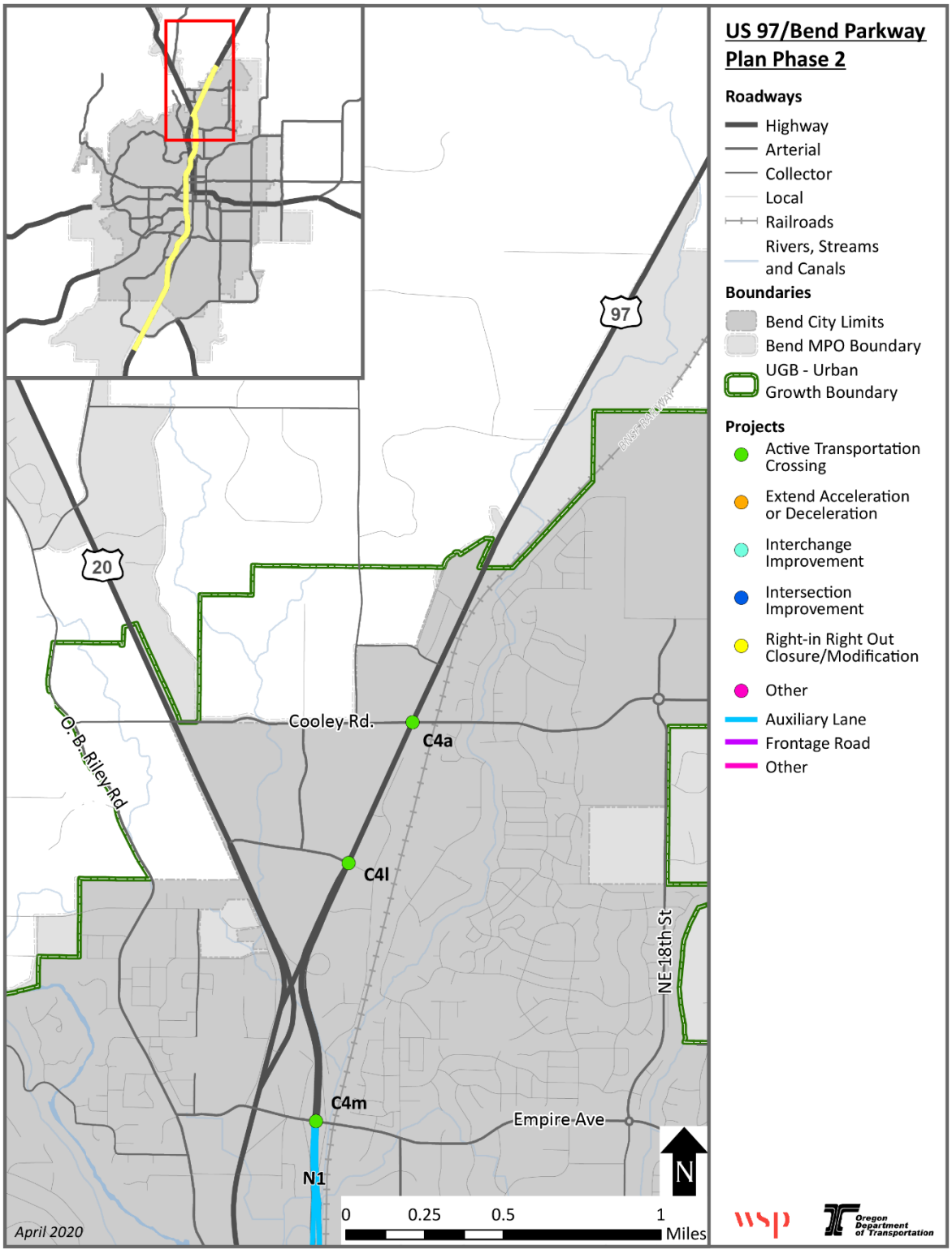


Figure 2: Locations of Recommended Projects from Second Level Screening, Central Study Area

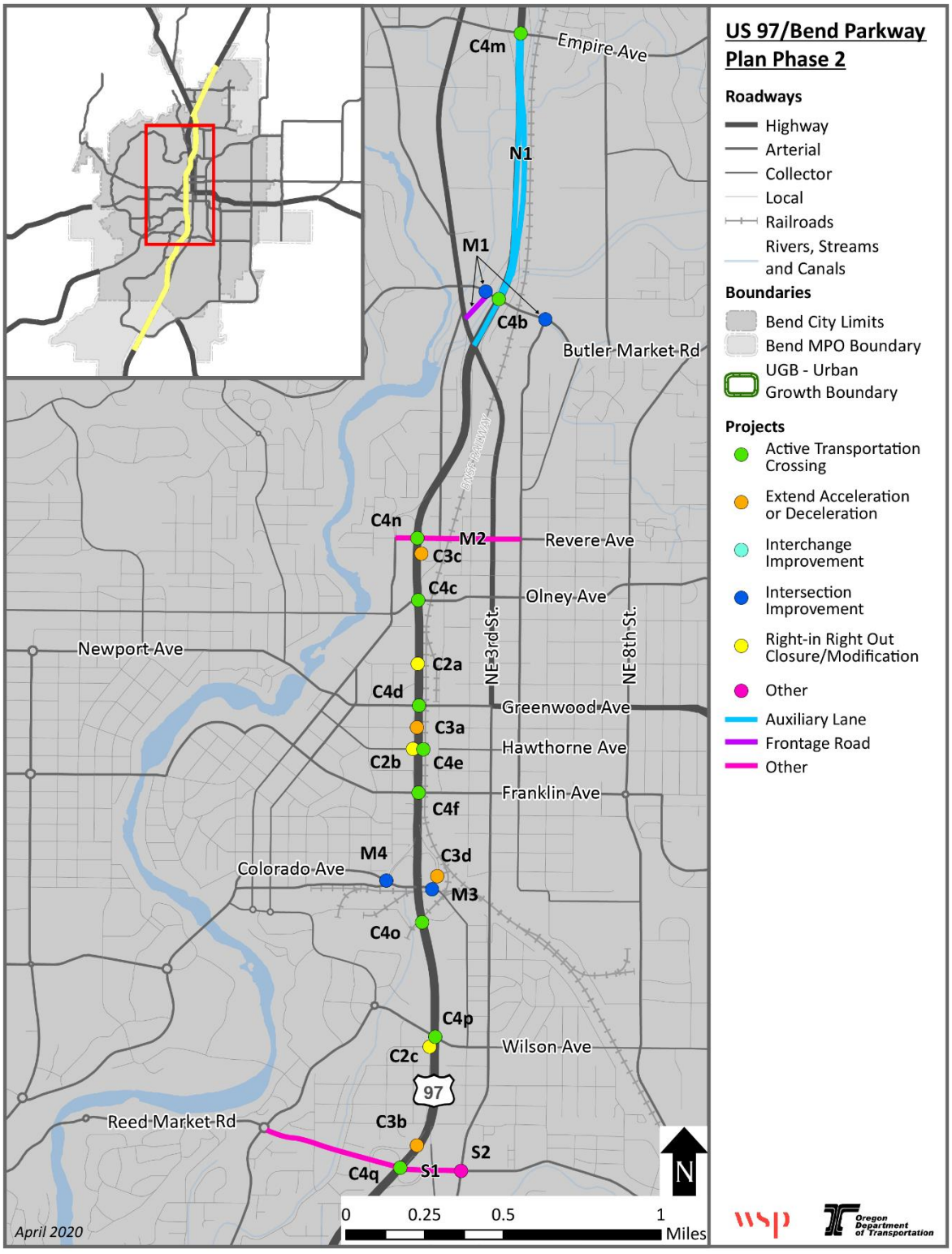
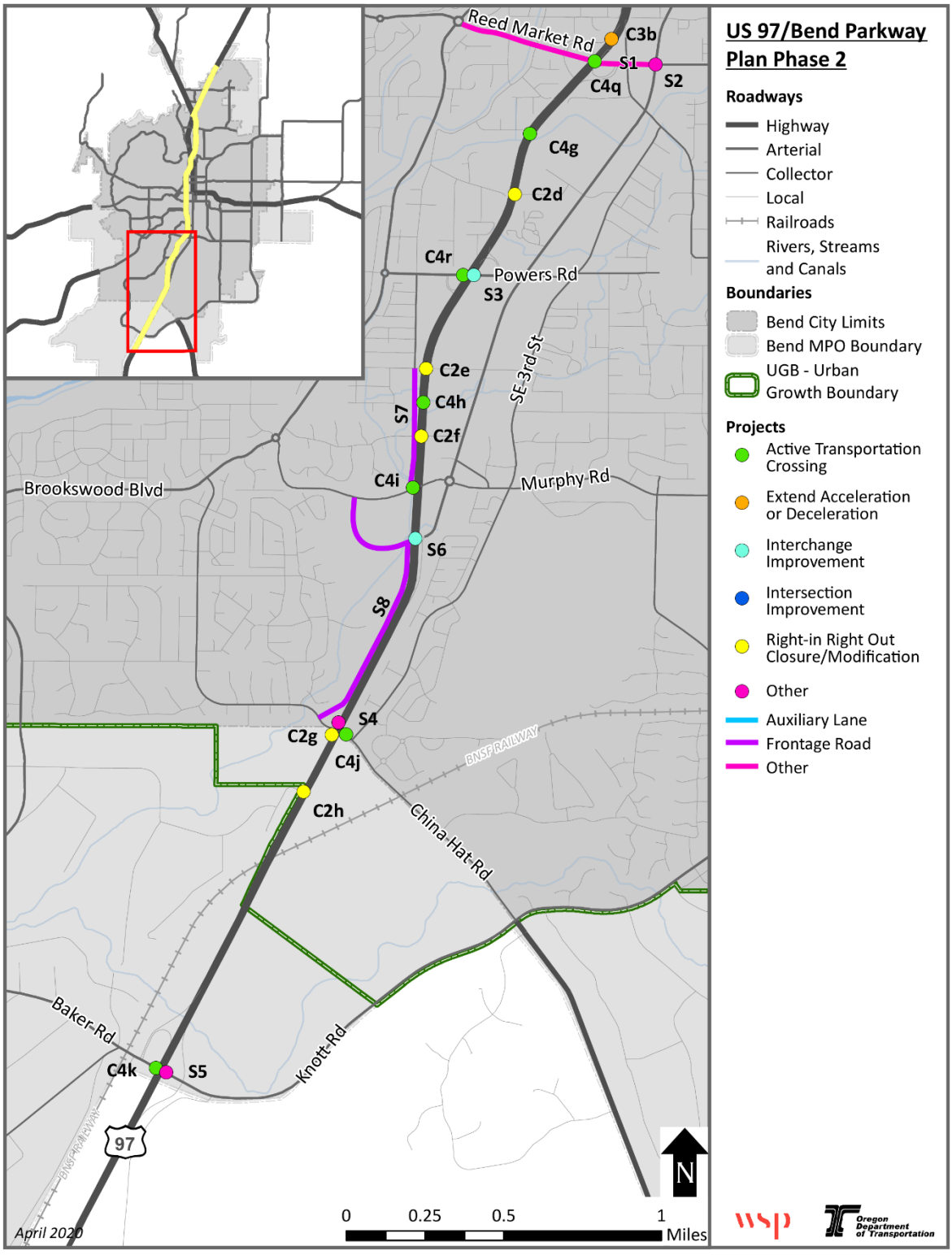


Figure 3: Locations of Recommended Projects from Second Level Screening, South Study Area



3.0 ADVISORY COMMITTEE AND STAKEHOLDER INPUT

The Bend MPO Policy Board and TAC are the official advisory committees for the project. They have reviewed and provided guidance on all major deliverables throughout the planning effort. In addition, a Sounding Board comprised of community and business representatives has been engaged to provide input at two key milestones during the planning process. Input from the general public has also been solicited in the form of an on-line survey and open house, as further described below.

VISIONING PROCESS

A visioning Process took place in the Fall of 2018, which included a visioning workshop during the BPMO Policy Board and TAC Joint Meeting on November 29. The vision was shaped by feedback from the BMPO Policy Board, the project's Technical Advisory Committee (TAC), and the project Sounding Board, as well as an online open house that elicited information and feedback from the larger Bend community.

The vision statement adopted by the BMPO Policy Board in December 2018 states:

In 2040, the Parkway is a key part of the larger US 97 highway corridor, which has a primary function of providing safe and reliable travel between communities and connections to recreation areas and economic centers with minimal interruptions, including travel to and from Bend as a major regional destination given its many major employment and commercial areas. The Parkway continues to support statewide, regional, and local interests as a critical asset in support of communities and economies, relative to the hierarchy of US 97's national, statewide, and regional designations.

Major elements, which are more fully detailed in the adopted document, include:

1. U.S. 97 Bend Parkway is part of a significant statewide route
2. U.S. 97 Bend Parkway is a significant local route
3. U.S. 97 Bend Parkway is facilitating through travel
4. The U.S. 97 Bend Parkway is fully integrated into the overall Bend multimodal transportation system with strategic on/off ramps, overcrossings/undercrossings, and a strong parallel system that accommodates the community's transportation needs
5. Local traffic growth is primarily accommodated on the local roadway system
6. The U.S. 97 Bend Parkway Corridor is safer for all users and more efficient due to access changes
7. The U.S. 97 Bend Parkway Corridor is part of a transportation system that supports active transportation modes such as walking, biking and taking public transportation

EVALUATION OF PROJECTS

A joint meeting of the BMPO Policy Board and the TAC was convened in the spring of 2019 to review and provide input to the First Level Alternatives Evaluation. Another joint meeting was held on November 19, 2019 regarding the Second Level Alternatives Evaluation. At that meeting, members heard

presentations on both the Second Level Alternatives Evaluation and the Murphy Road/Powers Road Improvement Concepts.

The Policy Board and TAC members expressed a variety of questions and comments following the presentation by project staff and consultants. Areas of emphasis for the Policy Board and TAC included:

- Impacts of potential RIRO closures and whether right-ins and right-outs could be evaluated separately
- Coordination of US 97 Parkway Plan recommendations with projects already included in the Bend's Capital Improvement Plan
- Distance between active transportation Parkway crossings

A Public Outreach Update to the Policy Board and TAC Members discussed strategies used to obtain input on vision and needs, results of Bend's demographic profile, and outreach contacts.

The second meeting of the Sounding Board was held on November 20, 2019. At that meeting, the group reviewed the alternatives evaluation and provided input on the investment strategy.

Areas of emphasis for the Sounding Board included:

- Several questions regarding the RIRO recommendations, including concerns about the cumulative impacts of widespread RIRO closure
- Concerns on whether ramp meters would lead to queuing and gridlock on City streets
- Interest in coordination of US 97 Parkway Plan improvements with Bend TSP projects

Online Open House

An online open house was hosted to share information about possible solutions and for gather feedback from the general public. The online open house differed from a conventional survey in that it contained more details, images, and links to other information intended to help create informed feedback. Survey details and results are outlined in the US 97 Parkway Phase 2: Online Open House Survey Summary[10].

A Title VI report and demographic analysis did not identify a prominent Title VI population but did recommend additional focus on reaching low-income populations based on their lower participation in a 2018 online survey. During the outreach period, the project team provided project information to local food pantries and social service organizations and hosted two tabling events at discount grocery stores where they engaged with 90 shoppers and referred them to the online survey.

The online survey was available from November 26 to December 15, 2019, and received 1,122 responses, including 455 long-form open-ended comments. Emails and handwritten letters received during the survey period were incorporated into the summary.

The first 13 questions were multiple choice and asked respondents about the relative urgency of proposed solutions and strategies to problems on the US 97 Parkway, selecting from "*Very urgent*", "*Somewhat urgent*", "*Less urgent*", "*Not needed*", "*I have concerns*", or "*Not sure*." These rating options were selected to help ODOT prioritize timing of future investments. Additional options were also

[10] US 97 Parkway Phase 2: Online Open House Summary DRAFT, January 2020

intended to allow the public to weigh in on overall necessity ("not needed"), to flag problematic solutions ("I have concerns"), and to identify where not enough information has been provided ("not sure"). Solutions and strategies with more "not sure" or "I have concerns" were listed as having aspects that could benefit from further clarification in the Next Steps section of the survey summary.

Question 14 asked the open-ended question: *"Is there anything else you want to tell us about the project or the proposed solutions? (Please explain below.)"* Congestion was the most commonly identified general problem (61 individuals), followed by Safety (33), Speed (18), and Traffic Signals (19). The most common of comments tagged as common solutions and opinions was keeping RIRO exits open (104), followed by adding new ramps or merge lanes (47) and better enforcing the speed limit on the Parkway (36). The most popular locations mentioned were Hawthorne Avenue (106), Lafayette Avenue (90), Reed Market Road (46), Empire Avenue (33), Murphy Road (30), and Powers Road (29).

Respondents were asked questions on their demographics and usage of the Parkway. More specifically, these are questions of zip code, modes of transportation used in general and on the Parkway, frequency of Parkway usage, age, gender, household income, race/ethnicity, and languages spoken at home.

The qualitative feedback from the public about the urgency of the needs and concerns about solutions was used along with the results of the technical work to inform the timing of the need and next steps for implementation as part of the investment strategy. The prioritization process and criteria are described in more detail in the next chapter.

4.0 PRIORITIZATION OF PROJECTS FOR IMPLEMENTATION

The Investment Strategy further prioritizes the identified projects with an eye toward implementation. The process starts with the timing of the need based on technical analysis and the evaluation scoring, the interrelationship with other projects, the severity of the need and the type of solution. The timing of the need is then considered against the potential for phasing and opportunities for funding. Project costs were developed in coordination with ODOT.

PROPOSED TIERS

The proposed tiers for projects were assigned not only by technical need or work, but also by opportunities for phasing or funding.

Tier 1 projects are intended for implementation in the short-term (0-10 years). There are 27 Tier 1 projects. Most Tier 1 projects address needs identified for the short-term, and others are included due to linkages with other projects or funding. All but two RIRO projects and the majority of active transportation crossing projects fall under this category. No Tier 1 projects are development driven.

Tier 2 projects are intended for implementation in the medium-term (11-15 years). There are 21 Tier 2 projects. Tier 2 projects may be needed in the short-, mid-, or long-term but fall under this timeline due to phasing or funding limitations. All development driven projects are Tier 2.

Tier 3 projects are designated for implementation in the long-term (16-20 years). Only one project is proposed as Tier 3: the Active Transportation Crossing at Wilson Avenue (C4p).

Below is a summary of the investment strategy. A more detailed table with project triggers and dependencies, cost estimates, funding opportunities, and other considerations is included in the appendix to this memorandum.

CORRIDOR WIDE PROJECTS

Ramp Meters (ITS/TSMO)

Installation of ramp meters is proposed as a Tier 2 project. While expected to provide benefits to traffic operations, they may not be needed in the short term. Additionally, RIROs need to be closed first for ramp meters to function effectively and further study is needed to develop operational details.

The Concept of Operations is proposed for development in the short-term and implementation would take place in the medium-term. There is potential for phasing, with ramps north of Powers Road implemented as Phase 1 because the interchange projects at Powers Road and Murphy Road would need to be completed prior to metering due to changes in flow and operations.

The Concept of Operations would include an assessment of all other ramps that are substandard to determine whether other roadway improvements are required to accommodate ramp meters. Ramps would likely operate most effectively if implemented together rather than ramp by ramp. Specific triggers for installation of ramp meters would be identified in the Concept of Operations, however,

merge failures at some locations on the Parkway are likely to occur in the next 10 to 15 years or sooner, depending on development, changing trends in travel demand, and other projects.

RIRO Closures/Modifications (Operations)

Right-in-right-out (RIRO) projects either close both a right-turn onto the Parkway and right-turn from the Parkway onto a local road, or one or the other with modifications to extend the remaining acceleration or deceleration lane. Triggers for RIRO projects include existing safety and operation issues, geometric deficiencies, needs of other projects for closure, and development. Six of eight RIRO projects are Tier 1 projects and are needed in the short term to address existing safety, operational, and geometric problems, or are needed for projects that are not development driven. China Hat Road and Ponderosa Street (C2g), and Rocking Horse Road (C2h) RIRO closures are Tier 2 because their need is development driven.

Completion of all RIRO projects north of Powers Road (C2a though C2d) is needed for installation of Ramp Meters (C1) to operate effectively. Thus, the need for RIRO closure or modification is triggered by the need for ramp metering.

Most RIRO projects are anticipated to be completed with minimal ROW impacts. However, the Lafayette Avenue project (C2a) will need ROW for the deceleration lane extension.

The closures of China Hat Road and Ponderosa Street RIRO intersections with the Parkway (C2g) may be completed separately, but full closure at this location is necessary for the China Hat Overcrossing project (S4).

The Powers Interchange (S3) and Murphy Road Tight Diamond (S6) projects trigger the need for closure of Badger Road RIRO (C2e) and Pinebrook Boulevard RIRO (C2f), respectively. Both RIRO projects are also needed for the Murphy North Frontage Road (S7) to operate effectively. While these two RIRO Projects may be phased where each side is closed separately, full closures are required for projects S3, S6 and S7.

The need for the Rocking Horse Road RIRO closure is driven by development build-out south of Ponderosa Street within the urban growth boundary. An IAMP at Baker Road and Knott Road Interchange (S5) is needed to determine access plans for this location. The Murphy Tight Diamond Interchange (S6) and South Frontage Road (S8) are also needed prior to this RIRO closure.

The next step is to advance scoping to consider:

- How to bundle RIRO projects.
- Needed mitigation
- Whether they could be done in phases, without final mitigation

One possibility may be to move forward with the highest-priority locations first (including Lafayette, Hawthorne, Truman, and Reed), with others following later. A RIRO study can be bundled with a study on shoulder width improvements.

Ramps Improved to Standard Lengths (Operations)

There are two deceleration lane extension projects, one to Hawthorne Avenue southbound (C3a) and the other to Reed Market Road southbound (C3b). Both are proposed as Tier 1.

There are two acceleration lane extension projects, one from Revere Avenue northbound (C3c) and the other from Colorado Avenue northbound (C3d). Both are proposed as Tier 2.

All four ramp extension projects are triggered by existing geometric deficiency. Safety issues are also a concern, particularly at Hawthorne Avenue. The Colorado Avenue project is the only one with likely ROW impacts, where some space on the Franklin Avenue overcrossing could be repurposed to fit in the extended acceleration lane.

The southbound deceleration lane at Hawthorne Avenue is needed to maintain Parkway exit access to downtown. It should be considered for pairing with nearby overcrossing projects, but has independent safety issues and needs to be addressed in the short term.

Active Transportation Crossing Improvements (Active Transportation)

There are 18 Active Transportation Crossing Improvement projects. 10 are proposed as Tier 1, 7 as Tier 2, and only one, at Wilson Avenue, as Tier 3. These projects are all triggered by existing gaps in the high priority low-stress bicycle and pedestrian network.

Funding opportunities vary for these projects. At least two projects could be funded through Infra grants (C4a, C4l), at least six could be part of potential bond projects (C4b, C4c, C4d, C4e, C4f, C4o). The active transportation crossing improvement does not appear to be included in the bond project for Reed Market Road improvements, though active transportation improvements would be part of any ultimate solution at this location. A crossing improvement at China Hat Road, triggered by development of the "Thumb" area, is likely developer or city funded.

Next steps for certain Active Transportation Crossing Improvement projects include coordination with Infra grant design (C4a, C4l), coordination with TSP improvements, coordination with (or completion of) other projects, and analysis and/or conceptual design. Individual projects could be implemented separately or grouped together. Cost estimates for these projects will be developed on a case-by-case basis as part of stand-alone scoping efforts or integrated as part of larger interchange or corridor projects.

Transportation Systems Management and Operations Projects (ITS/TSMO)

Weather Warning System, Variable Speed Signs, and Roadside Traveler Information Dissemination

Weather Warning System (C6) and Variable Speed Signs (C7) are both Tier 2 projects. Roadside Traveler Information Dissemination (C11) is not assigned a tier but could be bundled with these two projects. All TSMO projects can be bundled together, or each in combination with other TSMO projects.

Of these three projects, phasing is only considered for the weather warning system, as signs do not need to be installed all at once, and costs for these projects is per sign.

The needs for each of the three projects are all triggered in part by existing travel time reliability impacts. Namely, seasonal crash trends affect the need for Weather Warning System, seasonal weather

impacts affect the need for Variable Speed Signs, and special events impact the need for Roadside Traveler Information.

The recommended next step for all three projects is that ODOT coordinate with current County or MPO ITS planning effort and explore previous funding sources for ITS projects as well as communications infrastructure needs

Incident Management (ITS/TSMO)
Incident Management (C8) is a Tier 2 project triggered by travel time reliability impacts from crashes. It could be bundled with Roadside Traveler Information Dissemination (C11). It is more effective if implemented with Shoulders Built to Standard Widths (C5). The recommended next step is that ODOT coordinate with current County or MPO ITS planning effort and explore previous funding sources for ITS projects. The estimated cost is $50,000-500,000 per year.

Shoulders Width Improvements at Strategic Locations in the Corridor (Operations)
Shoulder width improvements at strategic locations in the corridor (C5) is proposed as Tier 2, and the project need is triggered by existing geometric deficiencies and travel time reliability issues. This project increases the benefit of Incident Management (C8) and can support traffic enforcement.

Right-of-way space needed to widen shoulders will either need to be purchased or repurposed by modifying medians where the right-of-way is tight.

Phasing can be implemented by segment. The next step would be the study and identification of priority locations based on operational issues and needs, and available ROW. This study can be bundled with a RIRO study.

Enhanced Traffic Signal Operations at Ramp Terminals and Traveler Information Signing (Operations)
Enhanced Traffic Signal Operations at Ramp Terminals (C9) is a Tier 1 project, the need for which is triggered by queuing, particularly at Powers Road. It should be coordinated with ODOT's ongoing ATC conversion plan. This could include freight and transit signal priority as interim solutions. Phasing is possible following the implementation of ATC controllers. The next step is to complete the ATC conversion plan and obtain additional radar funding.

Traveler Information Signing (C10) is also a Tier 1 project, the need for which is triggered by confusion of drivers, particularly those less familiar with the regional road network. It could be included as part of the Infra grant for improved wayfinding from Robal Road to Division Street. The recommended next step is that ODOT coordinate with current County or MPO ITS planning effort and explore previous funding sources for ITS projects. The recommended next step is that ODOT coordinate with current County or MPO ITS planning effort and explore previous funding sources for ITS projects. Cost to implement is estimated at $2,000-$30,000 per location.

NORTH STUDY AREA

FEIS Projects

FEIS Projects (N1) are not assigned a tier. Instead, timing depends on the larger North Corridor process and availability of funding to address existing operational and safety issues. The Infra grant-funded portion is the short-term first phase, and the full FEIS is long-term.

CENTRAL STUDY AREA

US 97 Mainline Projects (Modification)

The auxiliary lanes on southbound US 97 between Empire Boulevard and Butler Market Road and on northbound US 97 between 3rd Street and Empire Boulevard are part of the N1 project. They do not serve an existing need, but it is anticipated they will when traffic volumes are well over capacity 20 years out. They are part of the ultimate build out of FEIS Projects (N1) and should be re-assessed after the completion of the Infra grant phase.

Butler Market Road Projects

Interchange Improvements (Modification)

Butler Market Road Interchange Improvements (M1) is a Tier 1 project that involves a southbound frontage road to the interchange and roundabouts (or signals) at the southbound off-ramp and at Butler Market Road and 4th Avenue.

The southbound off-ramp terminal fails to meet the existing mobility target. The control type (roundabout or signal) should match what is installed at Butler Market Road and 4th Street). The project could be a part of a bond. Unlike the frontage road to interchange, there are likely no significant ROW impacts.

The southbound frontage road to interchange ramp terminal fails to meet the existing mobility target and westbound Butler Market queuing issues exist. Exact project trigger needs to be determined through a more detailed study. This project requires signal upgrades at 3rd Avenue and Butler Market Road, access refinement between the ramp terminal and 3rd Avenue, re-alignment of the west leg at Division Street and 3rd Avenue, and completion of the roundabout or signal at the Butler Market southbound off ramp, a part of this project. The project could be part of a bond. ROW impacts are minimal.

The trigger for traffic control options at Butler Market Road and 4th street is to address existing operational need. The control type, roundabout or signal, should match what is installed at the Butler Market Road southbound off-ramp. A roundabout scored higher than a signal in the Second Level Evaluation.

Revere Avenue Projects (Modification)

Revere Avenue Lane Reconfiguration (M2) is a Tier 2 project needed to address existing geometric and active transportation needs. It could be combined with a larger “Z” project that extends to Portland Avenue/Wall Street.

Colorado Avenue Projects (Modification)

Two projects besides the northbound on-ramp acceleration lane extension are proposed for Colorado Avenue.

- A signal or roundabout at the northbound ramp (M3) is a Tier 1 project that addresses existing operational needs. There are potential impacts to rail properties due to a westbound right turn lane.
- Improvement to the southbound ramp intersection is a Tier 2 project. A study should occur in the short-term to prevent Core Area solutions from precluding interchange solutions. This study can happen at any time, as there are no project dependencies and TSP findings are sufficient to support a study at this location. Cost estimate is unknown.

SOUTH STUDY AREA

Reed Market Road (Modification)

Reed Market Refinement Study (S1) from Bond Street to 3rd Street is a Tier 1 project triggered by existing operational needs on Reed Market Road. Solutions will likely require some ROW acquisition, particularly north of the northbound ramp terminal. The next step is to complete a refinement study, which can happen at any time, as TSP findings are sufficient to support a study at this location. Both the study and implementation of study recommendations should start in the short-term. Outcomes from the study are potential bond projects.

Dedicated left turn lane at Reed Market Road and 3rd Street (S2) is also a Tier 1 project triggered by existing operation needs on Reed Market Road. Ultimate solutions will be identified by the refinement study and will also likely require some ROW acquisition. This project is already funded through the City of Bend five-year CIP.

Powers Road (Modification)

The Powers Road Interchange project (S3) is a Tier 1 project. This project is recommended for after completion of the Murphy Road Tight Diamond Interchange project (S6), which can partially address existing needs. Badger Road RIRO project (C2e) is required prior to this project. Potential phasing would be to construct an overcrossing before the interchange, but only after Murphy Tight Diamond project is completed. Next steps are to refine preliminary design and begin ROW acquisition in the short-term, followed by construction in the mid-term.

Murphy Road (Modification)

The Murphy Road Tight Diamond Interchange (S6) is a Tier 1 project. It is triggered by the need for development of the Urban Renewal District around Murphy Road and to provide some relief to existing operations issues at Powers Road. It requires a RIRO closure at Pinebrook Boulevard (C2f), and likely requires some ROW acquisition. Potential funding sources are a bond or urban renewal funding. The recommended next step is for ODOT to develop a detailed project coordination plan with the City of bend regarding the implementation of Murphy and Powers Road Interchange projects.

Both frontage road projects are development driven Tier 2 projects, triggered by growth south of Murphy Road related to future buildout of the Murphy Crossing Area and the "Thumb" area, the undeveloped UGB land bounded by China Hat Rd, Knott Rd, and US 97.

The North Frontage Road is dependent on the Pinebrook Boulevard and China Hat Road/Ponderosa Street RIRO Closures (C2f, C2g). There is potential for phasing, with improvements to Blakely Road first, followed by new construction south of Pinebrook. Some ROW acquisition is required. The project is likely to be partially developer funded.

The South Frontage Road is dependent on the Murphy Tight Diamond (S6), China Hat Road Overcrossing (S4), and Rocking Horse Road Closure (C2h) to function effectively. There is potential for phasing with connection from the tight diamond to Murphy Road first, followed by the extension to Ponderosa Street as development increases. It is likely the South Frontage Road project would require minimal ROW acquisition. The South Frontage Road is a City of Bend responsibility, likely partially developer funded through properties in the Murphy Crossing area.

China Hat Road (Modification)

China Hat Overcrossing (S4) is a Tier 2 project, triggered by build out of the "Thumb" and dependent on the RIRO closure at China Hat Road and Ponderosa Street (C2g) and the Murphy Tight Diamond Interchange (S6). The overcrossing likely requires some ROW acquisition. The project is likely to be developer or City funded.

Baker Road/Knott Road (Modification)

Interchange Area Management Plan (IAMP) at Baker Road/Knott Road interchange (S5) is a Tier 1 project. Improvements are needed now to accommodate growth near this interchange. The Baker/Knott IAMP will start this summer (2020) and may identify a phased set of solutions.

5.0 ALTERNATIVE MOBILITY TARGETS

THE PURPOSE OF ALTERNATIVE MOBILITY TARGETS

It is important for a highway facility plan to identify a broad range of transportation system projects and services that would address the deficiencies that would exist at the end of a 20-year planning horizon if the community grows in accordance with its existing adopted land use plan and no additional improvements are made during that period of time. However, it is also important to realistically identify which transportation projects and services are reasonably likely to be implemented over the 20-year planning horizon, based on financial or other constraints. This exercise enables the community and, as appropriate, the state to establish realistic expectations for how that transportation system will likely operate at the end of the 20-year planning horizon.

Because of the financial and other constraints that have been faced by state and local governments over the last 20 years and which are expected to continue into the foreseeable future, it is often the case that the local and/or state roadways will not be able to meet local level-of-service (LOS) standards or, in the case of ODOT, roadway volume-to-capacity (v/c) ratio based mobility targets, at the end of the 20-year planning horizon if the community grows in accordance with its land use plan. This is particularly common in larger communities or in those with roadways that experience higher travel demands. In these cases, it is appropriate to adjust roadway performance expectations, as expressed through local LOS standards or state mobility targets, to match the performance that is actually forecasted to exist at the end of the 20-year planning horizon, through the adoption of alternative standards or mobility targets.

In these situations, adopting alternative standards or mobility targets is simply adjusting roadway performance expectations to match realistic expectations for how the roadways are forecasted to operate, taking into account financial and other constraints. In addition to establishing realistic expectations for future system performance, this process will help reduce the potential for state and local investment needs by not continuing to require compliance with standards or targets that both parties acknowledge cannot likely be achieved.

THE NEED FOR ALTERNATIVE MOBILITY TARGETS

In Bend, the transportation system analysis from the US 97 Parkway Plan has revealed that several locations within the US 97 Parkway corridor are not expected to meet ODOT's existing adopted mobility targets at the end of the 20-year planning horizon. This assessment was based on the transportation impact associated with the population and employment growth expected through implementation of the City's existing, adopted land use plan and the transportation system performance that would result, assuming implementation of those projects and services that have been identified as reasonably likely to be funded during the 20-year planning horizon. Where there is projected to be a significant disparity between adopted mobility targets and achievable performance even after improvement projects that are reasonably likely to be funded are in place, alternative mobility targets should be considered.

The traffic analysis for the US 97 Parkway Plan included a scenario (No-Build) which included projects in the Financially Constrained Project List as of the 2019 MTP Update (but not including the on-going Bend TSP reasonably likely project list). It also considered scenarios with a variety of improvements under consideration in place during the year 2040.

While an assessment of which of the recommended improvement projects are reasonably likely to be funded during the 20-year planning horizon has been conducted, a new traffic analysis scenario to evaluate performance with those projects in place has not been completed. Therefore, this assessment of the need for alternative mobility targets in the US 97 Parkway corridor is based only on the performance of the Parkway Study future No-Build (2019 MTP Financially Constrained) and Full-Build scenarios. While this will provide insight into the magnitude of the need for alternative mobility targets and likely locations, further refinement including analysis of a scenario with projects in place that are reasonably likely to be funded will be necessary as a next step.

Table 4 lists all state intersections within the US 97 Parkway corridor that were evaluated and shows how they are expected to perform through 2040 compared to adopted mobility targets. This analysis was based on conditions present during the 30th highest annual hour of traffic, which is the basis of ODOT's adopted mobility targets. Again, a scenario showing performance with only reasonably likely to be funded improvements in place is not currently available, so this comparison is intended to only assess the likely need for alternative mobility targets.

The results in Table 4 show that 18 of the 22 intersections evaluated will not comply with ODOT's mobility targets by 2040 under the No-Build scenario. With all recommended improvements in place, operations improve in many locations, but 13 intersections are still estimated to fail to meet mobility targets and 11 of those would have volume-to-capacity ratios of 1.0 or greater.

For the purpose of this exercise, the "Potential Need for Alternative Mobility Target" in Table 4 is based on the ability to comply with current mobility targets under the 2040 Build Condition. However, as stated earlier, this assessment should be based on a 2040 scenario with only the reasonably likely to be funded projects in place. Therefore, the need for alternative mobility targets is likely greater than shown.

The "Approximate Timing of Need" was determined by assessing the level of development present versus forecasted near each study intersection. For example, a study intersection in a currently uncongested, undeveloped location would have a long-term need if projected to fail to meet targets by 2040, while a location either failing or nearly failing today due to existing land use would have a short or medium-term need, depending on the severity of the failure.

A comparison of Parkway mainline operations (merge and diverge locations) to adopted mobility targets was also conducted as shown in Table 5. As shown, the segment of the Parkway from the southbound on-ramp at Division Street to the Colorado Avenue interchange will fail to comply with mobility targets. While the adoption of alternative mobility targets for the Parkway mainline could be pursued, such action should be deferred and reevaluated after the range of recommended system management strategies from the Parkway Plan has been implemented.

One possible approach to establishing alternative mobility targets would be to base them on an average weekday condition rather than on the 30th highest annual hour of traffic. Under the average weekday condition traffic volumes on the Parkway are 11% lower, which would lessen the degree to which mobility targets are not met. If it is found that volume-to-capacity ratios less than 1.0 still cannot be achieved under average weekday conditions, consideration should be given to applying an hours of congestion-based mobility target. Hours of congestion-based mobility targets essentially do not apply a maximum congestion threshold for a specified number of hours during the day. With any alternative mobility target applied to interchange ramp terminals, consideration should also be given to including a condition that while more congestion will be accepted, unsafe vehicle queues on off-ramps will not be allowed. Another factor to consider is the appropriate timing of adoption for alternative mobility targets, which could involve the use of triggers related to the completion of projects or the relationship with planned development.

The process for considering the adoption of alternative mobility targets requires further conversations with local elected officials and other affected stakeholders to ensure everyone understands and supports the trade-offs involved. Formal approval by Bend City Council, such as documenting support for the establishment of alternative mobility targets in an adopted Transportation System Plan, may be required prior to gaining approval by the Oregon Transportation Commission.

Table 4: US 97 Parkway Corridor Intersection Alternative Mobility Standard Needs

Locations	Current ODOT Mobility Target (v/c)	2017 Existing Conditions (v/c)	2040 No-Build (v/c)	2040 Build (v/c)	Potential Need for Alternative Mobility Target	Approximate Timing of Need (short, medium, or long-term)
Intersections						
Bend Pkwy SB On-Ramp & Empire Blvd	< 0.85	0.72/0.71	1.28	1.12	Yes	Medium
Bend Pkwy NB Ramps & Empire Blvd	≤ 0.85	0.87	1.33	1.11	Yes	Short
US 20 & Empire Blvd	≤ 0.85	0.96	1.32	1.19	Yes	Short
US 20 & Butler Market Rd	≤ 0.85	0.92	1.27	1.4	Yes	Short
Bend Pkwy SB Off-Ramp & Butler Market Rd	≤ 0.85 (ramp) ≤ 0.95 (Butler Market Rd)	NA/0.76	NA/1.30	0.75	No	-
Bend Pkwy NB On-Ramp & Butler Market Rd	≤ 0.85 (ramp) ≤ 0.95 (Butler Market Rd)	0.12/0.04	0.11/0.04	0.14/0.06	No	-
Bend Pkwy SB On-Ramp/Division St & 3rd St	≤ 0.85	0.97	0.95	1.04	Yes	Short
Bend Pkwy SB Ramps & Revere Ave	≤ 0.85	0.69	0.99	1	Yes	Long
Bend Pkwy NB Ramps & Revere Ave	≤ 0.85	0.62	0.94	0.96	Yes	Long
Bend Pkwy SB Ramps & Colorado Ave	≤ 0.85	0.79	1.17	1.05	Yes	Medium
Bend Pkwy NB Ramps & Colorado Ave	≤ 0.85 (ramp) ≤ 0.95 (Colorado Ave)	0.88/ >2.00	0.52/1.29	0.84	No	-
Bend Pkwy SB Ramps & Reed Market Rd	≤ 0.85	0.95	1.32	1.04	Yes	Short
Bend Pkwy NB Ramps & Reed Market Rd	≤ 0.85 (ramp) ≤ 0.95 (Reed Market Rd)	NA/1.53	NA/>2.00	0.89	Yes	Long
Bend Pkwy SB Ramps & Powers Rd	≤ 0.85 (ramp) ≤ 0.95 (Powers Rd)	0.07/0.83	0.08/1.24	0.84	No	-

Locations	Current ODOT Mobility Target (v/c)	2017 Existing Conditions (v/c)	2040 No-Build (v/c)	2040 Build (v/c)	Potential Need for Alternative Mobility Target	Approximate Timing of Need (short, medium, or long-term)
Bend Pkwy & Powers Rd	≤ 0.85	1.12	1.45	(no longer an intersection)	Yes	Short
Bend Pkwy NB Ramps & Powers Rd	≤ 0.85 (ramp) ≤ 0.95 (Powers Rd)	0.21/0.09	0.28/0.09	0.57	No	-
US 97 SB Ramps & Baker Rd	≤ 0.85 (ramp) ≤ 0.95 (Knott Rd)	0.05/0.87	0.02/1.26	0.63	No	-
US 97 NB Ramps & Knott Rd	≤ 0.85 (ramp) ≤ 0.95 (Knott Rd)	0.31/1.76	0.41/>2.00	0.8	No	-
US 20 & O.B. Riley Rd	≤ 0.85	0.62	0.91	1.09	Yes	Long
Revere Ave & 3rd St	≤ 0.85	0.83	1.17	1.12	Yes	Medium
US 97 SB Ramp & Murphy Rd	≤ 0.85	NA	NA	0.85	No	-
US 97 NB Ramp & Murphy Rd	≤ 0.85	NA	NA	0.74	No	-

Table 5: US 97 Parkway Mainline Alternative Mobility Standard Needs

Locations	Current ODOT Mobility Target (v/c)	2017 Existing Conditions (v/c)	2040 No-Build (v/c)	2040 Build (v/c)	Potential Need for Alternative Mobility Target
Merge/Diverge Locations					
US 97/Bend Parkway Southbound					
SB Division Street Ramp	≤ 0.85	0.94	1.24	1.04	Yes
SB Revere Avenue Ramp	≤ 0.85	0.94	1.24	1.04	Yes
SB Revere Avenue Ramp	≤ 0.85	0.94	1.2	1.09	Yes
SB Colorado Avenue Ramp	≤ 0.85	0.94	1.21	1.02	Yes
SB Colorado Avenue Ramp	≤ 0.85	0.9	1.13	0.97	Yes
US 97/Bend Parkway Northbound					
NB Reed Market Road Ramp	≤ 0.85	0.42	0.66	0.52	No
NB Division Street Ramp (Reed Market)	≤ 0.85	0.54	0.82	0.78	No
NB Colorado Avenue Ramp	≤ 0.85	0.54	0.73	0.78	No
NB Colorado Avenue Ramp	≤ 0.85	0.84	1.09	1.08	Yes
NB Revere Avenue Ramp	≤ 0.85	0.83	1.1	1.08	Yes
NB Revere Avenue Ramp	≤ 0.85	0.72	0.98	1.03	Yes
NB 3rd Street Ramp	≤ 0.85	0.88	1.2	0.57	No
NB Butler Market Road Ramp	≤ 0.85	0.97	1.27	0.49	No
NB Empire Boulevard Ramp	≤ 0.85	0.95	1.27	0.82	No
NB Empire Boulevard Ramp - Sisters Loop	≤ 0.85	0.61	0.56	NA	No

6.0 NEXT STEPS

This memorandum provides a roadmap for improvement and management of the US 97 Parkway for the next twenty years. The planning process has included:

- Identification of the 20-year project needs
- Development and evaluation of project solutions to address the needs
- Recommended tiers that would establish time frames for implementation based on urgency of the need, interrelation with other projects, phasing, and funding opportunities, among other considerations
- Time frames for consideration of alternative mobility targets throughout the corridor

Table 6 below presents a summary of the projects, their tiers, and next steps for implementation for each. A more detailed table with project triggers and dependencies, cost estimates, funding opportunities, and other considerations is included in the appendix to this memorandum.

Table 6: Project Tiers and Next Steps

Project Number	Project Name	Proposed Tier	Next Steps
C1	Install Ramp Meters	Tier 2	Concept of Operations
C2a	Close Lafayette Ave. right turn onto Parkway and extend the deceleration lane for the right turn off the Parkway.	Tier 1	Advance scoping to consider how to bundle RIROSs. Consider moving forward with top locations (Lafayette, Hawthorne, Reed Lane and Truman) first. Consider whether they could be done in phases, without final mitigation, and whether all should be done together or broken up. The scoping study could also include the strategy for the corridor.
C2b	Close Hawthorne Ave. right turn onto Parkway.	Tier 1	
C2c	Close Truman Ave. RIRO intersection with Parkway	Tier 1	
C2d	Close Reed Ln. RIRO intersection with Parkway	Tier 1	
C2e	Close Badger Rd. RIRO intersections with Parkway	Tier 1	
C2f	Close Pinebrook Blvd. RIRO intersections with Parkway	Tier 1	
C2g	Close China Hat Rd. and Ponderosa St. RIRO intersections with Parkway	Tier 2	S4 (China Hat Overcrossing) would likely require closure. Development Driven.
C2h	Close Rocking Horse Rd. RIRO intersections with Parkway	Tier 2	Consider timing for closure in S5 (Baker/Knott IAMP) and S6 (Murphy interchange.
C3a	Extend Southbound right turn deceleration lane at Hawthorne Avenue	Tier 1	
C3b	Extend southbound deceleration lane to Reed Market Rd	Tier 1	

Project Number	Project Name	Proposed Tier	Next Steps
C3c	Extend Revere Avenue northbound on-ramp acceleration lane	Tier 2	
C3d	Extend acceleration lane for Colorado Ave northbound on-ramp	Tier 2	
C4a	Active Transportation Crossing Improvements: Cooley Rd	Tier 1	Coordinate with Infra grant design.
C4b	Active Transportation Crossing Improvements: Butler Market Rd	Tier 1	Coordinate with TSP improvements.
C4c	Active Transportation Crossing Improvements: Olney Ave	Tier 1	Coordinate with TSP improvements.
C4d	Active Transportation Crossing Improvements: Greenwood Ave	Tier 1	Conceptual design and analysis
C4e	Active Transportation Crossing Improvements: Hawthorne Crossing	Tier 1	Develop feasible design.
C4f	Active Transportation Crossing Improvements: Franklin Ave	Tier 1	Conceptual design and analysis
C4g	Active Transportation Crossing Improvements: Canal/Garfield undercrossing	Tier 2	Conceptual design
C4h	Active Transportation Crossing Improvements: Badger/Pinebrook Overcrossing	Tier 2	Conceptual design to determine optimal location (Badger vs Pinebrook)
C4i	Active Transportation Crossing Improvements: Murphy Rd	Tier 1	Conceptual design
C4j	Active Transportation Crossing Improvements: China Hat Rd Overcrossing	Tier 2	Conceptual design for S4
C4k	Active Transportation Crossing Improvements: Baker Rd/Knott Rd	Tier 2	Coordinate with outcomes from IAMP.
C4l	Active Transportation Crossing Improvements: Robal Rd	Tier 1	Coordinate with Infra grant design
C4m	Active Transportation Crossing Improvements: Empire Blvd	Tier 2	Identify Empire Blvd project (3rd to SB Ramp terminal)
C4n	Active Transportation Crossing Improvements: Revere Ave	Tier 2	Refine M1 conceptual design
C4o	Active Transportation Crossing Improvements: Aune Ave	Tier 1	Develop Aune Extension conceptual design
C4p	Active Transportation Crossing Improvements: Wilson Ave	Tier 3	Conceptual design
C4q	Active Transportation Crossing Improvements: Reed Market Rd	Tier 2	Complete S1
C4r	Active Transportation Crossing Improvements: Powers Rd	Tier 1	Refine Conceptual design for S3

Project Number	Project Name	Proposed Tier	Next Steps
C5	Shoulder width improvements at strategic locations in corridor	Tier 2	Study corridor to determine which locations this should be completed based on operational issues/needs and available ROW. This could be bundled with RIRO study.
C6	Weather warning system	Tier 2	Concept of Operations. ODOT should coordinate with current county/MPO ITS planning effort and explore previous funding sources for ITS projects.
C7	Variable speed signs	Tier 2	
C8	Incident management	Tier 2	
C9	Enhanced signal operations at ramp terminals	Tier 1	Complete ATC conversion plan and obtain additional radar funding.
C10	Traveler information signing	Tier 1	ODOT should coordinate with current county/MPO ITS planning effort and explore previous funding sources for ITS projects.
C11	Roadside Traveler Information Dissemination		
N1	FEIS Projects		Infra grant is Phase 1
M1	Butler Market Interchange Improvements	Tier 1	
M2	Revere Avenue Lane Reconfiguration	Tier 2	
M3	Colorado Avenue Signal (or roundabout) at NB ramp	Tier 1	
M4	Colorado Avenue Improvement to SB ramp intersection	Tier 2	Conduct Study
S1	Reed Market Refinement Study from Bond Street to 3rd Street	Tier 1	Complete Refinement Study.
S2	Dedicated left turn lane Reed Market Rd and 3rd St (Through the TSP)	Tier 1	
S3	Powers Road Interchange	Tier 1	Refine preliminary design and begin ROW acquisition.
S4	China Hat Overcrossing	Tier 2	
S5	IAMP at Baker Rd/Knott Rd interchange	Tier 1	
S6	Murphy Tight Diamond Interchange	Tier 1	ODOT and City of Bend to develop a detailed coordination plan for implementation of Powers and Murphy Road Interchange projects
S7	Murphy North Frontage Road	Tier 2	
S8	Murphy South Frontage Road	Tier 2	Could be built in phases based on development