MEETING AGENDA

Citywide Transportation Advisory Committee Meeting #15

MEETING DATE: Tuesday, June 2, 2020

MEETING TIME: 1:00-4:30 p.m.

LOCATION: via Remote Meeting. Participation details can be found at:

https://www.bendoregon.gov/government/citizen-committees/citywide-transportation-advisory-committee

Objectives

- Informational update on incorporating outcomes of COVID-19 into TSP adoption and implementation process (no action)
- Informational update on Steering Committee review of goals and policies (no action)
- Recommendation to the Steering Committee on Chapters 1: Introduction, Chapter 3: Transportation System Plan Evaluation Process & Needs, Chapter 4: System Elements, and Chapter 7: Monitoring & Implementation

Agenda

Time			
1:00 p.m.	Welcome and introductory items • Introductions/conflict declaration • Approve previous meeting summary	Approve meeting summary	Joe Dills – Meeting Facilitator, APG
1:10 p.m.	Public comment – *Note: only written comments are being accepted at this time. Comments may be submitted by email to kswirsky@bendoregon.gov by 5:00 p.m. on June 1. City staff will summarize comments received at the CTAC meeting.*	N/A	Summary provided by Karen Swirsky
1:15 p.m.	Incorporation of COVID-19 outcomes into TSP process • Overview of how current pandemic may affect TSP implementation	Information	Brian Rankin
1:25 p.m.	TSP Adoption Process Overview • Process overview and next steps	Information	Karen Swirsky

Time	Topic	Desired CTAC Action (major actions in **bold**)	Lead
1:35 p.m.	Draft Chapter 7: Monitoring & Implementation Chapter Overview and Discussion • Chapter overview, review of CTAC metrics workshop • CTAC discussion CTAC approval of Draft Chapter 7: Monitoring & Implementation ***[Straw Poll]***	**Recommendation of Draft Chapter 7 to Steering Committee**	BreAnne Gale, Karen Swirsky
2:20 p.m.	Draft Chapter 1: Introduction Chapter Overview and Discussion CTAC approval of Chapter 1 for recommendation to Steering Committee ***[Straw Poll]***	**Recommendation of Draft Chapter 1 to Steering Committee**	Matt Kittelson

2:35 p.m.	Draft Chapter 3: Transportation System Plan Evaluation Process & Needs
	
	• Chapter Overview & Key Technical Finding Updates
	  ○ TPR Analysis
	  ○ Alternative Mobility Target Implementation Steps
	• CTAC Discussion
	
	CTAC approval of Draft Chapter 3: Transportation System Plan Evaluation Process & Needs for recommendation to Steering Committee ***[Straw Poll]***
		Recommendation of Draft Chapter 3 to Steering Committee	Matt Kittelson, Chris Maciejewski

3:05 p.m.	Draft Chapter 4: System Elements Chapter Overview and Discussion • Chapter overview • CTAC discussion CTAC approval of Draft Chapter 4: System Elements for recommendation to Steering Committee ***[Straw Poll]***	**Recommendation of Draft Chapter 4 to Steering Committee**	Karen Swirsky, Matt Kittelson
3:35 p.m.	CTAC Motion to recommend Draft Chapters 1, 3, 4, & 7 to Steering Committee	**Roll call vote on recommendation of Draft Chapters to Steering Committee**	Joe Dills

Time	Topic	Desired CTAC Action (major actions in **bold**)	Lead
3:50 p.m.	Status update of previously recommended chapters • Chapter 2 – Goals, Policies, & Actions • Chapter 5 – Projects & Programs • Chapter 6 – Funding Strategy	Information	Karen Swirsky, Matt Kittelson, Lorelei Juntunen
4:00 p.m.	Review Key Appendix Elements • Overview of Appendix structure	Information	Matt Kittelson
4:15 p.m.	Close & Recognition of CTAC Work	No action	Joe Dills

Accessible Meeting Information

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Agenda Item No. 1:
Meeting Summary
for CTAC #14

Minutes

CTAC Meeting #14

Bend's Transportation Plan

December 12, 2019

Trinity Episcopal Church
469 NW Wall Street, Bend, Oregon

CITY OF BEND

CTAC Members

Katy Brooks, *Member*
Louis Capozzi, *Member* (absent)
Garrett Chrostek, *Member*
Casey Davis, *Member*
Karna Gustafson, *Co-Chair*
Hardy Hanson, *Member*
Steve Hultberg, *Co-Chair* (absent)
Sally Jacobson, *Member*
Suzanne Johannsen, *Member*
Gavin Leslie, *Member*
Nicole Mardell, *Member* (absent)
Katie McClure, *Member* (absent)
Ariel Mendez, *Member*
Mike Riley, *Co-Chair*
Richard Ross, *Member*
Mel Siegel, *Member*
Iman Simmons, *Member*
Sid Snyder, *Member*
Glenn VanCise, *Member*
Ruth Williamson, Co-Chair
Sharlene Wills, *Member* (absent)
Dean Wise, *Member*

Ex-Officio Member

Gregory Bryant
Carolyn Carry-McDonald (absent)

City Staff / Elected Officials

David Abbas*, Transportation Services Director*
BreAnne Gale, Senior Planner
Gena Goodman-Campbell, City Councilor
Russ Grayson, Community Development Director
Susanna Julber*, Senior Policy Analyst*
Robin Lewis, *Transportation Engineer*
Elizabeth Oshel, *Assistant City Attorney*
Ryan Oster, *City Engineer*
Brian Rankin*, Principal Planner*
Joshua Romero, *Community Relations Manager*
Karen Swirsky, *Senior Planner*
Jenny Umbarger, *Administrative Support Specialist*

Consultants

Joe Dills, *Angelo Planning Group*
Matt Kittelson, *Kittelson & Associates*
Chris Maciejewski, *DKS Associates*

1. Welcome and introductory items

Mr. Dills called the meeting to order at 1:05pm. Member Wise noted the previous meeting's minutes indicated he is an attorney; he is not an attorney. Member Snyder moved to approve the minutes. Member Jacobson seconded. Voting resulting in Yes – 17, No – 0, Abstain – 0.

2. Public comment

Andrea Breault, Cascades East Transit (CET), indicated CET is requesting additional funding of $1m per high capacity transit and $500k per mobility hub, totaling $11.5m. The original request was $7.5m. CET is seeking to relocate Hawthorne Station, as well as secure secondary locations.

David Munks spoke in favor of a 'user pay' model regarding funding for facilities and services.

3. Transportation Outreach Strategy Update

Ms. Julber reviewed the transportation outreach strategy, as outlined in the presentation. Information will be posted on https://www.bendoregon.gov/city-projects/safe-travel.

Councilor Goodman-Campbell updated the committee on the project lists in the bond packages. Council will consider packages on January 8, 2020 and survey results will be presented at the work session. A decision to submit the bond measure for the May ballot is to be made February 5, 2020. All updates will be available on the above website.

The following members disclosed conflicts of interest:

Member Brooks, represents business interests
Member Chrostek, a local attorney
Member Gustafson, employed by Central Oregon Business Association (COBA)
Member Wise, employed by a developer
Member Simmons, employed by St. Charles Medical Center

Mr. Dills confirmed that today's voting indicates support for the substantive content of the recommendations the Citywide Transportation Advisory Committee (CTAC) is making.

4. Draft Transportation Projects and Programs Chapter

Mr. Kittelson and Mr. Maciejewski reviewed the summary of revisions to the Draft Transportation Projects and Programs Chapter, as outlined in the presentation. They pointed out that there are projects reflected in the Transportation System Plan (TSP) that are along the Parkway, but which were not recommended for forwarding in the Parkway Study. These are projects that were not shown to sufficiently increase safety or capacity on the Parkway (relative to cost). However, those projects do demonstrate benefits for the City's system. Additional cost adjustments will be

finalized after the Parkway Study is completed. The committee generally discussed chapter language. Agreed upon revisions are outlined in the attached table.

Member Gustafson moved to recommend forwarding the Draft Transportation Projects and Programs Chapter, including revisions identified by CTAC, to the Steering Committee. Member Brooks seconded. Voting resulted in Yes – 16, No – 1, Abstain – 0.

5. Draft Funding Chapter

Member Johannsen moved to approve the minutes from Funding Work Group meetings 6 and 7, Member Riley seconded. Voting resulted in Yes – 4, No – 0, Abstain – 1.

Ms. Juntunen reviewed the Draft Funding Chapter, as outlined in the presentation. The committee generally discussed chapter language. Agreed upon revisions are outlined in the attached table.

Member Gustafson moved to recommend forwarding the Draft Funding Chapter, including revisions identified by CTAC, to the Steering Committee. Member Johannsen seconded. Voting resulted in Yes – 15, No – 0, Abstain – 2.

Member Gustafson moved to recommend forwarding the Near-term Funding Action Plan (Appendix A), including revisions identified by CTAC, to the Steering Committee. Member Johannsen seconded. Voting resulted in Yes – 15, No – 1, Abstain - 1.

6. Draft Goals & Policies Chapter

Ms. Swirsky reviewed Draft Goals and Policies Chapter, as outlined in the presentation. The committee generally discussed chapter language. Agreed upon revisions are outlined in the attached table. Language in equity policies is to remain as written.

Member Gustafson moved to recommend forwarding the Draft Goals, Policies and Actions Chapter, including revisions identified by CTAC, to the Steering Committee. Member Johannsen seconded. Voting resulted in Yes – 17, No – 0, Abstain – 0.

7. Upcoming Project Tasks and Schedule Overview

Mr. Kittelson reviewed upcoming project tasks and an overview of the schedule, as outlined in the presentation.

Ms. Swirsky reviewed potential performance metrics under consideration, as outlined in the presentation. A brown bag or workshop will be scheduled later this winter.

8. Public Comment

Scott Nunns spoke in favor of pricing methods that could be imposed on users to change behavior and account for growth.

9. Close and next meeting

Meeting adjourned at 3:16pm.

Respectfully submitted,

Jenny Umbarger

Growth Management Department

Accessible Meeting/Alternate Format Notification

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Agenda Item No. 2:
Cover Memo:
Overview of Draft TSP

2040 Transportation System Plan
Overview of Draft TSP

June 2, 2020

Introduction

This packet includes draft versions of the chapters that will comprise the Bend Transportation System Plan (TSP). The draft TSP is the product of over two years of work by the Citywide Transportation Advisory Committee (CTAC), CTAC's Funding Working Group, the Transportation Plan Steering Committee (SC), technical team, and agency partners. It includes the input and valuable insights from many community members and business owners in Bend. The City recognizes and greatly appreciates the countless hours contributed by CTAC members in helping to shape the future of the City's transportation infrastructure, programs, and policies.

This memorandum includes an overview of each chapter, key modifications (if any) from drafts previously reviewed by CTAC, and specific requests for CTAC actions prior to the final CTAC Meeting #15 on June 2, 2020.

Additionally, the Project Team offers thoughts below on the possible near-term and longer-term implications of the COVID-19 crisis for transportation planning in Bend. The recent *Stay Home, Stay Safe* provisions will alter how the near-term implementation of the TSP may occur. Over the longer-term, there is more uncertainty about how COVID-19 will change individual behavior, land use needs, overall transportation needs and funding.

TSP Contents & CTAC Actions

The TSP consists of seven chapters. Chapters 2, 5, and 6 have been approved by the Steering Committee and no further action by CTAC is needed. Chapters 1, 3, 4 and 7 are new to CTAC in chapter form. Of these, Chapters 1, 3 and 4 are compilations of material that CTAC has seen, reviewed, and in some cases approved. Chapter 7 contains material largely new to CTAC, except for those members who attended the May 15, 2020 workshop, where some of the metrics were introduced.

Table 1 summarizes the status of each chapter. Items that are **bolded** are those requiring CTAC action. A more detailed description of each chapter's contents follows.

Table 1: Summary of TSP Chapters, Status, & Requested CTAC Actions

TSP Chapter	Status	Action Requested
Chapter 1: Introduction	New draft chapter compiled by Project Team based on material previously reviewed by CTAC.	**Review & forward to Steering Committee with any relevant revisions.**
Chapter 2: Goals, Policies, & Actions	Steering committee has approved Goals and Policies and will be reviewing Actions at the next meeting.	No CTAC action (edits resulting from May 21 Steering Committee meeting are provided in an attached track changes version as information only).
Chapter 3: Transportation System Plan Evaluation Process and Needs	New draft chapter compiled by Project Team based on material previously reviewed by CTAC.	**Review & forward to Steering Committee with any relevant revisions.**
Chapter 4: System Plan Elements	New draft chapter compiled by Project Team based on material previously reviewed by CTAC and other appropriate planning documents.	**Review & forward to Steering Committee with any relevant revisions.**
Chapter 5: Transportation Projects and Programs	Steering committee has approved this chapter.	No CTAC action (minor edits are highlighted for information only).
Chapter 6: Transportation Funding Strategy	Steering committee has approved chapter.	No CTAC action (minor edits are highlighted for information only).
Chapter 7: Implementation and Monitoring	New draft compiled by Project Team; presents an overview of (1) project implementation process and (2) recommended monitoring metrics. Some of this material was presented at the CTAC Workshop on May 15, but the chapter includes new and/or edited content.	**Review & forward to Steering Committee with any relevant revisions.**

Note: Final versions of chapters may include clerical edits as the combined TSP is developed and published.

The considerable technical material that has been developed over the last two years to support the development of the TSP has been compiled and is available here. The organization of this technical material may be revised based on specific elements that will be adopted in conjunction with the TSP and those that are supporting elements

Chapter Details

Chapter 1: Introduction

Chapter 1 provides an important introduction and statement on planning context for the TSP. The content sets the stage for the TSP and provides a description of where the reader can find information within the document as well as the supporting materials that led to the development of the TSP.

Key content includes:

- TSP introduction & organization
- Purpose, guiding principles, context, and relationship to other planning documents
- Overview of process to develop the TSP

Chapter 2: Goals, Policies, & Actions

Goals, policies, and actions are foundational elements of the TSP. CTAC has previously recommended a draft version of this chapter to SC. SC is currently reviewing chapter content. SC will consider action on this chapter at SC Meeting #6 on June 18th.

Chapter revisions by the SC include proposed policy modifications that address facility coordination with ODOT, including potential future alternative mobility targets that guide how state highway performance is monitored and planned for over time. CTAC is not asked to approve SC changes, as CTAC's role is to make recommendations to the SC for its consideration.

Key content includes:

- TSP goals
- Policies and actions that support TSP goals

Chapter 3: Transportation System Plan Evaluation Process & Needs

Chapter 3 provides a concise narrative of the technical process that led to key elements of the TSP, including the future land use and transportation scenarios and the evaluation process that guided the project and program prioritization process. The technical work summarized in Chapter 3 informed the near-, mid-, and long-term priorities detailed in Chapter 5.

Chapter 2 also provides a link to key technical documents to be included in the TSP appendices that formed the basis of this chapter. These include the Existing Conditions Analysis, Scenario Evaluation, Prioritization Analysis, TPR Analysis Memorandum, and Alternative Mobility Target Memorandum.

Key content includes:

- Expected growth patterns
- Overview of transportation system needs
- Overview of scenario evaluation process
- Overview of prioritization process
- Overview of system performance for regulatory purposes

***Note**: The following technical information has been provided for CTAC as background to Chapter 3. No action is requested from CTAC on these documents:*

- *Transportation Planning Rule (TPR) Analysis Memorandum – evaluates system-wide performance and study intersections based on 2040 forecasts and the reasonably likely to be funded project list. This analysis is a key basis for making TPR findings, which is a requirement of statewide planning goals.*
- *Alternative Mobility Target Memorandum – provides analysis of potential alternative mobility target strategies for the state highway system. This document will provide a technical basis for future alternative mobility target discussions with ODOT. These efforts are being coordinated with ODOT's Parkway Study and will continue through the TSP implementation process.*

Chapter 4: System Plan Elements

Chapter 4 documents much of the modal plan requirements of a TSP, including maps identifying the future pedestrian, bicycle, transit, and roadways networks. The chapter also references various other plans and regulations that have significance to the Bend transportation system.

Key content includes:

- *Pedestrian System & Bicycle System:* includes the Pedestrian Facilities Map, Bicycle Facilities Map, and the Low Stress Bicycle Network
  - Note: This section includes a reference to the Bend Parks and Recreation Trail System Plan, which is not maintained by the City of Bend.
- *Public Transportation Plan:* includes key outcomes of the Cascades East Transit (CET) Master Plan. This chapter does include a map of Key Transit Corridor and Mobility Hub locations as part of the coordination between the Bend TSP and the CET Master Plan.
- *Roadway Network:* includes the Functional Classification System Map and a reference to the Street Design Standards adopted by City Council to implement the Classification System Map.
- *Freight System Plan:* describes applicable state and federal freight designations
- Transportation Demand Management & System Management: discussion and key elements of various transportation demand management (TDM) and system management strategies and applications relevant to the Bend transportation system.
- *Technology & Transportation:* description of applicable intelligent transportation system (ITS) tools available to the City of Bend and the Deschutes County ITS Plan. Also includes a general description of the impacts of emerging transportation technologies on transportation planning, including Automated Driving Systems & Automated Vehicles.
- *Parking Management:* description of how parking and TDM measures can help the City provide support of economic development as well as overall community health and sustainability.

- *Rail, Aviation, Waterways, and Transmission Pipelines:* description of the modal plans and how the city will coordinate with the owners of these facilities.
- *Climate Change Planning:* applicable references to the Bend Community Action Plan.

Chapter 5: Transportation Projects & Programs

Chapter 5 provides an overview of the coordinated transportation investments that address transportation needs over the next 20 years. This includes the City's current Capital Improvement Program (CIP), capital projects, roadway reconstruction projects, and transportation programs. Transportation priorities are categorized into near-, mid-, and long-term priorities. Projects needed for the UGB expansion areas of the City are also identified.

Key content includes:

- Capital Project List
- Transportation Programs
- Existing Failed Roadway Reconstruction Projects
- Overview of Effectiveness of Transportation Investments
- Transportation Priorities and Planning Level Cost Estimates

Chapter 6: Transportation Funding Strategy

Chapter 6 provides flexibility and direction on how projects identified within the TSP will be funded over time. The chapter includes a summary of existing funding sources, cost estimates for the identified transportation improvement projects and programs, and potential new funding tools and possible revenue. The appendix includes two recommended action plans for consideration by decision-makers during implementation. The chapter reviewed by the SC will include additional information about how the funding plan may be impacted by COVID-19.

Key content includes:

- Funding analysis, including review of existing sources and identified funding gap
- Overview of potential new funding sources to address funding gap
- Key findings for funding capital projects, operations & maintenance, and programs, including reasonably likely to be funded determinations.

Chapter 7: Implementation & Monitoring

Chapter 7 provides information on implementation, including how projects are built and programs are implemented.

This chapter also provides a framework for performance monitoring – through the use of identified metrics and defined targets – to track progress towards desired goals and outcomes over time.

Key content includes:

- Performance monitoring metrics and targets
- Stages of the transportation system project lifecycle

COVID-19 Considerations

As of June 2020, the City of Bend, State of Oregon, the country, and the world are in the middle of an unprecedented global pandemic caused by the novel coronavirus (COVID-19). The short- and long-term impacts on transportation, land use planning, and the economy and funding availability may not be fully understood for many years. Our only certainty right now is that the world around us has and will continue to change.

Changes we all experience over the coming weeks and months may affect factors considered through this TSP development process. Many communities are already experiencing changes in expected revenue, as well as drops in motor vehicle use and unprecedented levels of pedestrian and bicycle traffic. These changes are shifting how our streets are used. Although revenue capacity from existing sources may decline in the short term, other sources, such as a potential federal stimulus, may create new sources not previously considered. Beyond revenue impacts, the City may see changes to construction costs, near-term development potential, travel demand, or mode choice. All these factors could impact funding choices, project development, and construction schedules, but do not alter the community's desire to better use the streets and pathways that exist today.

Although the significant impacts of COVID-19 could not have been anticipated, the TSP has been shaped to allow the City to be prepared for the unexpected. The plan includes a wide variety of projects and programs and a range of new and existing revenue sources that can be flexibly applied, over time, in response to changing transportation and economic conditions and needs. In this sense, the TSP provides a solid and resilient framework for decision-makers to be responsive to changing economic conditions and transportation needs.

We know the current COVID-19 crisis presents challenges, but it may also present opportunities. Adopting the new TSP will allow the City to enter the implementation phase of the TSP with an updated community vision for transportation that is aligned with the Comprehensive Plan and other plans and initiatives in Bend.

Agenda Item No. 3:
Draft Chapter 7

DRAFT Chapter 7: Implementation & Performance Monitoring

This Chapter provides an overview of how the transportation projects and programs identified in Chapter 5 are implemented and how performance of the TSP can be monitored over time.

Implementation

One of the primary outcomes of Bend's Transportation System Plan is a list of high priority strategic improvement projects and programs that are ready to be advanced by the City of Bend and its regional transportation partners. Having an adopted TSP is a vital starting point for Bend to guide its decisions about where to invest in its transportation system. Once the TSP is updated and adopted by City Council, the common next question is "when will these projects get built"? This section presents the process of turning Bend's transportation planning ideas into a reality.

Transportation System Project Lifecycle

Public agencies like the City of Bend, Deschutes County, and ODOT use the concept of a "project lifecycle" to define, prioritize, fund, design and construct a system project. There are four discrete stages.

Stage 1: Program Development (or Planning) - A project listed in an adopted TSP is in Stage 1. Before it can be built, the TSP project must be further scoped and refined to develop preliminary scaled plan drawings and analyzed to more clearly understand the constraints involved, and to prepare initial construction cost estimates. Initial evaluation of property acquisition will be identified, which can be a major cost factor. In cases where environmental impacts could be significant, special guidelines set by the State of Oregon and the federal government are followed.

The end of Stage 1 is a prioritized list of projects, referred to as a capital improvement program (CIP), that designates which projects will receive funding to advance to the next stages. These CIP lists designate investments for the short-term, typically five to six years.

Stage 2: Project Development (or Design) – The next stage involves engineering design for all the elements that are necessary for project construction as scoped in Stage 1. This often includes incorporating new data about the location and condition of utilities, terrain, soil, environmental areas and property boundaries to fully address the needs of the project design as defined by applicable agency design standards. For example, the City of Bend has roadway design standards for each type of street in its system that define preferred width, materials, and features. The cost estimates are updated to incorporate the new findings from the design stage. For most projects, a set of construction documents (engineering plans and specifications, and cost estimates) are prepared and a public notice is made to encourage qualified construction contractors to submit bids. Once a bid is awarded, the process advances to construction. If a particular project warrants, City Council can exempt a project from the two-step process of design then bidding for construction (Stages 2 and 3), and combine these two steps into a single contract for design and construction (called "Design-Build" or "Progressive Design-Build", depending on the structure of the contract and project scope).

Stage 3: Construction Management – The agency oversees and periodically inspects the work of the construction contractor to ensure that the work is performed according to agency standards. Major roadway projects can include special traffic control measures to safely operate the on-going use of the roadway, and to reduce conflicts with construction equipment and workers. A designated construction

manager checks on overall progress and compliance with the construction documents at key milestones. The final steps of this stage are the opening of the new facility and activation of any associated lighting or control systems.

Stage 4: Maintenance / Operations – The final stage in the project lifecycle defines the steps and cost required to maintain and operate the facility. These on-going costs are included in the agency operating budget along with other work required to keep the system going.

Factors That Influence Project Timing to Implementation

The length of time that is necessary to advance through the four project lifecycle stages can range from months to years. As noted previously, not all projects identified in a TSP make it through the cycle for one reason or another. Factors that influence the timing to implementation include the following:

- The scale and complexity of the TSP improvement project
- Funding availability
- Agency priorities and regulations

Scale and Complexity of Projects - More complex improvement projects may include formal environmental reviews, which can span several years, and require coordination with multiple agencies, and property owners to fully address design and regulatory requirements. Larger capital improvement projects are often built in phases, as additional funding becomes available. Another key factor in the pacing of project implementation is determined by which agency is leading the project development process, and the project urgency based on the lead agency's priorities. In general, the agency that owns and maintains a transportation facility will take the lead on the project design and construction.

Capital Improvement Program and Other Funding Sources – Public funding for design and construction represents the largest part of a project development costs. Short-term projects that have high priority and available funding are managed through the annual capital improvement programs that are administered by the City of Bend, Deschutes County, and ODOT. Sometimes, special State or Federal funding grant opportunities arise that require the agency to compete to win additional funds to accelerate implementation of a particular type of project. The City of Bend has also leveraged a special kind of funding, called general obligation bonds, which the voters have approved to provide supplemental funding that allowed them to accelerate and deliver high priority transportation projects.

Land Development Review **-** Another way that TSP projects get built are through the private land development review process. In addition to the facility improvements within the boundary of the development site, the City's regulations may also require that the developer address any off-site impacts that will be caused by higher levels of multimodal travel activity associated with that site. In some cases, the development is required to design, build, and construct improvements as part of their development approval process. Contrary to the CIP process, many TSP projects that are constructed through the development review based on their proximity to the site, rather than the overall TSP system priorities or CIP project rankings. In this way, a specific TSP project nearby the development site may be accelerated and implemented faster than would be provided through the traditional CIP process.

Implementing the City's Standards

All public facility improvements constructed through the CIP process or through Land Development Review must comply with the City's design standards and the adopted TSP. Example transportation plan elements include street functional classification, pedestrian and bicycling system plans, public transportation plan, and intelligent transportation system plan, to name a few. These plans and

documents describe the key design characteristics that must be addressed through the project design process. The design process must consider the location, how it connects to other parts of the system, public right-of-way width, types of construction materials, street cross-section dimensions, traffic controls, street lighting and signing. A public facility design must be reviewed and approved for construction by the responsible agency. Selected City resources for facility designs and transportation master plans are available online including the City Street Functional Classification Map and City Street Design Standards.

Implementation Summary

In summary, the journey from an adopted TSP project list to a ready-to-use public improvement requires that each project go through the four stages of the Project Life Cycle. Depending on the project size and complexity, this can take years to complete all of the stages. A key part of that journey is having sufficient funding to design and construct the project. The City of Bend may lead the design and construction of a project provided for in their Capital Improvement Program. ODOT has a similar process for state highways within the City of Bend planning area. Finally, the private land development review process may also trigger system improvements that better support growth in a particular part of the City.

Performance Monitoring

Performance monitoring is a tool to that allows the City to track progress towards meeting its goals through the use of metrics and defined targets. Performance monitoring allows the City to identify areas where additional improvements are needed so that it can make more informed investment decisions.

The performance monitoring targets and metrics identified in this section were formulated based on the transportation goals and policies in Chapter 2. They were intentionally chosen because they represent each of the specific policy areas and goals and were based on the best data available at the time this TSP was adopted. These measures are suggested approaches and are advisory recommendations for performance monitoring. They do not limit the City to a single performance monitoring approach. The City should employ best practices for performance monitoring and should consider using alternative or different performance measures as new technologies or data become available. The exception to this is VMT reduction, which is a requirement of TPR. The intent is that the targets and metrics identified below, or their equivalents, will be monitored over time at regular intervals, and the results reported to the community.

Performance Metrics & Targets

The performance metrics in this Chapter provide measurable benchmarks for the identified related policy area(s) and goals. They are an indicator of how a particular aspect (i.e. Safety, Mobility) of the TSP is being achieved and are recommended because their data sources are objective, reliable, and credible.

Where possible, the performance targets provide numeric benchmark thresholds that define whether or not the identified aspect of the TSP is meeting the desired outcome. Targets were established based on the goals, current performance, industry standards, and peer cities. The target date is 2040, the planning horizon, unless otherwise specified.

In addition, some of the targets are based on the Actions associated with policies and Chapter 2 and the Programs in Chapter 5. They are a way to track progress towards establishing new programs for the City of Bend and are simply an initial measure of if a program has been initiated. How to measure the success of any particular program will be determined as part of program development.

Table 1. Performance Monitoring Targets

	TARGET	Metrics/Measurements and Data Sources
Safety	**Zero transportation-related fatalities. Reduction of transportation-related serious injuries by 50%.**	Metrics: Rate of fatalities per capita, rate serious injuries per capita, number of fatalities, number of serious injuries, number of non-motorized fatalities, number of non-motorized serious injuries, crashes by severity and mode (pedestrian, bicycle, and motor vehicle). Data Sources: ODOT, MPO, TSAP
	Establish a Speed monitoring program within five years of TSP adoption.	Measurement: Yes/No A speed monitoring program would evaluate select streets to establish and enforce appropriate motorist speeds based on street context. Data Source: City
Equity	**Develop a Transportation Equity Program within five years of TSP adoption.**	Measurement: Yes/No This target is intended to establish a baseline for future related measurements. Transportation Equity program development would include equity mapping and data collection to better identify and understand transportation needs and target projects/programs to improve transportation-related conditions for underserved populations. Data Source: City
Mobility	**Reliable travel time for motor vehicles on key arterials.**	Measurement: ODOT and the BMPO set the reliable travel time targets as required by the Federal Highway Administration (FHWA). The ODOT 2022 target for the BMPO area is: 78% of person-miles traveled on the key arterials (non-Interstate National Highway System) as reliable. Reliable travel time is measured by ODOT using FHWA Level of Travel Time Reliability (LOTTR) standards. Key arterials are identified as US 97, HWY 20/3rd St./Greenwood, Empire Ave., Reed Market Rd., and 27th St. Data Sources: ODOT, MPO, FHWA's National Performance Management Research Data Set or equivalent. Reported every two years.
	100% of City street network pavement with a Pavement Condition Index (PCI) average rating of 80 or higher. **50% of Non-Interstate National HWY System (NHS) pavement with a PCI average rating of 70 or higher.**	Metric: Pavement condition is measured using standardized Pavement Condition Index (PCI) which rates the condition of the surface of a road network. The PCI provides a numerical rating for the condition of road segments, where 0 is the worst possible condition and 100 is the best The 2019 overall City PCI average was 74. The 2022 Council Goal for the overall City PCI average was 75. The Non-Interstate National Highway System (NHS) target for PCI is set by ODOT and the BMPO. Data Sources: City, MPO, ODOT. City data reported annually.
Technology, Transit & TDM	**Develop a TDM Program for major employers and institutions within five years of TSP Adoption.**	Measurement: Yes/No This target is intended to establish a baseline for future related measurements and targets. Data Source: City
Bicycle, Pedestrian, & Complete Streets	**Establish a Bicycle and Pedestrian Facility Maintenance Program within five years of TSP adoption.**	Measurement: Yes/No This would include mapping of baseline conditions. It is intended to establish a baseline for future related measurements and targets. Data Source: City
	Complete all 12 Key Routes by 2030.	Measurement: Yes/No See TSP project list for projects needed to complete Key Routes.

		Monitoring should include both percentage of individual Key Routes complete/under construction and total number of Key Routes completed. Data Source: City
	Adopt a Pedestrian Master Plan within five years of TSP Adoption.	Measurement: Yes/No This target includes creating a Pedestrian Master Plan to identify and prioritize pedestrian system improvements (local, collector, arterial sidewalk infill), transit access, safe routes to schools and parks, and wayfinding. It is intended to establish a baseline for future related measurements and targets. Data Source: City
Environment	**Double the number of commute trips made by bike, walking, and transit.**	Metric: Transportation Mode-Split. Measured as increase of work-home commute trip shares (i.e. an increase of 10% to 20% would be a 100% increase). Both the individual bike, walking, and transit mode shares and combined bike, walking, transit mode share should be monitored overtime. Measuring techniques could include either or both the American Communities Survey (ACS) and/or Bend-Redmond Transportation Model (BRM). Target reflects both data sets. Data Sources: American Communities Survey, Bend-Redmond (Transportation) Model
	No more than 5% increase in VMT per capita (from 2010 level).	Metric: VMT per capita. 2010 baseline: 9.47 VMT per capita per day Target is a TPR requirement. Vehicle Miles Traveled (VMT) estimates are developed by ODOT as required by the Federal Highway Administration (FHWA) for the Highway Performance Monitoring System (HPMS). ODOT creates estimates for each federal aid urban boundary (FAUB) by functional classification. Data Source: ODOT
	Measure and report on transportation-related Green House Gas (GHG) emissions every three to five years.	Measurement: Yes/No This target is intended to establish a baseline for future transportation related GHG emission measurements. Data Source: City (through implementation of the Climate Action Plan, 2019)

Agenda Item No. 4:
Draft Chapter 1

DRAFT Chapter 1: Introduction

Bend's Transportation System Plan (TSP) describes Bend's transportation policies and investment priorities to support the City's needs and visions for an economically vital, healthy, and equitable community. To support how people and goods move within and through the City, and complement Bends land use and growth management strategies, the TSP establishes a system of transportation facilities, programs, and policies that will guide the development of transportation infrastructure over the next 20 years. The TSP is the transportation element of Bend's Comprehensive Plan. The TSP study area is shown in Figure 1.

Between 2018 and 2020, the City of Bend developed this TSP through a robust process guided by:

- Community values and project goals;
- Data-driven decision-making; and
- Input from the Citywide Transportation Advisory Committee, agency partners, key stakeholders, and other community members.

The collaborative process resulted in a TSP that:

- Addresses existing and future needs through capital investment projects that serve all users;
- Prioritizes programs that make regular investments into the transportation system, including maintenance of existing and newly constructed infrastructure;
- Establishes policies that guide future decision-making; and
- Identifies a flexible and implementable funding strategy that matches the planned level of improvements, and which, if implemented, can fund all of the projects and programs identified as needs for the next 20 years.

TSP Organization

Bend's TSP is comprised of two volumes. Volume 1 is the main document and includes the items that will be of interest to the broadest audience. Volume 2 contains the technical memoranda, data, and related transportation plans that enhance and support Volume 1.

Volume 1 includes the following:

- **Chapter 1: Introduction** – a brief overview of the planning context for the TSP;
- **Chapter 2: Goals, Policies, & Actions** – goals, policies, and actions that express the City's long-range vision for the transportation system;
- **Chapter 3: Transportation System Plan Evaluation Process and Needs** – expected land use patterns, transportation system needs, and the process to develop the TSP's list of planned capital improvements and transportation programs;
- **Chapter 4: System Plan Elements** - overview of needs and plans for walking, cycling, transit, vehicle, freight, air, rail, and key pipeline facilities

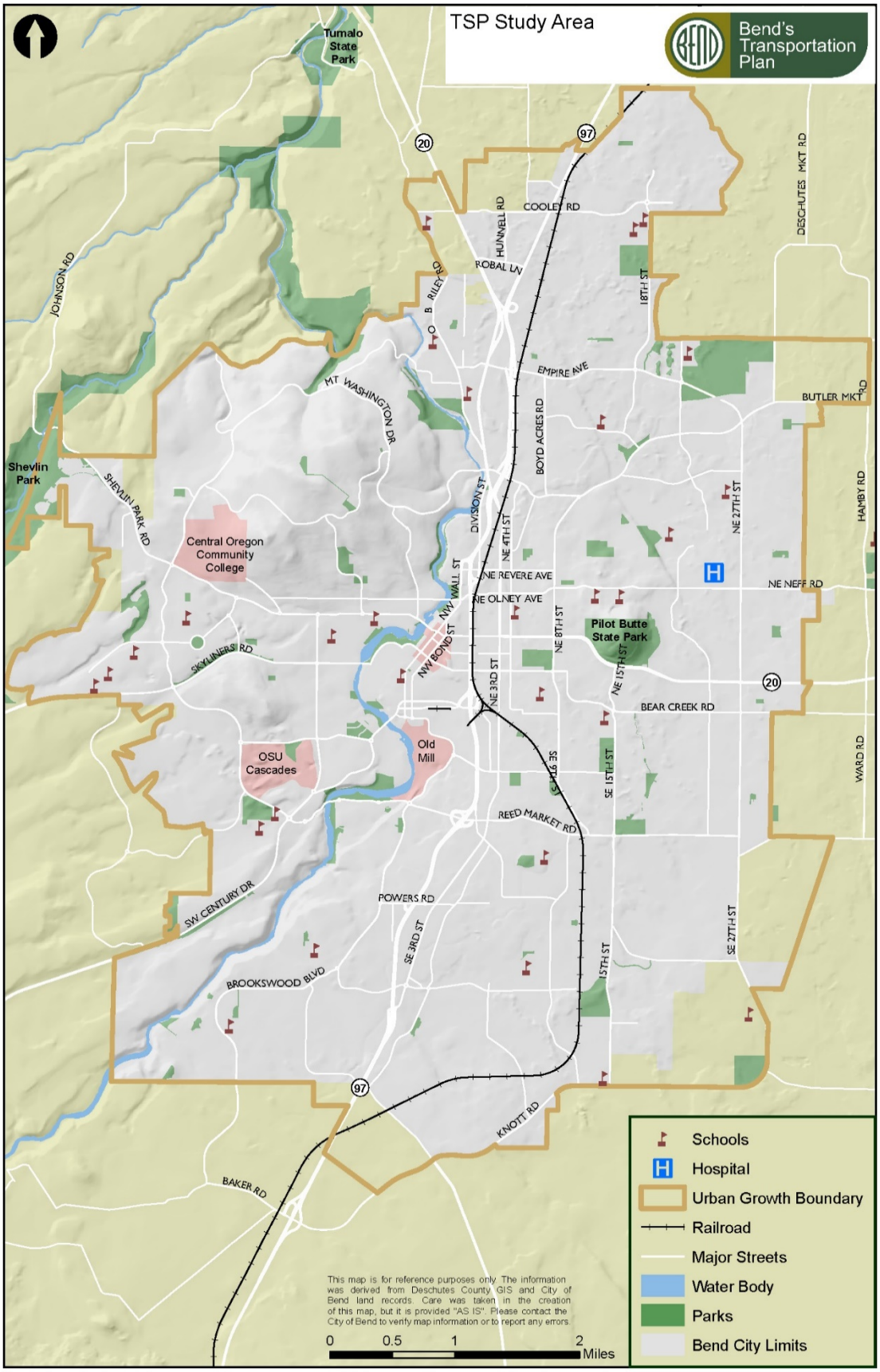
- **Chapter 5: Transportation Projects and Programs** – an overview of the prioritized projects and programs planned over the next 20 years;
- **Chapter 6: Transportation Funding Strategy** – a comprehensive funding assessment and preferred set of new and expandable funding tools to address the identified gap between community needs and available funding sources, and,
- **Chapter 7: Monitoring and Implementation** – a plan for implementation of a transportation monitoring program.
- Attachment A – Near-term Funding Action Plan
- Attachment B – Funding Strategy Analysis and Methods

Volume 2 includes the following technical documents and background information:

- Appendix A: Methodology Memorandum
- Appendix B: Existing Conditions Analysis
- Appendix C: Updated Land Use Assumptions for Bend's Transportation Plan Memorandum.
- Appendix D: Performance Measures for Scenario Evaluation
- Appendix E: Scenario Evaluation Memorandum
- Appendix F: Prioritization Criteria Memorandum
- Appendix G: Preliminary Prioritization Evaluation Results Memorandum
- Appendix H: Transportation Planning Rule (TPR) Analysis Memorandum
- Appendix I: Alternative Mobility Target Memorandum
- Appendix J: Technical Analysis Files
- Appendix K: Planning Level Cost Estimates
- Appendix L: CTAC Meeting Packet Material
- Appendix M: Funding Workgroup Packet Material
- Appendix N: Steering Committee Packet Material

Volume 2 includes documentation of TSP development material, some of which is superseded by final recommendations documented in Volume 1. Even so, all the documents provide useful information regarding the basis for the decisions represented in Volume 1.

Figure 1. TSP Study Area



Purpose

The TSP identifies the transportation facilities and programs to support Bend's adopted Comprehensive Plan. The plan identifies a long-term community vision to maintain and improve the existing transportation system to serve City residents, employees and visitors over the next 20 years. The TSP also serves as a resource for future transportation and land use decision-making by providing:

- Solutions to address existing and future transportation needs for all modes;
- A blueprint for investments in transportation projects and programs that improve safety and access for all travelers, improve Regional and State resilience, and support City and Regional economic development priorities;
- A tool for coordination with regional and local agencies and governments;
- Information to ensure prudent land use and transportation choices,
- Planning-level cost estimates for transportation infrastructure investments needed to support current and future community members, economic development and growth, and possible sources of funding these improvements;
- Function, capacity and location of future streets, sidewalks, bikeways, pathways, transit, and other transportation facilities; and
- Potential programs to help improve opportunities to travel by driving, walking, bicycling and transit in the future.

The TSP satisfies the state's requirements for a local transportation system plan as prescribed by Oregon Statewide Planning Goal 12: Transportation, and the Transportation Planning Rule: OAR Chapter 660-012.

Guiding Principles and Context

The TSP provides a flexible, adaptable framework for making transportation decisions in an increasingly unpredictable and financially constrained future. Decisions about the City's transportation system will be guided by the goals and policies contained in Chapter 2, but ultimately the decisions will be made within the overall context of the City's land use plans, regional coordination, Planning Commission, and City Council direction.

The Oregon Revised Statutes require that the TSP be based on the Comprehensive Plan land uses and provide for a transportation system that accommodates the expected growth in population and employment. Development of this TSP was guided by Oregon Revised Statute (ORS) 197.712 and the Department of Land Conservation and Development (DLCD) administrative rule known as the Transportation Planning Rule (TPR, OAR 660-012. Also, an Integrated Land Use and Transportation Plan (ILUTP), which was adopted in 2016 as part of the City's Urban Growth Boundary (UGB) expansion, established guiding principles to serving future transportation demand through coordinated land use and transportation planning.

Consistent with the TPR, this TSP identifies multimodal transportation needs to serve users of all ages, abilities, and incomes. Solutions to address existing and future transportation needs and improved safety for all travelers are included. Following adoption of the TSP, the City will also amend specific ordinances needed to maintain existing transportation facilities and to enhance walking and bicycling facilities between residential, commercial, and

employment/institutional areas. Finally, as required by the TPR, this TSP was developed in coordination with local, regional and state transportation plans.

Relationship to the Bend Metropolitan Planning Organization Metropolitan Transportation Plan & Other Transportation Plans

The City and Bend Metropolitan Planning Organization (MPO) understand the importance of having a coordinated and consistent vision, plan, and implementation strategy for the future of the transportation system. Because transportation needs do not stop at the City's borders, this TSP was developed in close coordination with the Bend MPO Metropolitan Transportation Plan (MTP) as well as Deschutes County, Oregon Department of Transportation (ODOT), and Cascades East Transit (CET). This approach allowed for close coordination on the "reasonably likely to be funded" project list that closely mirrors the "financially constrained" project list required and maintained by the Bend MPO MTP. Such alignment will simplify future year planning and provide consistent scenarios for decision-making.

In addition to the Bend MPO MTP, the Bend TSP was coordinated with and influenced by several other regional transportation planning documents. These documents include but are not limited to:

- Oregon Highway Plan
- Bend Parkway Plan
- Bend Transportation Safety Action Plan (TSAP)
- Deschutes County Intelligent Transportation System (ITS) Plan
- Cascades East Transit Master Plan
- Deschutes County Transportation System Plan
- Bend Park and Recreation District Trails Master Plan

The Bend TSP also helps inform ongoing or forthcoming planning efforts within the City's UGB. Notable examples include:

- Core Area Project – City led planning effort considering a comprehensive approach to implement the vision of four of the UGB identified Opportunity Areas, important for redevelopment in the Bend Comprehensive Plan, including the Korpine and Bend Central District areas.
- Other Opportunity Area plans.
- Master Plans or Area Plans, including those associated with UGB Expansion Areas.
- Transportation System Development Charge (TSDC) Update

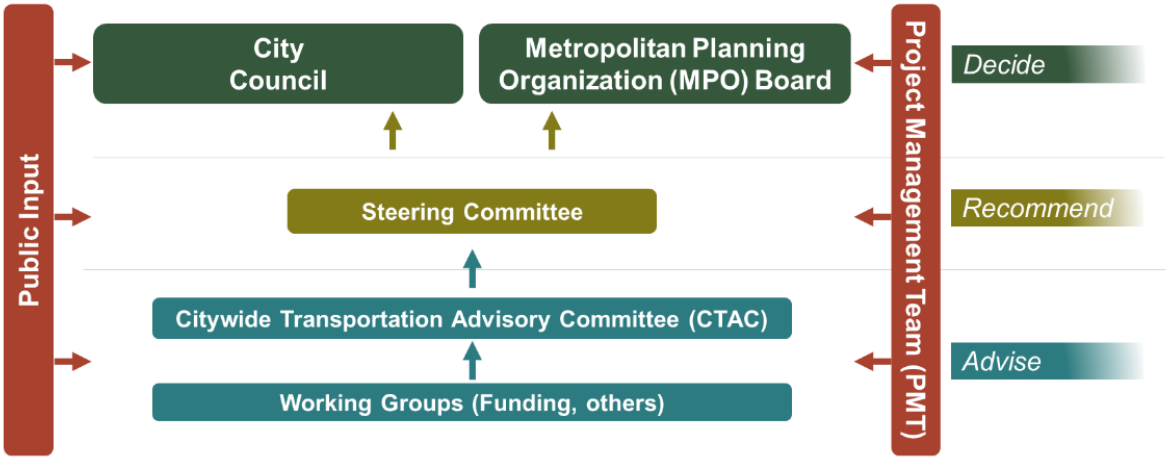
Developing Bend's Transportation Plan

The City began updating the TSP in January 2018. The previous TSP was initially adopted in October 2000. Between 2014 and 2016, Bend updated its Comprehensive Plan as part of the UGB Remand process. The approved plan included TSP amendments, notably an Integrated Land Use and Transportation Plan, that set the stage for a more comprehensive update of the TSP.

Every step of this TSP update was guided by a Citywide Transportation Advisory Committee (CTAC), whose members were appointed by the Bend City Council. Twenty-seven citizens were selected to serve on CTAC to represent a wide range of perspectives and community values. Members of CTAC also formed a number of working groups to more deeply explore specific topics of interest, policy subgroups, and numerous “brown bag” gatherings to discus, learn, and provide input on various technical areas. CTAC’s commitment to the purpose of the TSP, consensus building, and implementable outcomes informed and enriched the vision for the transportation system presented within this plan. CTAC met 15 times throughout the development of the TSP. The Funding Work Group (FWG), a subset of the CTAC, also convened 8 times to help shape the investment priorities and funding strategies identified in Chapter 5 of the TSP.

In addition to CTAC, a number of other key stakeholders and many members of the public shaped the decision-making and development for the TSP, as outlined below.

- Project Management Team (PMT) – This group included City staff and the consultant team retained to assist with the technical work, public engagement, and documentation needed to develop the TSP. The PMT developed all technical documentation, organized and facilitated committee meetings and public events, and advised CTAC.
- Steering Committee (SC) – This group was comprised of the Bend City Council and a representative from each of the Bend Planning Commission, Deschutes County Board of Commissioners, and the Oregon Department of Transportation. The role of this group was to give direction at key points within the TSP update process and formally recommend the adoption of the TSP to elected decision-making bodies. The SC met eight times as part of TSP development.
- Bend City Council and MPO Policy Board – These decision-making bodies formally adopted the Bend TSP.
- Public Input – Bend’s citizens and other area residents and business owners were invited to provide input at every point of the TSP update process. Key input was provided through public comment at CTAC meetings and SC meetings, targeted pubic outreach meetings, and through comment during the formal adoption process. Feedback received at a public in-person and online open house and five neighborhood workshops included representation from all neighborhood association, exceeded 1,000 participants, and included over 2,500 total comments. This feedback helped to shape the TSP.



In addition to the formal events listed above, the City of Bend organized, attended, or participated in numerous formal or informal community gatherings, including regularly attendance at Neighborhood Association meetings, outreach to specific interest groups, and regular discussions with interested members of the community.

Documentation of the formal meetings outlined comprise a significant portion of the technical appendices included in Volume 2. This reflects the significance of the community engagement process and its role in developing the Bend TSP.

Agenda Item No. 5:
Draft Chapter 3

Bend's Transportation Plan

DRAFT Chapter 3: Transportation System Plan Evaluation Process & Needs

Introduction

Bend's Transportation System Plan (TSP) describes an integrated, multimodal transportation network that will meet the needs of City residents, businesses, and visitors over the next 20 years. The TSP was developed through a robust public process guided by statewide planning goals and statutes, community values (as expressed through the Goals, Policies, and Actions outlined in Chapter 2), and extensive technical and qualitative analysis. Details on the technical analyses that helped inform the TSP can be found in Volume 2. This chapter provides a high-level overview of expected growth patterns in Bend, the scenario evaluation process, the prioritization process, and key findings and multimodal system needs. More specific description of system plan elements is included in Chapter 4. Chapter 5 and Chapter 6 further expand on project and program priorities and funding strategies to address the needs documented here. Chapter 7 describes the suggested metrics by which the City can measure progress towards achieving its desired transportation system.

Expected Growth Patterns

The future transportation system is planned to support the households and jobs as envisioned in the City's Comprehensive Plan for growth within the Urban Growth Boundary (UGB) to 2040[1]. Growth in households and jobs and anticipated traveler behavior changes between 2010 and 2040 informed forecast vehicular traffic volumes using the City's street system.

The population and employment forecasts were coordinated at the state and regional level in compliance with Oregon transportation and land use planning requirements. Growth was allocated to developable areas within the current UGB consistent with the land use designations shown in the adopted *Bend Comprehensive Plan*[2]. A summary of the population, household, and employment forecasts are included in Table 1.

Table 1: City of Bend Population & Employment Forecasts

	Year 2019	Year 2040	Growth
Population Forecast	91,353	153,700	62,347 (68%)
Households	38,064	63,444	25,230 (67%)
Employees	XX,XXX	84,934	XX,XXX (xx%)

The following figures show the location and intensity of projected growth in the Bend area through 2040, including specific opportunity areas and expansion areas identified through the 2016 UGB

[1] The Bend Comprehensive Plan projects population and employment growth to 2028. The modeling done for the TSP projected those rates to 2040. See the "Updated Land Use Assumptions for Bend's Transportation Plan Memorandum" in Volume 2 for more information.

[2] Bend Comprehensive Plan 2016

update. Figure 1 illustrates the relative intensity of housing growth in different areas of the UGB, while Figure 2 illustrates the relative intensity of employment growth.

Year 2040 traffic volume forecasts were developed for the City's collector and arterial street system and the ODOT highway system using the Bend Redmond Travel Demand Model. This model is a calibrated tool maintained by ODOT that is useful in developing and analyzing future land use and transportation investment scenarios. Development of the traffic forecasts was consistent with the methodology outlined in ODOT's Analysis and Procedures Manual (APM). Further details of the forecasting tools, assumptions and results are included in the Methods and Assumptions Document included in Volume 2.

Figure 1. Heat map of projected housing growth (2014-2040)

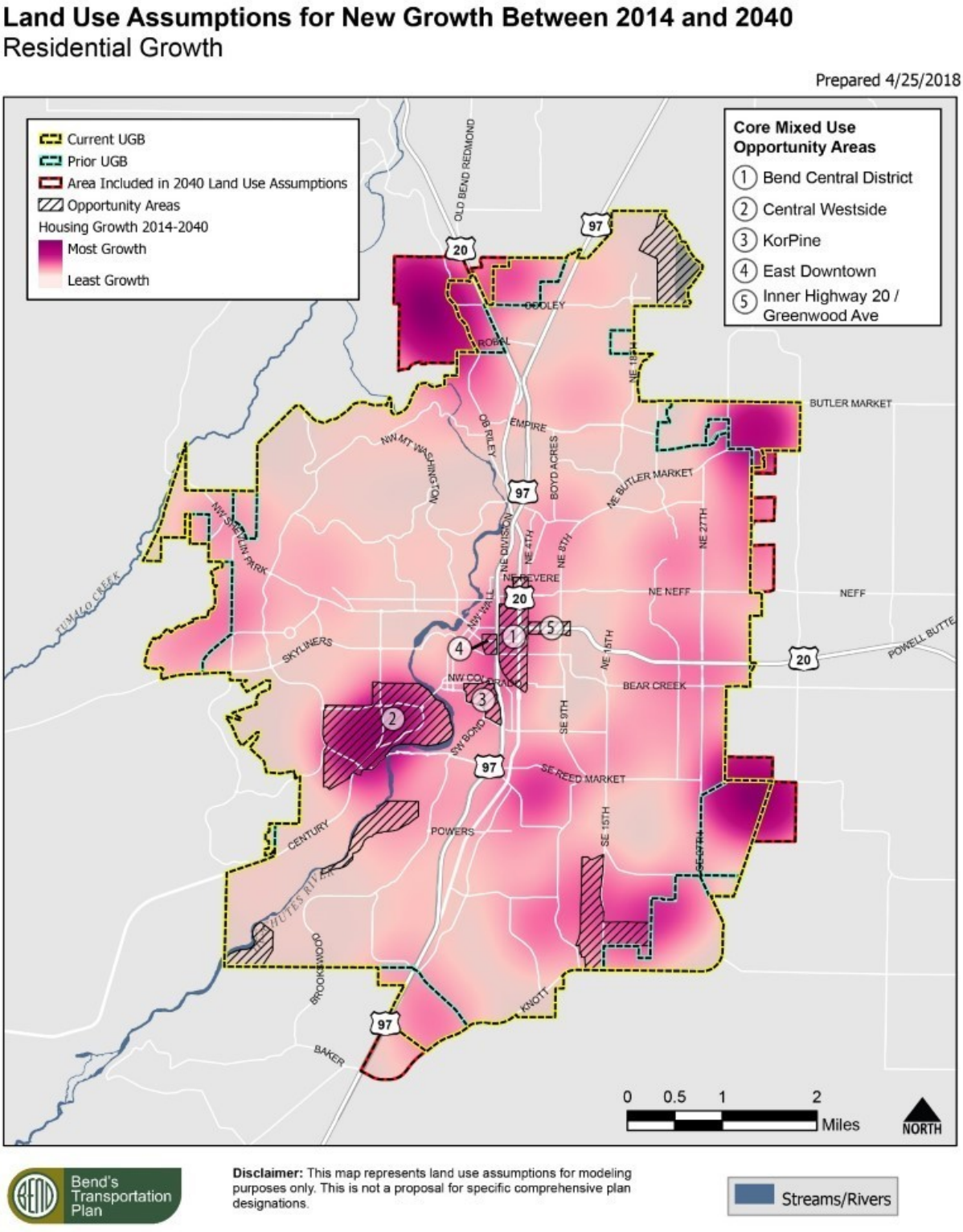
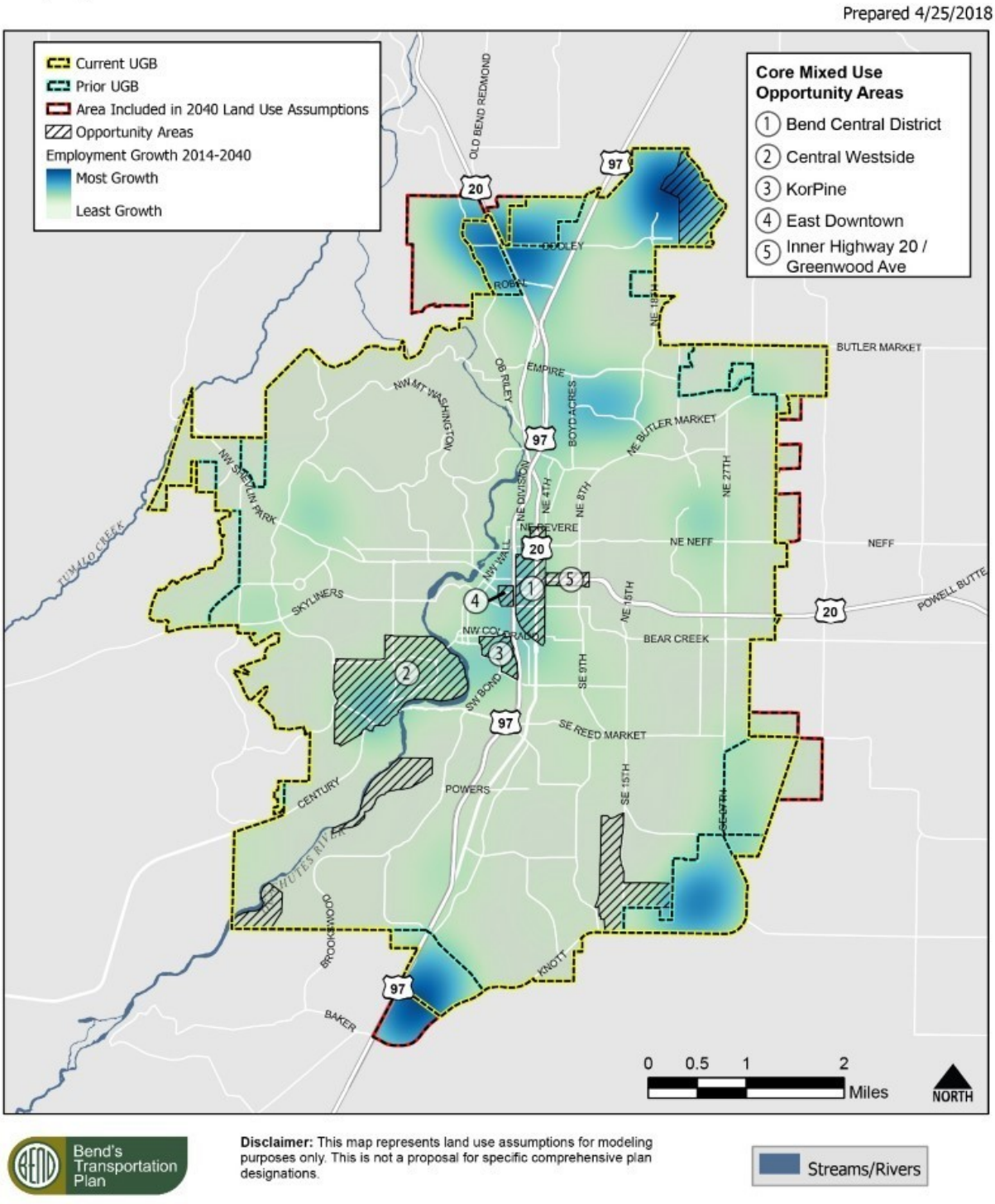


Figure 2. Heat map of projected employment growth (2014-2040)



Transportation System Needs

Development of the TSP included an extensive analysis of existing transportation system conditions (See Existing Conditions Analysis in Volume 2) and an evaluation of future conditions consistent with the 2040 Comprehensive Plan. The determination of needs was shaped by the CTAC process and robust public outreach. The culmination of these efforts led to a broad list of existing and future transportation needs.

The overall themes of the existing and future system needs analysis relate to the following:

- **Bend Parkway (US 97) Congestion and Safety:** As a main north-south route, the Parkway is and will continue to be a primary route for those traveling within and through Bend. Parkway-related needs were shaped by the TSP technical analyses, stakeholder input, and ODOT's Bend Parkway Study. The close collaboration between these parallel planning efforts identified the needs for travel along and access to/across the Parkway.
- **East-West Corridor Congestion**: Physical and topographic challenges constrain east-west travel in the City for those walking, biking, riding transit, and driving. Barriers such as the Deschutes River, Bend Parkway, and BNSF Railway limit the location and extent of east-west streets. This creates heavy demand for travel along a few key corridors (e.g., Greenwood Avenue, Reed Market Road, Colorado Avenue, Wilson Avenue, Empire Avenue, and Murphy Road), which can result in breakdowns of travel time reliability, especially for motorists.
- **North-South Corridor Congestion in Eastern Bend**: Pilot Butte, the extensive canal system, the BNSF Railway, and existing neighborhood development patterns also limit the location and extent of north-south streets, particularly east of US 97. These constraints create heavy demand for travel along 3rd, 8th/9th, 15th and 27th Streets and are responsible for a lack of continuous routes for those walking, biking, or taking transit. Although City roadway projects currently in design/construction will provide some relief to these corridors, additional changes are needed to address future travel demand.
- **Bicycle and Pedestrian Facilities**: Existing topographic constraints and the built environment limit the scope and scale of continuous, low-stress bicycle and pedestrian facilities in Bend. Key gaps in the network of walking and biking routes need to be addressed to serve users of all abilities both today and in the future.
- **Transit**: Cascades East Transit (CET) provides regional transit service throughout Central Oregon, including several routes within Bend city limits. At the time of the TSP, CET also began preparation of a Master Plan to guide its future growth in service levels over the next 20 years. To ensure a coordinated set of infrastructure recommendations, the City and CET collaborated throughout the process to reflect the current and future vision for transit service within the community.
- **Transportation Safety:** The Bend Transportation Safety Action Plan (TSAP)[3] identified high priorities for changes to the transportation system to address both localized as well as systemic safety needs. The findings and outcomes of that work are incorporated into this TSP.

[3] Bend's TSAP is comprehensive safety program that systematically identifies and prioritizes safety projects and establishes a proactive approach to reducing crashes to create a baseline from which to measure progress in reducing crash frequency and severity

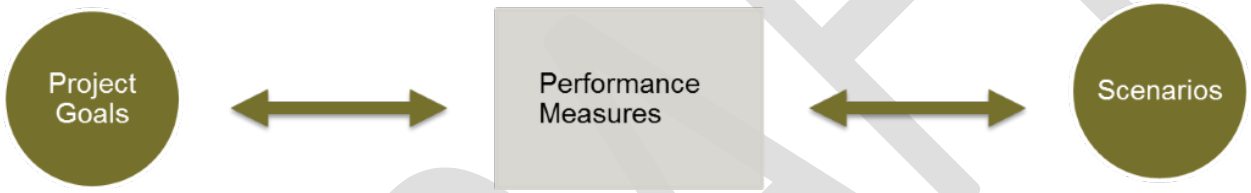
Scenario Based Evaluation

A scenario evaluation process guided the testing of various sets of circumstances and transportation strategies that could address identified deficiencies. The scenario evaluation process was based on the community's desired outcomes for the transportation system, as articulated through the TSP Goals and Policies. The scenario evaluation process resulted in an assessment of how various investment packages could help achieve the Goals as assessed by a number of systemwide performance measures identified by CTAC.

Three primary investment packages were assessed:

- **Scenario A: Build New Corridors–**primarily comprised of building new streets, extending existing streets, building new bridges and crossings, and adding key multi-use paths to add connectivity.
- **Scenario B: Widen and Enhance Existing Corridors–**primarily included projects that use the existing transportation system by widening existing corridors and adding missing walking and bicycling facilities to add capacity.
- **Scenario C: Maximize the Existing Transportation System–**relied on increased use of transit, technology, and transportation demand programs to increase the efficiency of the City's existing transportation system.

The scenario-based evaluation process led to a hybrid investment strategy of transportation projects and programs that will form the basis of the City's transportation system over the next 20 years. This hybrid investment scenario combined the most promising elements of the three scenarios into a robust and effective set of improvements.



[Inset] How are Performance Measures Useful

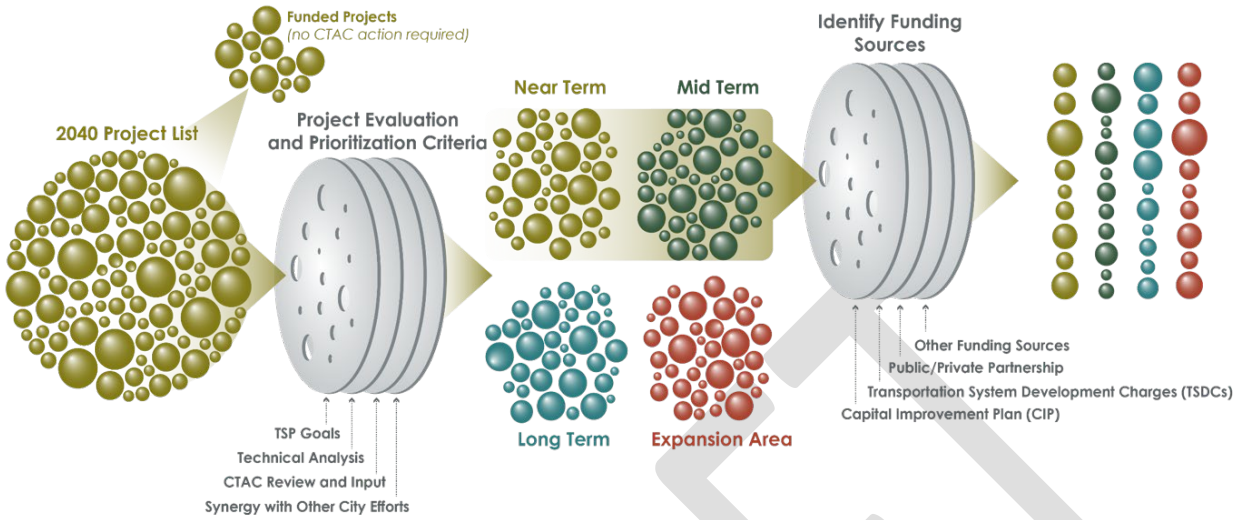
Performance measures can help the City evaluate how a set of future investment priorities help address a variety of needs. As transportation system choices and investments grow increasingly complex, partly due to developing technology and behavioral changes, no single measure can fully characterize the desired or intended performance of the system. Using multiple measures helps clarify how different users are served by the City's investments, informing a variety of choices related to how the transportation system is planned, managed, and monitored over time.

Prioritization & Investment Strategy Identification

The projects and programs included in the hybrid investment scenario were prioritized to help guide a future funding and implementation plan for the TSP. This effort relied upon project prioritization criteria that identified *what* transportation facilities and programs are important to fund and implement and *when* those investments should occur over the next 20 years.

Specifically, the prioritization criteria helped the City, CTAC and the public to differentiate, compare and discuss trade-offs associated with the identified investment strategy. This evaluation was informed by outputs from the Bend-Redmond Regional Travel Demand Model and detailed technical and qualitative evaluations related to system performance. Using this information, each of the projects or programs was assessed according to the prioritization criteria. The outcome of this process is the prioritized projects and programs described in Chapter 5. Funding strategies to implement these projects and programs are outlined in Chapter 6.

The prioritization process was an important step in helping to understand how various investments can meet the City's visions and goals for its future. Accordingly, the process relied on both a quantitative technical evaluation as well as qualitative judgment. This guided decision-making was reviewed and discussed at length by agency staff, CTAC, the Steering Committee, and other community members to develop a final set of recommendations. The record of discussion and decision-making, as well as the established prioritization criteria, can be found in Volume 2.



How the System Will Perform

The transportation projects and programs included in the TSP respond to the key transportation challenges and issues identified by the community, both today and into the future, as documented throughout the scenario and prioritization processes. Additional information on the effectiveness of the prioritized transportation investments relative to systemwide measures and specific needs is provided in Chapter 5.

In addition to the criteria identified through the TSP process, the consistency of the investments with regional and state policies and performance standards was also reviewed. Much of this review centered on vehicular performance-based standards related to key corridors and intersections. For a detailed discussion of the performance and evaluation, see the *2040 TSP Project List TPR Analysis Technical Memorandum in Volume 2*. As summarized, the prioritized investments:

- Reduce Vehicle Miles Travelled (VMT) per capita by 4.5% compared to the 2040 Baseline Scenario conditions; this complies with the VMT-related requirements of the Transportation Planning Rule
- Meet current City of Bend mobility targets at nearly all study intersections
- Improve ODOT highway system performance through a combination of infrastructure changes, system management strategies, and demand management strategies. However, it should be noted that meeting ODOT mobility targets in some key highway locations would be inconsistent with the City's goals, vision, and funding priorities for the future. Following adoption of the TSP, the City will work with ODOT to pursue alternate mobility targets along the US 97 and US 20 corridors to align performance expectations with the balance of community goals established through the TSP development process. This will enable subsequent planning efforts, land use development processes, and capital improvement program development to proceed in a

consistent fashion. See the *Alternative Mobility Target Memorandum in Volume 2* for additional discussion and analysis to support future coordination on specific alternative mobility targets.

Agenda Item No. 6:
Draft TPR Analysis
Technical Memorandum

DRAFT - 2040 TSP Project List TPR Analysis Technical Memorandum

PREPARED FOR: City of Bend

PREPARED BY: DKS Associates

DATE: April 24, 2020

Introduction

This memorandum documents the transportation system performance analysis conducted for the Bend Transportation System Plan (TSP) for the purposes of making findings for compliance with the State's Transportation Planning Rule (TPR) requirements. Specifically, this memorandum includes evaluation of vehicle miles traveled (VMT) per capita and intersection performance compared to required targets. In addition, the memorandum includes several system and corridor performance measures that are a subset of the TSP scenario evaluation performance measures for consistency with (and comparison to) the previously evaluated scenarios.

The underlying inputs to this evaluation include both land use (demand) and transport network (supply) assumptions for the horizon year of 2040. The land use assumptions utilized to determine demand for the horizon year is consistent with the City of Bend Comprehensive Plan's land use designations and growth area projections for the Bend Metropolitan Planning Organization MPO's Metropolitan Transportation Plan (MTP), including consistency with coordinated population projections. The transportation network includes the full set of improvement projects, programs, and policies documented in the Bend TSP, which were determined to be reasonably likely to be funded (as described in Chapter 5[1] and Chapter 6[2] of the TSP).

System Performance

To help understand how the improved transportation system will perform in Bend, the Bend-Redmond Model (BRM) was used to calculate system-level performance measures. These measures are a subset of the TSP performance measures for evaluating scenarios[3]. Where applicable, results are compared to the Baseline Scenario to provide context for how the system improves with the implementation of the TSP Project List. Table 1 below lists these system performance metrics from the BRM. The results for each metric are discussed in more detail

[1] Chapter 5: Transportation Projects and Programs, Bend's Transportation System Plan Update

[2] Chapter 6: Transportation Funding Strategy, Bend's Transportation System Plan Update

[3] Recommended Performance Measures Memo, Bend's Transportation System Plan Update, August 2018

following Table 1. For additional description about the metrics and how they are measured, see the detailed technical analysis from the scenario evaluation[4].

Table 1. System Performance Metrics

System Performance Metric	2040 TSP Project List	% change relative to 2040 Baseline Scenario
Vehicle Miles Travelled (VMT) per Capita (miles per person)	9.50	- 4.5%
Vehicle Hours of Delay (VHD)	632	- 28.6%
Mode Split (% Single Occupancy Vehicle Trips)	43.4%	- 3.3%

Vehicle Miles Travelled per Capita

VMT per capita helps demonstrate how a combination of automobile usage and proximity of complimentary land uses can affect the efficiency of the transportation system. As documented at length in the Bend Urban Growth Boundary (UGB) Expansion process, VMT/capita is also a key measure in State regulations for MPO areas related to reducing reliance on the automobile over time. As found in the UGB Expansion process, VMT/capita in Bend is projected to increase as the region grows in geography and population, which triggered the need for the development and adoption of an Integrated Land Use and Transportation Plan (ILUTP) to demonstrate how the increase over year 2010 conditions could be kept below a 5% increase and work towards a no-increase condition. While the Baseline Scenario VMT/capita is near the 5% increase threshold, the 2040 TSP Project List is only a 0.3% increase, well below the threshold and consistent with the trend projected in the Bend ILUTP.

This major improvement can be attributed to the balanced investment of the 2040 TSP Project List that complements the planned land use pattern. The 2040 TSP project list helps reduce vehicle demand through implementing transportation demand management programs (TSP Program/Project P-2) such as parking pricing (P-7) and investments in key walking (P-5, R1-A to R12-B), bicycling (R1-A to R12-B) and transit infrastructure (T-1 to T-3). In addition, the 2040 TSP project list also improves the efficiency of the transportation system by adding connectivity in areas with projected large growth to help shorten the length of vehicle trips. For example, there are new roads to connect Opportunity and Expansion Areas, extensions of Purcell Boulevard (C-2), Murphy Road (CIP), Britta Road (C-50), and Empire Boulevard (2020-2024 City of Bend Transportation Capital Improvement Program (CIP).

Vehicle Hours of Delay

Vehicle hours of delay (VHD) is a measure of total system congestion forecasted in the BRM across all roadways in Bend. The reduction in total VHD can be traced back to some of the causes listed above for changes in VMT/capita (reduction in overall vehicle demand, added connectivity to provide alternative routes to congested areas). However, another major contributor to the decrease in system congestion between the Baseline Scenario and the TSP Project List is the implementation of projects to reduce key bottlenecks in the system such as the North Parkway Extension (Phase 1 and C-40), ramp metering on the Parkway (C-4), and the Reed Market Road interchange improvements (C-19 to C-20).

[4] Scenario Evaluation Detailed Technical Analysis (Scenario Evaluation Overview for CTAC, Attachment E: Detailed Technical Analysis), November 2019

Mode Split

Mode split provides a quantitative measure of how each project shifts trips between walking, biking, transit, and auto. A lower percentage of single occupancy vehicle (SOV) trips also has the potential to reduce congestion and improve air quality in Bend.

With an investment in key walking and biking routes, transit improvements, and supporting mobility hubs (T-3), the TSP Project List leads to a decrease in SOV trips with a corresponding increase in transit, walking and biking trips. Note that while the relative differences between the Baseline Scenario and the TSP Project List for mode-share appears limited (only a few percent), this level of change is significant as it relates closely to the VMT/capita performance measure, where even small changes are important relative to meeting State regulations.

Corridor Performance

In addition to measuring system-wide metrics, the BRM was used to measure corridor level performance across the network.

Demand-to-capacity (d/c) ratio is the corridor performance measure for motor vehicles, derived from the BRM and is determined by dividing the forecasted weekday peak hour traffic demand along a segment by the roadway corridor capacity. The d/c ratio represents levels of motor vehicle congestion, with a lower ratio indicating smoother operations and minimal delays. As the ratio approaches 1.0, expected congestion increases. When it exceeds 1.0, the roadway is oversaturated and can result in increased queuing, delays, and longer peak traffic conditions. Table 2 summarizes corridor performance across the network using the d/c ratio. Note that this corridor-level measure is an indicator of the potential for congestion and used for high-level planning purposes. Additional details for actual intersection bottleneck projected performance for key intersections in discussed in the following section.

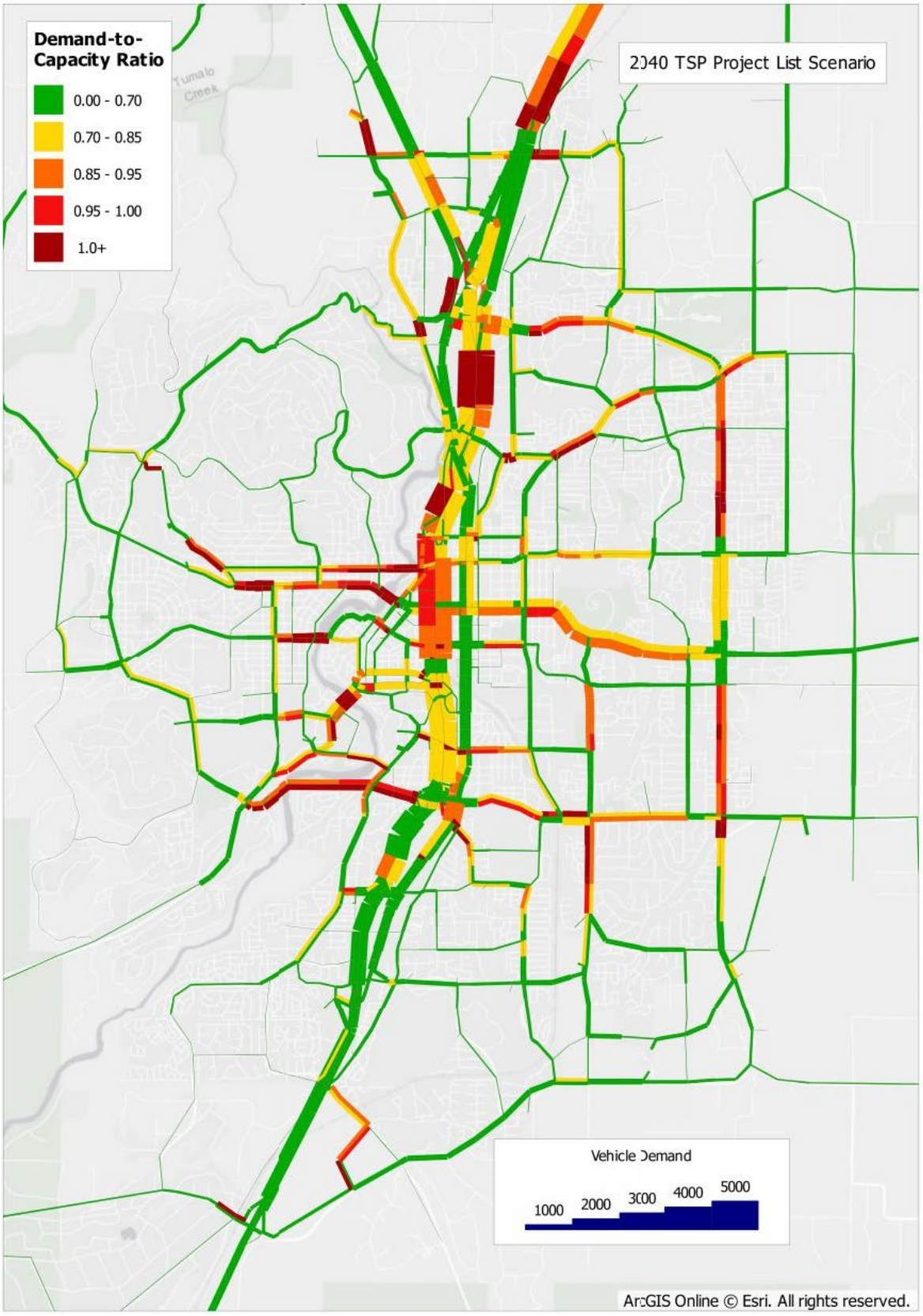
As listed in Table 2, the miles of arterials with d/c ratios greater than 1.0 are cut nearly in half under the TSP Project List compared to the Baseline Scenario (a reduction of 46%). This is in large part due to connectivity projects spreading traffic demand as well as a reduction in vehicle demand on key corridors, as discussed above under Mode Split, particularly along Greenwood Avenue, Butler Market Road and Empire Boulevard.

Table 2. Corridor Performance Metric

Corridor Performance Metric	2040 TSP Project List	% change relative to 2040 Baseline Scenario
Demand-to-Capacity (D/C) Ratio (Percent of arterial roadways with demand-to-capacity ratio > 1.0)	4.5%	- 46%

Figure 1 below shows d/c ratio plots from the BRM for the TSP Project List for 2040 average weekday peak hour conditions. With the implementation of ramp meters (C-4) and the North Parkway Extension (Phase 1 and C-40), most of the Parkway is under capacity, except a few segments between Butler Market Boulevard and Empire Boulevard. The darkest areas on the map (showing higher d/c ratios and more congestion) are typically around capacity constrained crossings of the Deschutes River.

Figure 1. TSP Project List 2040 Demand-to-Capacity Ratio Map



Intersection Performance

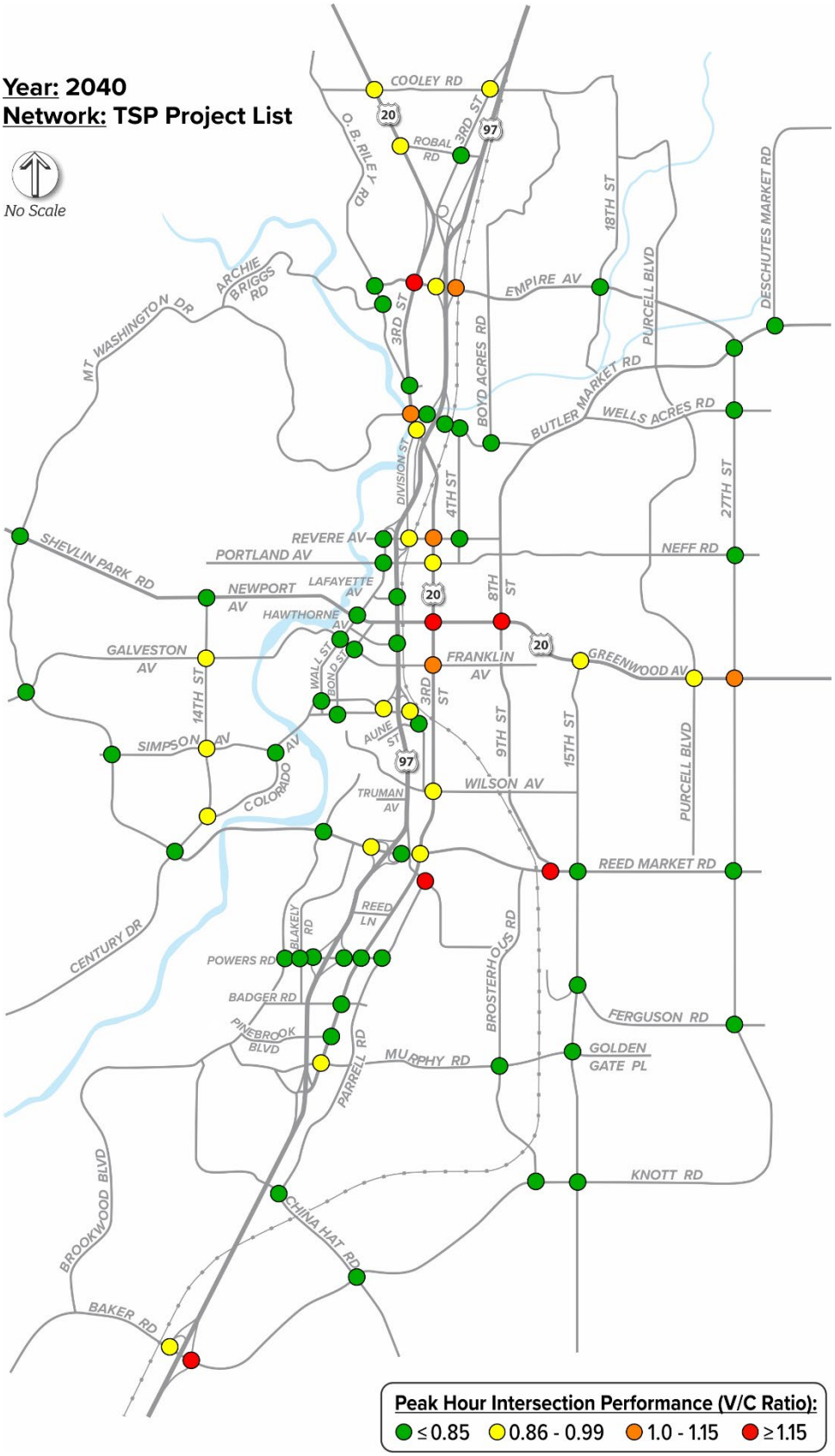
Intersection operations were analyzed at each of the study intersections using 2040 post-processed future motor vehicle volumes, following the methodology described in the project Methods and Assumptions Memorandum[5]. Results represent peak summer (30th Highest Hour (30 HV)) conditions for Oregon Department of Transportation (ODOT) intersections and average weekday peak hour conditions for City of Bend intersections.

Figure 2 below shows a summary of intersection volume-to-capacity (v/c) ratios at each of the study intersections. A table of intersection operations for all of the study intersections is included in Attachment A, while Attachment B includes the analysis software reports.

The majority of study intersection in Bend are shown as operating well under capacity (v/c ≤ 0.85). There are some intersections that are approaching ODOT mobility targets (v/c ≤ 0.85) or City mobility targets (v/c ≤ 1.0). Intersections that are forecast to exceed mobility targets over the 20-year planning horizon are discussed in the sections below, organized by key motor vehicle mobility needs of East-West Capacity in Central Bend, North-South Capacity in Eastern Bend, and US 97/Parkway Corridor Capacity.

[5] City of Bend intersection performance analysis is based on peak hour volume without applying a Peak-Hour-Factor (PHF) to evaluate peak 15-minute conditions. ODOT intersections include a PHF adjustment per ODOT's required methodology.

Figure 2. TSP Project List Scenario Intersection Operations



East-West Capacity in Central Bend

East-west capacity in Central Bend was identified as a need in both existing conditions[6] and during the scenario evaluation process. In particular, Deschutes River bridge crossings, Reed Market Road, and Greenwood Avenue (US 20) are existing and future capacity constraints for motor vehicles. Each area is discussed below.

Deschutes River Bridge Crossings Capacity

Bend has a limited number of bridges over the river connecting the west side of Bend to downtown and the east. While a project has been included in the TSP Project List to study an additional southern river crossing (C-4) to improve connectivity and relieve demand on existing corridors, the 2040 TSP Project List Scenario does not include major capacity improvements for crossing the river. However, smaller intersection improvements at key bottlenecks leading to the bridges, such as the Portland Ave/Wall St intersection improvement (C-8), Colorado Avenue intersection improvements (C-7), and Reed Market/Bond Street roundabout (CIP) will help improve traffic flow and reduce bottlenecks at bridges. Table 3 lists the intersection operations for key study intersections at or near bridge crossings. All are expected to meet City mobility targets within the 20-year horizon.

Table 3. Deschutes River Bridge Crossings 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
Wall St & Portland Ave	RAB	18	C	0.68	City of Bend	v/c ≤ 1.0	C-8
NW 14th St & Newport Ave	RAB	20	C	0.79	City of Bend	v/c ≤ 1.0	-
Wall St & Greenwood Ave	Signal	26	C	0.72	City of Bend	v/c ≤ 1.0	-
NW 14th St & Galveston Ave	RAB	49	E	0.94	City of Bend	v/c ≤ 1.0	-
Wall St & Franklin Ave	Signal	25	C	0.70	City of Bend	v/c ≤ 1.0	-
Bond St & Franklin Ave	Signal	21	C	0.74	City of Bend	v/c ≤ 1.0	-
SW 14th St & Simpson Ave	RAB	44	E	0.88	City of Bend	v/c ≤ 1.0	-
Colorado Ave & Simpson Ave	RAB	25	C	0.75	City of Bend	v/c ≤ 1.0	C-7
Century Dr & Colorado Ave	RAB	55	F	0.95	City of Bend	v/c ≤ 1.0	-
Wall St & Colorado Ave	Signal	13	B	0.64	City of Bend	v/c ≤ 1.0	-
Bond St & Arizona Ave	Signal	12	B	0.74	City of Bend	v/c ≤ 1.0	-
Century Dr & Reed Market Rd	RAB	29	D	0.81	City of Bend	v/c ≤ 1.0	-
Brookswood Blvd & Reed Market Rd	RAB	13	B	0.61	City of Bend	v/c ≤ 1.0	CIP

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

[6] Existing Conditions and Needs Technical Memorandum, July 2018

Reed Market Road Capacity

Reed Market Road is a congested corridor under existing conditions with unreliable travel times, particularly with the at-grade railroad crossing located near a switchyard. The 2040 TSP Project List includes a number of projects to help reduce bottlenecks on this congested corridor and determine a solution for delays due to the at-grade railroad crossing (CIP, C-14, C-19, C-20, S-2). Table 4 shows the intersection capacity results for the key east-west corridor.

Table 4. Reed Market Road 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
Century Dr & Reed Market Rd	RAB	29	D	0.81	City of Bend	v/c ≤ 1.0	-
Brookswood Blvd & Reed Market Rd	RAB	13	B	0.61	City of Bend	v/c ≤ 1.0	CIP
US 97 NB Ramps & Reed Market Rd	Signal	35	C	**0.89**	ODOT	v/c ≤ 0.85	C-19, C-20
US 97 SB Ramps & Reed Market Rd	Signal	11	B	0.80	ODOT	v/c ≤ 0.85	C-19, C-20
SE 3rd St & Reed Market Rd	Signal	77	E	0.99	City of Bend	v/c ≤ 1.0	CIP
SE 9th St & Reed Market Rd	TWSC	12 / **>300**	B / F	0.25 / 1.89	City of Bend	Delay ≤ 50 s	S-2, C-44
SE 15th St & Reed Market Rd	RAB	21	C	0.64	City of Bend	v/c ≤ 1.0	C-14
SE 27th St & Reed Market Rd	Signal	50	D	0.86	City of Bend	v/c ≤ 1.0	C-31, C-65

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

Greenwood Avenue (US 20) Capacity

Greenwood Avenue (US 20) serves regional and commuter traffic and is a key route that runs east-west through Bend. Table 5 lists in the intersection operations under the 2040 TSP Project List scenario. While projects and programs like mobility hubs (T-3), improvements to the transit system (T-1 and T-2) and implementing transportation demand management strategies (P-2) such as parking pricing (P-7) are projected to significantly reduce peak hour vehicle demand in the area, Greenwood Avenue remains a key regional route with delays and congestion. Greenwood Avenue is also constrained by surrounding land uses and there are limited opportunities for spot congestion improvements that would be in balance with non-auto safety and planned land-use patterns. As such, nearly all the study intersections along Greenwood Avenue exceed current ODOT mobility targets (note that four of the six exceeded mobility targets under existing conditions) and many are forecast to exceed capacity in 2040 with the planned system.

Table 5. Greenwood Avenue (US 20) 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
Wall St & Greenwood Ave	Signal	26	C	0.72	City of Bend	v/c ≤ 1.0	-
US 20 (NE 3rd St) & Greenwood Ave	Signal	170	F	**1.33**	ODOT	v/c ≤ 0.85	-
NE 8th Ave & US 20 (Greenwood Ave)	Signal	125	F	**1.20**	ODOT	v/c ≤ 0.85	-
SE 15th St & US 20 (Greenwood Ave)	Signal	40	D	**0.92**	ODOT	v/c ≤ 0.85	C-62
Purcell Blvd & US 20 (Greenwood Ave)	Signal	53	D	**0.95**	ODOT	v/c ≤ 0.85	C-62
SE 27th Ave & US 20 (Greenwood Ave)	Signal	61	E	**1.04**	ODOT	v/c ≤ 0.85	C-31, C-62

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

North-South Capacity in Eastern Bend

North-south capacity in Eastern Bend was identified as a need during the scenario evaluation process. In particular, US 20/3rd Street, 15th Street, and 27th Street/Empire Boulevard were all identified as north-south routes projected in the BRM as being over capacity in 2040. Each area is discussed below.

US 20/3rd Street

Table 6 shows the intersection capacity results for US 20/3rd Street, which is a key regional route and provides an alternate route to the Parkway through Bend. Nearly all of the intersections on US 20/3rd Street north of Franklin Avenue fail to meet mobility standards, with many of the intersections over capacity. This is due in part to the more stringent ODOT mobility target, which requires analysis of higher peak summer volumes (30 HV) instead of average weekday volumes.

Table 6. US 20/3rd Street 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
US 20 & Cooley Rd	RAB	30	F	**0.95**	ODOT	v/c ≤ 0.85	C-26
US 20 & Robal Rd	RAB	33	F	**0.94**	ODOT	v/c ≤ 0.85	C-26
US 20 & Empire Blvd	Signal	120	F	**1.25**	ODOT	v/c ≤ 0.85	C-40
US 20 (NE 3rd St) & O.B. Riley Rd	Signal	27	C	0.82	ODOT	v/c ≤ 0.85	-
US 20 (NE 3rd St) & Butler Market Rd	Signal	52	D	**1.04**	ODOT	v/c ≤ 0.85	C-21
US 20 (NE 3rd St) & Division St	Signal	31	C	**0.88**	ODOT	v/c ≤ 0.85	C-21
US 20 (NE 3rd St) & Revere Ave	Signal	92	F	**1.10**	ODOT	v/c ≤ 0.85	-
US 20 (NE 3rd St) & Olney Ave	Signal	64	E	**0.97**	ODOT	v/c ≤ 0.85	-
US 20 (NE 3rd St) & Greenwood Ave	Signal	170	F	**1.33**	ODOT	v/c ≤ 0.85	-
NE 3rd St & Franklin Ave	Signal	79	E	**1.09**	City of Bend	v/c ≤ 1.0	C-36
NE 3rd St & Wilson Ave	Signal	46	D	0.92	City of Bend	v/c ≤ 1.0	C-22
SE 3rd St & Reed Market Rd	Signal	77	E	0.99	City of Bend	v/c ≤ 1.0	CIP
SE 3rd St & Powers Rd	Signal	27	C	0.71	City of Bend	v/c ≤ 1.0	C-37
SE 3rd St & Badger Rd	Signal	12	B	0.53	City of Bend	v/c ≤ 1.0	C-38
SE 3rd St & Pinebrook Blvd	TWSC	13 / 91[A]	B / F	0.23 /0.63	City of Bend	Delay ≤ 50 s	-
SE 3rd St & Murphy Rd	Signal	34	D	0.76	City of Bend	v/c ≤ 1.0	-

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

[A] Worst minor movement is less than 100 peak hour trips and therefore does not exceed City mobility targets.

15th Street

Table 7 shows the intersection capacity results for 15th Street, which is one of the few north-south routes through eastern Bend that helps provide connectivity to Expansion Areas. With intersection improvements planned at key cross streets (e.g. Reed Market Road (C-14), Ferguson Road (C-34), Murphy Road (CIP)), the only study intersection expected to exceed mobility standards on 15th Street is US 20/Greenwood Avenue.

Table 7. 15th Street 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
SE 15th St & US 20 (Greenwood Ave)	Signal	43	D	**0.98**	ODOT	v/c ≤ 0.85	C-62
SE 15th St & Reed Market Rd	RAB	21	C	0.64	City of Bend	v/c ≤ 1.0	C-14
SE 15th St & Ferguson Rd	RAB	11	B	0.56	City of Bend	v/c ≤ 1.0	C-34
SE 15th St & Murphy Rd	RAB	8	A	0.43	City of Bend	v/c ≤ 1.0	CIP
SE 15th St & Knott Rd	RAB	13	B	0.63	City of Bend	v/c ≤ 1.0	-

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

27th Street/Empire Boulevard

The planned extension of Empire Boulevard to 27th Street, 27th Street provides an alternate route to access US 20 to the east and help connect major growth areas. Table 8 lists the intersection capacity results for the key north-south corridor. With incremental intersection improvements planned on 27th Street (C-31) and intersection improvements planned at Empire Road (CIP) and Wells Acres Road (C-35), the only intersection forecast to exceed mobility targets along 27th Street is at US 20/Greenwood Avenue.

Table 8. 27th Street 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
NE 18th St & Empire Blvd	RAB	28	D	0.68	City of Bend	v/c ≤ 1.0	-
NE 27th St & Butler Market Rd	RAB	7	A	0.76	City of Bend	v/c ≤ 1.0	CIP
NE 27th St & Wells Acres Rd	Signal	8	A	0.67	City of Bend	v/c ≤ 1.0	C-35
NE 27th St & Neff Rd	RAB	41	D	0.83	City of Bend	v/c ≤ 1.0	-
SE 27th Ave & US 20 (Greenwood Ave)	Signal	61	E	**1.04**	ODOT	v/c ≤ 0.85	C-31, C-62
SE 27th St & Reed Market Rd	Signal	50	D	0.86	City of Bend	v/c ≤ 1.0	C-65
SE 27th St & Ferguson Rd	RAB	6	A	0.13	City of Bend	v/c ≤ 1.0	C-53

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

US 97/Parkway Corridor Capacity

Table 9 lists the intersection operations for each of the study intersections along the Parkway. With the implementation of the North Parkway Extension (Phase 1 and C-40) and ramp metering (C-42) paired with at-grade access closures, there are only three intersections or ramps (out of 24) expected to be over capacity. However, ODOT's current mobility target is a v/c less than 0.85, so eight intersections are forecast to exceed the mobility target under 30HV conditions.

Table 9. US 97/Parkway 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
3rd Street (US 97 Bus) & Cooley Rd	Signal	67	E	**0.89**	ODOT	v/c ≤ 0.85	Phase 1, C-40
3rd Street (US 97 Bus) & Robal Rd	Signal	34	C	0.73	ODOT	v/c ≤ 0.85	Phase 1, C-40
US 97 SB On-ramp & Empire Blvd	Signal	70	E	**0.99**	ODOT	v/c ≤ 0.85	C-13
US 97 NB Ramps & Empire Blvd	Signal	55	E	**1.10**	ODOT	v/c ≤ 0.85	C-13
US 97 SB Off-ramp & Butler Market Rd	RAB	10	B	0.55	ODOT	v/c ≤ 0.85	C-21
US 97 NB Ramps & Butler Market Rd	TWSC	11 / 25	B /C	0.11 / 0.13	ODOT	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Butler Market Rd)	-
Wall St & Revere Ave	Signal	25	C	0.84	ODOT	v/c ≤ 0.85	C-9
Division St & Revere Ave	Signal	37	D	**0.92**	ODOT	v/c ≤ 0.85	C-9
US 97 & Lafayette Ave	Parkway Exit Only	NA	NA	NA	ODOT	v/c ≤ 0.85	C-42
US 97 & Hawthorne Ave	Parkway Exit Only	NA	NA	NA	ODOT	v/c ≤ 0.85	C-42
US 97 SB Ramps & Colorado Ave	Signal	48	D	**0.98**	ODOT	v/c ≤ 0.85	-
US 97 NB Ramps & Colorado Ave	Signal	37	D	**0.90**	ODOT	v/c ≤ 0.85	C-7
US 97 & Truman Ave	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42
US 97 SB Ramps & Reed Market Rd	Signal	35	C	**0.89**	ODOT	v/c ≤ 0.85	C-19, C-20
US 97 NB Ramps & Reed Market Rd	Signal	11	B	0.80	ODOT	v/c ≤ 0.85	C-19, C-20
US 97 & Reed Ln	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42

US 97 SB Ramps & Powers Rd	Signal	29	C	0.81	ODOT	v/c ≤ 0.85	C-41
US 97 NB Ramps & Powers Rd	Signal	17	B	0.70	ODOT	v/c ≤ 0.85	C-41
US 97 & Badger Rd	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42
US 97 & Pinebrook Blvd	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42
US 97 & Ponderosa St	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42
US 97 SB Ramps & Baker Rd [A]	TWSC	8 / 37	A / E	0.05 / 0.86	ODOT	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Baker Rd)	
US 97 NB Ramps & Knott Rd [A]	TWSC	12 / >300	B / F	0.38 / **2.86**	ODOT	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Knott Rd)	

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

[A] The US 97 Interchange at Baker Rd/Knott Rd is outside the urban growth boundary.

Alternate Mobility Targets

It is important for a TSP to identify a full range of transportation system projects and services that would address the transportation needs and deficiencies over the 20-year planning horizon. However, it is also important (and required) for a TSP to 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, local agencies and the state to establish realistic expectations for how that transportation system will likely operate at the end of the 20-year planning horizon.

As noted in the sections above, while the major investments in transportation through the TSP Project List (the reasonably likely to be funded list) will result in significantly improved system, corridor, and intersection performance, not all intersections will be able to meet current state or local mobility targets for motor vehicles. Particularly for the ODOT system, there is a need to investigate alternate mobility targets along the US 97 and US 20 corridors. Alternate mobility targets can align performance expectations with the balance of community goals established through the TSP development process, enabling subsequent studies, land use development processes, and improvement project/program development to proceed in a consistent fashion. The process for evaluating and establishing alternate mobility targets on the ODOT system will be documented in a separate memorandum.

Findings

Based on the evaluation presented above, the Bend TSP's reasonably likely to be funded improvement program (the Bend TSP Project List) was found to comply with the State's TPR system performance requirements as follows:

- VMT/capita is projected to decrease by 4.5% compared to the baseline scenario, resulting in levels nearly equal to year 2010 conditions. This is consistent with the adopted Bend ILUTP.
- The City study intersections were found to meet mobility targets at almost all locations. Locations not meeting mobility targets were, in general, improved compared to Baseline conditions and the resulting balance of planned improvements and intersection performance are consistent with the TSP's Goals.
- The ODOT study intersections were found to exceed mobility targets in a number of locations. The Bend TSP policies should support subsequent evaluation and potential implementation of alternate mobility targets on the ODOT system.

Attachments:

- Attachment A – 2040 TSP Project List Intersection Operations (all study intersections)
- Attachment B – 2040 TSP Project List Intersection Analysis (software report)

Agenda Item No. 7:
Alternate Mobility Targets Technical Memorandum

Alternate Mobility Targets Technical Memorandum

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DATE: May 26, 2020

Purpose

This technical memorandum summarizes a preliminary evaluation of potential locations where alternate mobility targets may be needed on the State highway system within Bend. This evaluation reflects the community-driven outcomes and technical work performed as part of the Bend Transportation System Plan (TSP) update and of the US 97 Parkway Plan. The findings presented herein identify locations where alternative mobility targets should be considered as part of future collaboration and work efforts between the City of Bend, ODOT Region 4, Bend MPO, and other key stakeholders. Final review and approval of alternate mobility targets for State highway corridors would be an action of the Oregon Transportation Commission (OTC).

Introduction

The Oregon Transportation Planning Rule (TPR) requires cities to identify the needs associated with existing and planned multimodal facilities. The TPR also requires that the TSPs identify those projects that are needed to maintain mobility on ODOT facilities, consistent with the performance targets in the Oregon Highway Plan (OHP). It is also important (and required) for a TSP to 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 enables the community, local agencies, and the state to establish realistic expectations for how that transportation system will likely operate at the end of the 20-year planning horizon.

Consistent with the OHP Policy 1F, the ability to meet OHP mobility targets may not be consistent with a city's land use plan or their TSP goals. In these cases, the TSP's goals, policies, projects, and programs should reflect significant collaboration between the community, agency stakeholders, and partners to identify a balance of multimodal investments needed to support the community through the 20-year planning horizon. In some cases, as with this Bend TSP update, this may result in a choice to not add capacity to major roadways due to the desire to balance capacity with other community priorities such as safety, land use, financial limitations, or engineering design feasibility. As such, it is appropriate to consider adjusting long term roadway performance expectations through the adoption of alternate standards or mobility targets. While this outcome does not "solve" projected congestion issues, it does align investments strategies with the community supported vision.

In addition to establishing realistic expectations for future system performance, this process will help reduce the potential for state and local investment needs in the 20-year planning horizon by not continuing to require compliance with standards or targets that both parties acknowledge

cannot likely be achieved, assuming that the community continues to grow in accordance with its existing, adopted land use plan.

A key note regarding mobility targets for State highways is that targets in the Oregon Highway Plan (OHP) relate to evaluations for development review processes or Transportation Planning Rule (TPR) compliance. Alternate mobility targets would modify the Oregon Highway Plan targets for a facility. A separate set of standards related to the development and design of facility improvements is located in ODOT's Highway Design Manual. These standards would not be changed with an alternate mobility target. However, adopting alternate mobility targets can be helpful in requesting design exceptions during project development.

The Need for Alternate Mobility Targets in Bend

In Bend there is a significant amount of population and employment growth projected over the 20-year planning horizon. Even with the transportation improvements identified as reasonably likely to be funded in the City's TSP (approximately $1B of projects and programs), transportation analysis forecasts portions of US 20 (3rd Street and Greenwood Avenue) and intersections along US 97/Bend Parkway to exceed ODOT's current mobility targets by the end of the 20-year planning horizon.

An evaluation of the disparity between the current targets and forecasted traffic operations confirmed the need for assessing the potential to mitigate conditions through other means, while balancing the community's goals established in the Bend TSP Goals and Policies. The findings of that evaluation are described below.

Current Mobility Targets

Currently, all ODOT intersections in the Bend study area must comply with the volume to capacity (v/c) ratio targets in the Oregon Highway Plan (OHP). ODOT v/c ratio targets are based on highway classification and area type. Within Bend, the v/c target is 0.85.

ODOT standard analysis procedure also requires intersection operating conditions to be compared to existing OHP Mobility Targets during the 30th highest annual hour of traffic (30 HV). Within Bend, the 30 HV typically occurs during the summer months, when traffic volumes increase due to an influx of vacationers and visitors, leading to a significant increase in traffic over average weekday conditions (from a 5 percent to 40 percent increase in some areas).

Scenarios Evaluated to Meet Future Needs

A scenario evaluation process guided the testing of various sets of transportation strategies that could address identified deficiencies. This scenario evaluation process was based on the community's desired outcomes for the transportation system, as articulated through the TSP Goals and Policies.

The scenario evaluation process resulted in an assessment of how various investment packages could help achieve the Goals, as evaluated by a number of system-wide performance measures.

Three primary investment packages were assessed:

- Scenario A: Build New Corridors – primarily comprised of building new streets, extending existing streets, building new bridges and crossings, and adding key multi-use paths to increase the capacity of the City's existing transportation facilities.
- Scenario B: Widen and Enhance Existing Corridors – primarily included projects that use the existing transportation system by widening existing corridors and adding missing walking and bicycling facilities to increase the connectivity of the City's transportation system.

- Scenario C: Maximize the Existing Transportation System – relied on increased use of transit, technology, and transportation demand programs to increase the efficiency of the City's existing transportation system.

The scenario-based evaluation process led to a hybrid investment strategy of transportation projects and programs that will form the basis of the City's transportation system changes over the next 20 years. This hybrid scenario combined the most promising elements of the three scenarios evaluated into a robust and effective set of improvements, including:

- Citywide connected bicycle and pedestrian corridors that reduce reliance on vehicle trips, including grade-separated crossings of US 97
- Enhancements to the public transit system, including two high-capacity transit corridors (including along Hwy 20 from 3rd Street to 27th Street) and the construction of micro-mobility hubs that serve first/last mile trips
- Travel Demand Management Programs for major employers and institutions
- Parking pricing and management in downtown Bend
- Implementation of the Deschutes County ITS Plan, including traffic signal coordination as well as freight and transit signal priority
- Local system connectivity projects and intersection bottleneck improvement projects that provide route choices on the Bend arterial and collector system
- Completion of the US 97 North Parkway Extension
- Access Management and Ramp Metering on US 97
- Construction of the US 97 / Powers Road Interchange (or grade-separated crossing)
- Widening of US 20 between Cooley Road and Empire Avenue
- Intersection capacity improvements on US 20 at Cooley Road and Robal Road
- US 97 Interchange improvements at Empire Avenue, Revere Avenue, Colorado Avenue, Reed Market Road, Murphy Road
- Construction of an overcrossing of US 97 at China Hat Road, connecting to a frontage road to the Murphy Road Interchange

Future Intersection Operations

Future year 2040 peak hour conditions were evaluated at study intersections throughout Bend assuming implementation of the reasonably likely to be funded TSP projects and programs. These projects and programs are anticipated to be synonymous with the Bend Metropolitan Transportation Plan's Update to the financially constrained project list. Given the increased growth in Bend over the 20-year planning horizon, traffic demand in the summer p.m. peak period is forecast to exceed capacity at many intersections by 2040. As listed in Table 1 and Table 2, 7 (out of 16) study intersections along US 97/Bend Parkway and 12 (out of 13) study intersections along US 20 would fail to comply with the existing mobility targets.

It should be noted that while the 3rd Street (US 97 Bus) & Cooley Rd intersection is forecast as failing to meet mobility targets in the 2040 horizon, the actual design of this intersection has not yet been finalized. The ultimate design of Phase 1 of the North Parkway Extension may significantly change the performance of this intersection. In addition, the upcoming Baker Interchange Area Management Plan will likely identify improvements to the US 97 ramp terminal intersections at Baker/Knott Road.

Table 1: US 97 Intersection Operation Results (2040 PM Peak Hour, 30HV, w/ TSP project list improvements)

US 97/ Bend Pkwy Intersection	Int. Control	Existing OHP Mobility Target	Delay (s/veh)	Level of Service	Volume/ Capacity	TSP Project?
3rd Street (US 97 Bus) & Cooley Rd	Signal	v/c ≤ 0.85	67	E	**0.89**	US 97 North Parkway Extension Phase 1
3rd Street (US 97 Bus) & Robal Rd	Signal	v/c ≤ 0.85	34	C	0.73	US 97 North Parkway Extension Phase 1
US 97 SB On-ramp & Empire Blvd	Signal	v/c ≤ 0.85	70	E	**0.99**	Empire Ave widening (C-13)
US 97 NB Ramps & Empire Blvd	Signal	v/c ≤ 0.85	55	E	**1.10**	Empire Ave widening (C-13)
US 97 SB Off-ramp & Butler Market Rd	RAB	v/c ≤ 0.85	10	B	0.55	Butler Market Rd/US 20/US 97 improvement (C-21)
US 97 NB Ramps & Butler Market Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Butler Market Rd)	11 / 25	B /C	0.11 / 0.13	-
US 97 SB Ramps & Revere Ave	Signal	v/c ≤ 0.85	25	C	0.84	Revere Ave interchange improvements (C-9)
US 97 NB Ramps & Revere Ave	Signal	v/c ≤ 0.85	37	D	**0.92**	Revere Ave interchange improvements (C-9)
US 97 SB Ramps & Colorado Ave	Signal	v/c ≤ 0.85	48	D	**0.98**	-
US 97 NB Ramps & Colorado Ave	Signal	v/c ≤ 0.85	37	D	**0.90**	US 97/Colorado Ave NB ramp capacity improvement (C-7)
US 97 SB Ramps & Reed Market Rd	Signal	v/c ≤ 0.85	35	C	**0.89**	US 97/Reed Market Rd interchange (C-19,C-20)
US 97 NB Ramps & Reed Market Rd	Signal	v/c ≤ 0.85	11	B	0.80	US 97/Reed Market Rd interchange (C-19,C-20)
US 97 SB Ramps & Powers Rd	Signal	v/c ≤ 0.85	29	C	0.81	Powers Rd interchange (C-41)
US 97 NB Ramps & Powers Rd	Signal	v/c ≤ 0.85	17	B	0.70	Powers Rd interchange (C-41)
US 97 SB Ramps & Baker Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Baker Rd)	8 / 37	A /E	0.06 / **0.86**	-
US 97 NB Ramps & Knott Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Knott Rd)	12 / >300	B /F	0.38 / **2.86**	-
US 97/ Bend Pkwy Intersections meeting targets					7 / 16	

Note: Signalized intersection volume-to-capacity (v/c) results are reported for the overall intersection. Roundabout (RAB) results are reported for the worst leg. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

Bold, Red and Shaded indicates a v/c ratio greater than the target.

Table 2: US 20 Intersection Operation Results (2040 PM Peak Hour, 30HV, w/ TSP project list improvements)

US 20 (3rd Str/ Greenwood Ave) Intersection	Int. Control	Existing OHP Mobility Target	Delay	LOS	V/C Ratio	TSP Project?
US 20 & Cooley Rd	RAB	v/c ≤ 0.85	30	F	**0.95**	US 20 intersection safety and capacity improvements near US 20/Robal Rd (C-26)
US 20 & Robal Rd	RAB	v/c ≤ 0.85	33	F	**0.94**	US 20 intersection safety and capacity improvements near US 20/Robal Rd (C-26)
US 20 & Empire Blvd	Signal	v/c ≤ 0.85	120	F	**1.25**	US 97 North Parkway Extension Phase 2 (C-40)
US 20 (NE 3rd St) & O.B. Riley Rd	Signal	v/c ≤ 0.85	27	C	0.82	-
US 20 (NE 3rd St) & Butler Market Rd	Signal	v/c ≤ 0.85	52	D	**1.04**	Butler Market Rd/US 20/US 97 improvement (C-21)
US 20 (NE 3rd St) & Division St	Signal	v/c ≤ 0.85	31	C	**0.88**	Butler Market Rd/US 20/US 97 improvement (C-21)
US 20 (NE 3rd St) & Revere Ave	Signal	v/c ≤ 0.85	92	F	**1.10**	-
US 20 (NE 3rd St) & Olney Ave	Signal	v/c ≤ 0.85	64	E	**0.97**	-
US 20 (NE 3rd St) & Greenwood Ave	Signal	v/c ≤ 0.85	170	F	**1.33**	-
US 20 (Greenwood Ave) & NE 8th Ave	Signal	v/c ≤ 0.85	125	F	**1.20**	-
US 20 (Greenwood Ave) & SE 15th St	Signal	v/c ≤ 0.85	40	D	**0.92**	US 20 operational improvements from 15th Street to east UBG (C-62)
US 20 (Greenwood Ave) & Purcell Blvd	Signal	v/c ≤ 0.85	53	D	**0.95**	US 20 operational improvements from 15th Street to east UBG (C-62)
US 20 (Greenwood Ave) & SE 27th Ave	Signal	v/c ≤ 0.85	61	E	**1.04**	US 20/27th St intersection improvement (C-31, C-62)
US 20 Intersections meeting targets					1 / 13	

Note: Signalized intersection volume-to-capacity (v/c) results are reported for the overall intersection. Roundabout (RAB) results are reported for the worst leg. TWSC intersection results are reported for the worst major approach/worst minor.

Bold, Red and Shaded indicates a v/c ratio greater than the target.

Factors Limiting the Ability to Meet Existing Mobility Targets

Several factors combine to make compliance with the current mobility targets within Bend difficult. They include the following.

Projected Multimodal Travel Needs

The importance of US 20 and US 97 to statewide, regional, and local travel creates significant multimodal demands for both short and long trips along the corridor. These users include:

- People driving taking advantage of the higher speeds and grade separations to make local trips to homes, work, and shopping
- People driving making regional trips between cities (including between Redmond, Sisters, Sunriver, La Pine and other Central and Eastern Oregon destinations)
- Freight traveling to and through Bend
- Transit traveling along the main state facility or crossing at a local street
- People biking and walking along and across US 20 and US 97

Balancing the needs of each of these various users was a key factor in the Bend Citywide Transportation Advisory Committee's discussions and decisions in evaluating scenarios and identifying projects and programs.

Existing and planned development patterns

In many areas along US 20 and US 97, adjacent existing development and planned urban form promoting increased density and mixed-land use constrains the ability to widen the highway right-of-way or provide parallel alternate routes. Obtaining needed right-of-way for highway widening would require acquisition and removal of such development, which would be very expensive and undesirable to the community.

Financial factors

Funding for transportation improvements is limited and constrains the ability of Bend and ODOT to pay for highway capacity improvements. Therefore, while the Bend TSP includes a robust transportation funding strategy that enables the TSP 2040 project and programs list to be designated reasonably likely to be funded, there are remaining facility mobility target performance deficiencies that could not be addressed within the funding constraints.

Alternate Mobility Target Evaluation

Figure 2 shows the ODOT methodology for determining alternate mobility targets. A summary of each step under consideration at this time (Steps 1 through 4) is discussed below and Tables 2 and 3 list the results for each individual intersection. In addition to the steps outlined below, additional considerations could be taken when determining alternate mobility targets to ensure other goals and objectives within the TSP continue to be addressed (such as safety, equity, economic vitality, etc.)

Figure 2: Alternate Mobility Target Methodology

Step 1: Implement recommended improvements

With the implementation of the recommended improvements in the TSP, nearly half of the study intersections along US 97 (7 out of 16) and one study intersection along US 20 (out of 13) are forecast to meet existing mobility standards. To be compliant with mobility targets, alternate mobility targets would be needed for the remaining state study intersections within Bend.

Step 2: Increase v/c targets

Step 2 maintains the same methodology as in Step 1 (using 30 HV) but raises the v/c target from 0.85 to 1.0. Fourteen of the 16 study intersections along US 97 and 7 of the 13 study intersections along US 20 are forecast to have a v/c ratio less than 1.0 under 30 HV conditions.

Step 3: Remove peaking

Setting the peak hour factor (PHF) to 1.0 relaxes the peaking assumptions and allows for analysis of the peak hour volumes instead of the peak 15-minute volumes. With a PHF of 1.0, 9 of the 13 study intersection would have a v/c ratio of 1.0 or less. No additional intersections along US 97 would have a v/c ratio less than 1.0.

Step 4: Analyze average weekday conditions

Step 4 analyzes average weekday (AWD) conditions instead of 30 HV conditions. In Bend, the 30 HV range anywhere from roughly five to 40 percent higher than AWD volumes. The City of Bend uses an average weekday mobility target on City facilities. Analyzing average weekday conditions instead of the 30 HV gives a more accurate representation of typical conditions instead of peak summer conditions when there is an influx of visitors in Bend. Using AWD volumes with a PHF of 1.0, all the study intersections except one on US 97 and 10 of the 13 study intersections on US 20 are forecast to operate with a v/c ratio of 1.0 or less.

Table 3: US 97 Intersection Operations Results (2040 PM Peak Hour)

US 97/ Bend Parkway Intersection	Int. Control	Existing OHP Mobility Target	*Step 1: 30HV, with Recommended Improvements*	*Step 2: 30HV, V/C ≤ 1.0*	Step 3: 30HV, PHF=1.0, V/C ≤ 1.0	Step 4: AWD, PHF=1.0, V/C ≤ 1.0
3rd Street (US 97 Bus) & Cooley Rd	Signal	v/c ≤ 0.85	**0.89**	0.89	0.85	0.77
3rd Street (US 97 Bus) & Robal Rd	Signal	v/c ≤ 0.85	0.73	0.73	0.67	0.63
US 97 SB On-ramp & Empire Blvd	Signal	v/c ≤ 0.85	**0.99**	0.99	0.96	0.88
US 97 NB Ramps & Empire Blvd	Signal	v/c ≤ 0.85	**1.10**	**1.10**	**1.01**	0.90
US 97 SB Off-ramp & Butler Market Rd	RAB	v/c ≤ 0.85	0.55	0.55	0.51	0.46
US 97 NB Ramps & Butler Market Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Butler Market Rd)	0.11 / 0.13	0.11 / 0.13	0.10 / 0.10	0.08 / 0.08
US 97 SB Ramps & Revere Ave	Signal	v/c ≤ 0.85	0.84	0.84	0.74	0.68
US 97 NB Ramps & Revere Ave	Signal	v/c ≤ 0.85	**0.92**	0.92	0.80	0.74
US 97 SB Ramps & Colorado Ave	Signal	v/c ≤ 0.85	**0.98**	0.98	0.91	0.81
US 97 NB Ramps & Colorado Ave	Signal	v/c ≤ 0.85	**0.90**	0.90	0.80	0.72
US 97 SB Ramps & Reed Market Rd	Signal	v/c ≤ 0.85	**0.89**	0.89	0.81	0.70
US 97 NB Ramps & Reed Market Rd	Signal	v/c ≤ 0.85	0.80	0.80	0.74	0.66
US 97 SB Ramps & Powers Rd	Signal	v/c ≤ 0.85	0.81	0.81	0.77	0.66
US 97 NB Ramps & Powers Rd	Signal	v/c ≤ 0.85	0.70	0.70	0.66	0.58
US 97 SB Ramps & Baker Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Baker Rd)	0.06 / **0.86**	0.06 / 0.86	0.05 / 0.80	0.05 / 0.68
US 97 NB Ramps & Knott Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Knott Rd)	0.38 / **2.86**	0.38 / **2.86**	0.33 / **1.72**	0.33 / **1.05**
US 97/Parkway Intersections meeting targets			**Step 1:** 7 / 16	**Step 2:** 14 / 16	**Step 3:** 14 / 16	**Step 4:** 15 / 16

Note: Signalized intersection volume-to-capacity (v/c) results are reported for the overall intersection. Roundabout (RAB) results are reported for the worst leg. TWSC intersection results are reported for the worst major approach/worst minor.

Bold, Red and Shaded indicates a v/c ratio greater than the mobility target at that step.

Table 4: US 20 Intersection Operations Results (2040 PM Peak Hour)

US 20 (3rd Str/ Greenwood Ave) Intersection	**Int. Control**	**Existing OHP Mobility Target**	***Step 1: 30HV, with Recommended Improvements***	***Step 2: 30HV, V/C ≤ 1.0***	**Step 3: 30HV, PHF=1.0, V/C ≤ 1.0**	**Step 4: AWD, PHF=1.0, V/C ≤ 1.0**
US 20 & Cooley Rd	RAB	v/c ≤ 0.85	**0.95**	0.95	0.84	0.83
US 20 & Robal Rd	RAB	v/c ≤ 0.85	**0.94**	0.94	0.87	0.86
US 20 & Empire Blvd	Signal	v/c ≤ 0.85	**1.25**	**1.25**	**1.18**	**1.07**
US 20 (NE 3rd St) & O.B. Riley Rd	Signal	v/c ≤ 0.85	0.82	0.82	0.77	0.71
US 20 (NE 3rd St) & Butler Market Rd	Signal	v/c ≤ 0.85	**1.04**	**1.04**	0.94	0.86
US 20 (NE 3rd St) & Division St	Signal	v/c ≤ 0.85	**0.88**	0.88	0.81	0.75
US 20 (NE 3rd St) & Revere Ave	Signal	v/c ≤ 0.85	**1.10**	**1.10**	**1.02**	0.97
US 20 (NE 3rd St) & Olney Ave	Signal	v/c ≤ 0.85	**0.97**	0.97	0.95	0.88
US 20 (NE 3rd St) & Greenwood Ave	Signal	v/c ≤ 0.85	**1.33**	**1.33**	**1.27**	**1.18**
US 20 (Greenwood Ave) & NE 8th Ave	Signal	v/c ≤ 0.85	**1.20**	**1.20**	**1.12**	**1.03**
US 20 (Greenwood Ave) & SE 15th St	Signal	v/c ≤ 0.85	**0.92**	0.92	0.90	0.79
US 20 (Greenwood Ave) & Purcell Blvd	Signal	v/c ≤ 0.85	**0.95**	0.95	0.94	0.84
US 20 (Greenwood Ave) & SE 27th Ave	Signal	v/c ≤ 0.85	**1.04**	**1.04**	1.00	0.93
US 20 Intersections meeting targets			**Step 1:** 1 / 13	**Step 2:** 7 / 13	**Step 3:** 9 / 13	**Step 4:** 10 / 13

Note: Signalized intersection volume-to-capacity (v/c) results are reported for the overall intersection. Roundabout (RAB) results are reported for the worst leg. TWSC intersection results are reported for the worst major approach/worst minor.

Bold, Red and Shaded indicates a v/c ratio greater than the mobility target at that step.

Summary of Findings

As noted in the sections above, while the major investments in transportation through the TSP 2040 Project and Programs List (the reasonably likely to be funded list) will result in improved intersection performance on ODOT facilities, not all intersections will be able to meet state v/c targets and there is a need to investigate alternate mobility targets in select locations. Alternate mobility targets can help establish realistic expectations for future system performance and create targets that help the community continue to grow in accordance with its existing, adopted land use plan.

Given the differing roles that each of the highway plays within the community, region, and the state, the following considerations should be taken when selecting alternate mobility targets.

US 20 Considerations:

- Only two-thirds of the study intersections along US 20 are forecast to operate with a v/c less than 1.0 under 30 HV conditions with no peaking factors. Only one additional study intersection is forecast to operate with a v/c less than 1.0 under average weekday conditions, meaning three study intersections (US 20/Empire Boulevard, US 20 (3rd Street)/Greenwood Avenue, and US 20/15th Street) would exceed capacity in future year average weekday conditions.
- Analysis is currently underway to determine the exact improvements related to the North Parkway Extension and through that work (or separate work on the North Parkway Extension Phase 2), US 20/Empire Boulevard capacity issues may be mitigated.
- Aside from US 20/Empire Boulevard, the remaining three intersections that do not operate with a v/c less than 1.0 under 30 HV conditions are located within the Bend Central District Opportunity Area as identified in the Bend Comprehensive Plan.
- An alternate mobility target for US 20 in Bend could consider:
    - Establishing a boundary in the Bend Central District area where peak hour motor vehicle mobility targets are not applied to better balance the goals in the TSP (instead relying upon safety, complete multimodal facilities, etc.). This could mirror a Multimodal Mixed Use Area approach to support the integrated land use and transportation planning in this core redevelopment area.
    - Setting a 30 HV (with no peak hour factor) target of 1.0 outside of the Bend Central District (e.g., north of Underwood Avenue and east of 8th Street).
    - Setting an average weekday target outside of the Bend Central District. This target could be set lower than 1.0 to provide more flexibility in handling day-to-day traffic variations. Using average weekday conditions would be consistent with the City's development review code and would better align with the travel demand forecast tools utilized for system planning in the Bend region.
    - Establishing targets or policies for other performance factors such as safety, equity, economic vitality, or multimodal mobility, consistent with the Bend TSP Goals and Policies.

US 97 Considerations:

- All the ramp terminals TWSC approach at Knott Road and US 97 NB ramp) along US 97 are forecast to operate with a v/c less than 1.0 under 30 HV conditions when using a peak hour factor of 1.0.
- If average weekday conditions were used as the mobility target for US 97 intersections in Bend all the intersections (except the TWSC approach at Knott Road NB ramp) would meet a v/c ratio of 0.9 or less.

- While this alternate mobility target memo sets up a framework for determining alternate mobility targets at intersection locations, additional analysis may consider safety, mainline highway operations and target weave, merge and diverge movements.
- If alternate mobility targets are set along US 97, additional considerations should be taken to ensure that queues do not back up onto the safe stopping distance areas from the mainline exits, creating safety issues.
- An alternate mobility target for US 97 in Bend could consider:
    - Further evaluation of ramp terminal intersection performance to understand the potential for queue spillback onto the mainline.
    - Setting a 30 HV (with no peak hour factor) target of 1.0 for ramp terminals and other intersections.
    - Setting an average weekday target of 0.90 or lower for ramp terminals and intersections. Using average weekday conditions would be consistent with the City's development review code and would better align with the travel demand forecast tools utilized for system planning in the Bend region.
    - Further evaluation to understand if an alternate mobility target for mainline weave, merge, and diverge operations should be established.
    - Establishing targets or policies for other performance factors such as safety, equity, economic vitality, or multimodal mobility, consistent with the Bend TSP Goals and Policies.

Agenda Item No. 8:
Draft Chapter 4

Bend's Transportation Plan

DRAFT Chapter 4: System Plan Elements

Introduction

This TSP communicates a set of policies, programs, and projects to support multimodal transportation system needs within Bend's Urban Growth Boundary (UGB) over the next 20 years. This chapter provides an overview of needs and plans for walking, bicycling, transit, vehicle, freight, air, rail, and key pipeline facilities that make up Bend's transportation system. Policies are provided in Chapter 2, an overview of the systemwide performance evaluation is included in Chapter 3, and project and program lists are detailed in Chapter 5.

Pedestrian and Bicycle System

Comfortable, continuous, and convenient pedestrian and bicycle facilities are needed to connect people to places, services, recreation, transit, and jobs. Some aspects of the walking and bicycling system are best dealt with independently, but many overlap and relate to the street system as well.

Walking System

People walking in Bend rely on the sidewalk system along City streets as well as some separated trails and paths (largely under the jurisdiction of the Bend Park and Recreation District (BPRD)). Numerous streets have no sidewalks, or substandard ones, and crossings remain difficult in many locations. A strong interest in increased safety, comfort, and availability of walking facilities, particularly for children, was expressed by CTAC and the public. The resulting pedestrian-oriented policies, projects, and programs are aimed at serving different types of walking trips for people of all ages and abilities. The policies, projects and programs focus on providing:

- A complete sidewalk network connecting neighborhoods, schools, parks, and transit stops and hubs;
- Pedestrian-related safety enhancements, particularly for arterial and collector street crossings; and
- Key Routes[1] that link important destinations and provide critical east-west and north-south cross-town travel for people walking and bicycling (See Figure 5.2 in Chapter 5).

The Pedestrian Facilities Map is shown in Figure 1.

Bend Parks and Recreation Trail System

The City of Bend TSP incorporates the BPRD Trails Map (BPRD Comprehensive Plan adopted July 2018)[2]. BPRD and the City of Bend recognize that trail alignments are conceptual and subject to refinement.

[1].Key Routes are connected segments of low stress bicycle facilities and shared pathways that allow travel across the city.

[2] The BPRD Comprehensive Plan can be found at https://www.bendparksandrec.org/about/planning-and-development.

Bicycling System

Currently, the City has an incomplete system of on-street bike lanes and separated trails and paths (largely under BPRD's jurisdiction), with several Neighborhood Greenways[3] installed in recent years. A strong interest in bicycling facilities was indicated by both CTAC and the public. The resulting list of projects and programs is directed at improving safety, convenience, comfort, and direct connections for those choosing the bicycle as a mode of travel:

- A complete Low Stress[4] bicycle network (see Figure 2);
- Key Routes[5] that link key destinations and provide critical east-west and north-south cross-town travel for people walking and bicycling (See Figure 5.2 in Chapter 5);
- A wayfinding signage program;
- Safe Routes to Schools and Parks; and
- Pedestrian and bicyclist connections to transit stops and hubs.

The Bicycle Facilities Map is shown in Figure 3.

[3] A Neighborhood Greenway is a shared roadway located along a traffic-calmed local road.

[4] A Low Stress network is a system of connected infrastructure that allows cyclists of all abilities, including children, to comfortably and safely access their destinations. Examples include protected bike lanes, separated pathways, and Neighborhood.

[5].Key Routes are connected segments of low stress bicycle facilities and shared pathways that allow travel across the City.

Figure 1. Pedestrian Facilities map

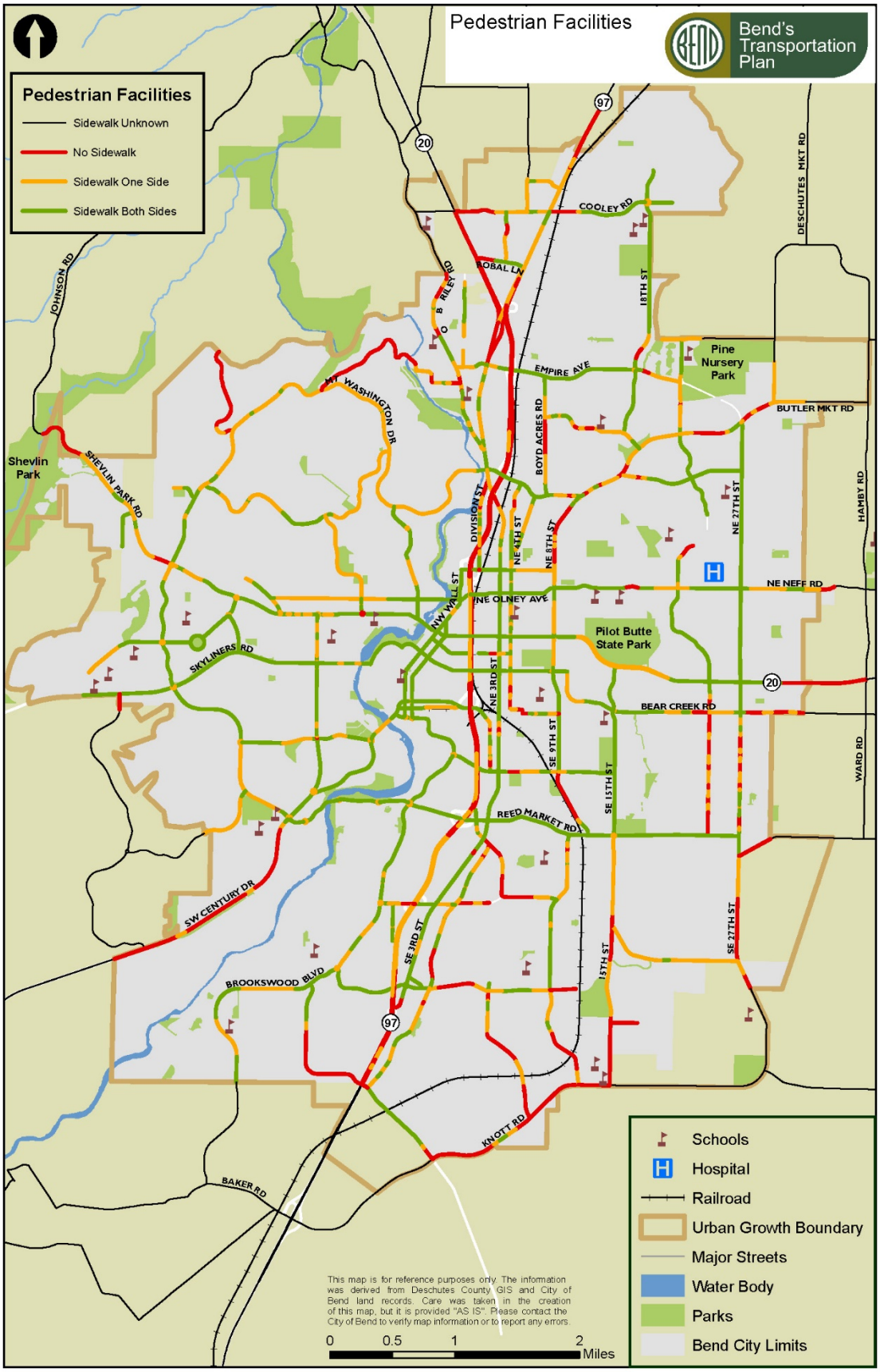


Figure 2. Low Stress Bicycle Network

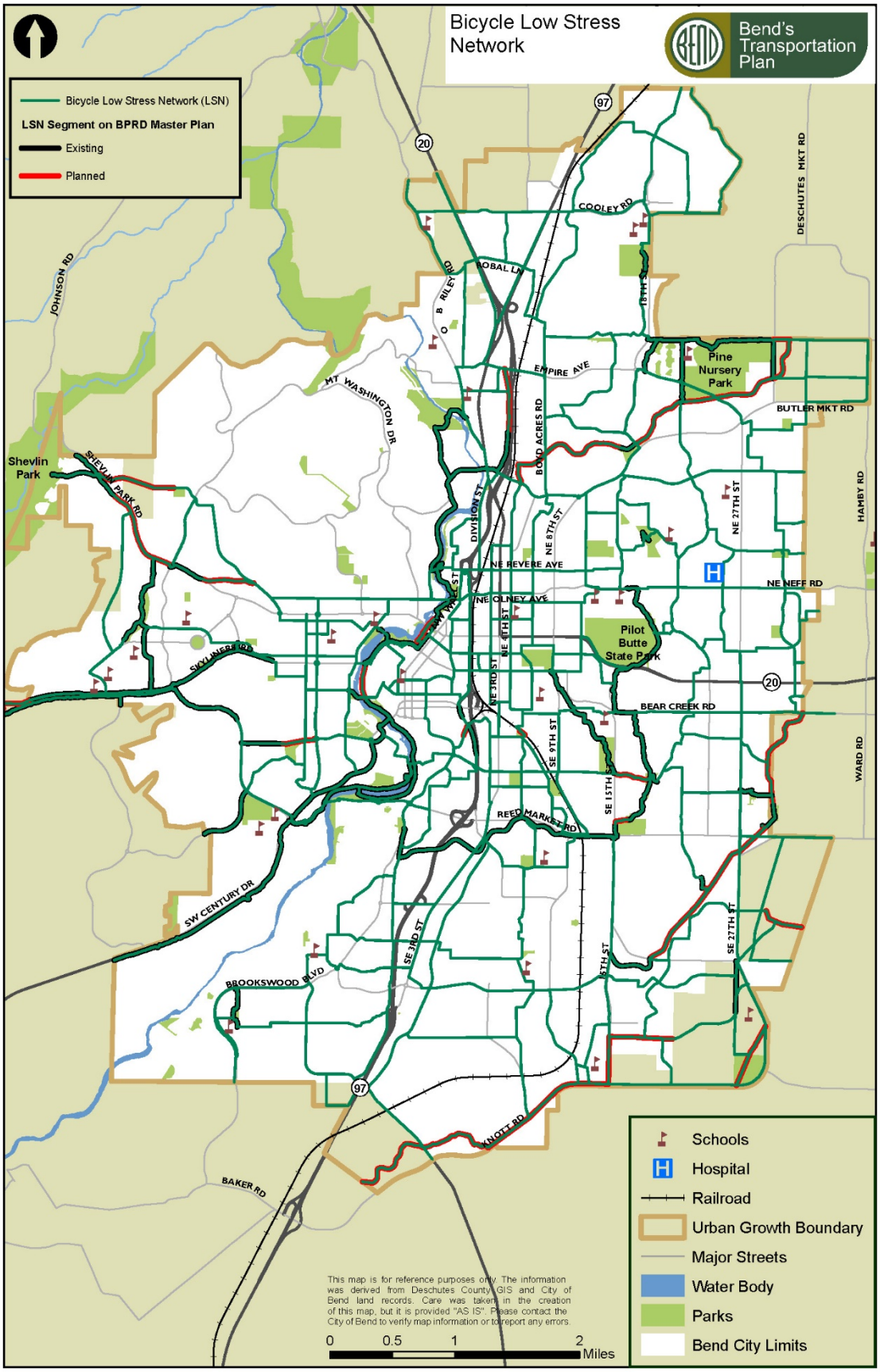
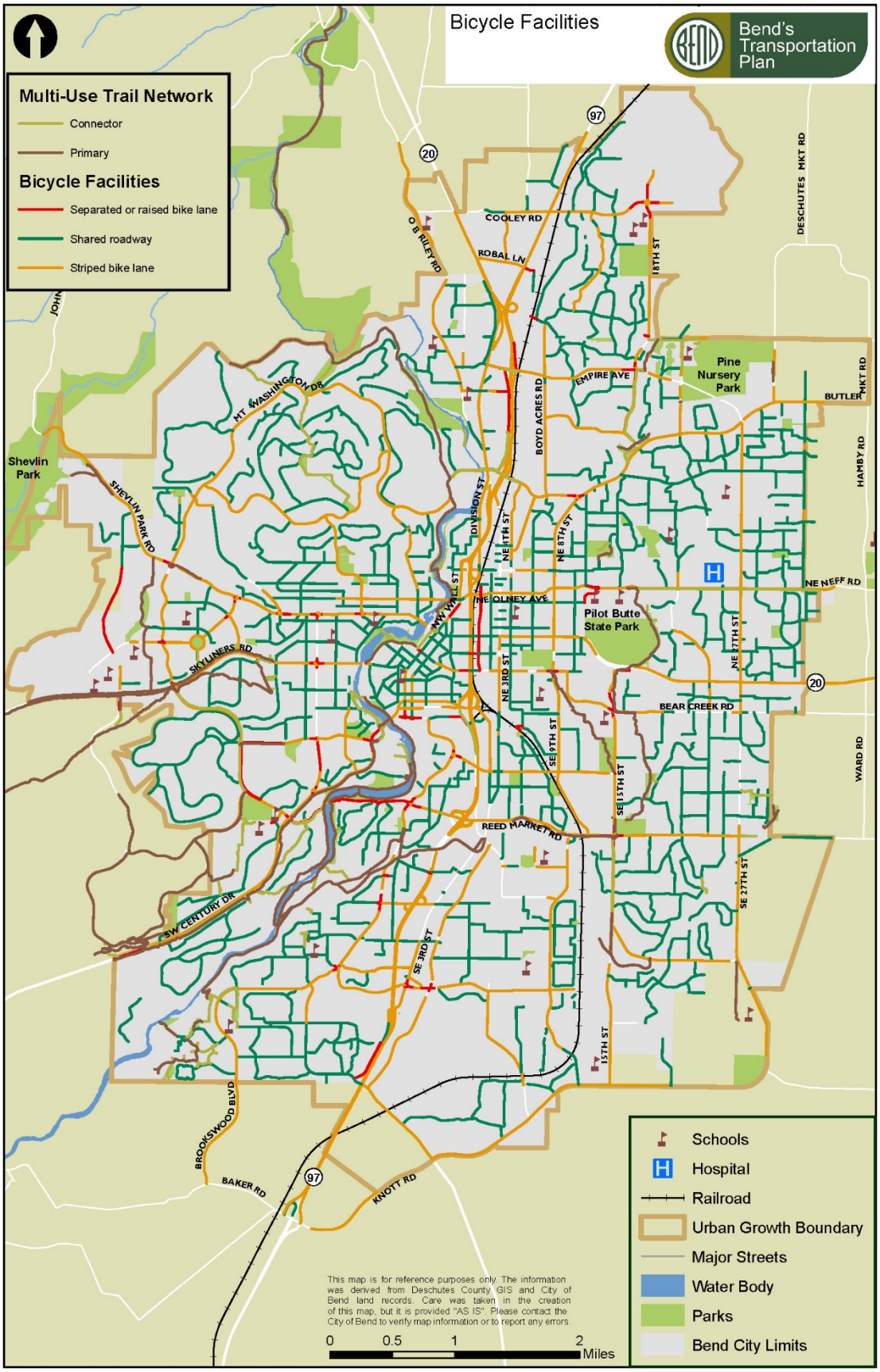


Figure 3. Bicycle Facilities Map



Public Transportation Plan

Transit is an important element of multi-modal transportation planning, providing mobility options for the traveling public who cannot or choose not to drive. In Bend, the public transportation system has been operated by Cascades East Transit, a department of the Central Oregon Intergovernmental Council (COIC) since 2010. COIC was designated a Council of Governments by an intergovernmental agreement (IGA) between Crook, Jefferson, and Deschutes Counties and the cities within those counties in 1972. In September 2010, the City and COIC entered into an IGA for COIC to run the City's transit service, now called Cascade East Transit or CET.[6]

Prior to 2010, the City twice (2000 and 2004) sought voter approval for fixed-route transit system funding and were unsuccessful. Recognizing the need for transit, the City decided to form the Bend Area Transit (BAT) system in 2006, primarily funded by the General Fund. The program established routes to serve community members with the greatest needs. However, a third measure that would have helped fund a transit district was again denied by voters in 2008.

As part of the 2010 agreement, the City and COIC transferred all grant funds received by BAT to CET. The City retained the ability to have input on any reduction in service levels. The 2010 Intergovernmental Agreement related to the transit system was updated and mostly replaced by a 2018 by the Second Intergovernmental Agreement Re: Transit System between the City and COIC (IGA). This two-year IGA may be extended and updated by amendment.

Cascades East Transit

In 2019, CET service includes nine routes within Bend[7]. The routes radiate from the Hawthorne Station transit center in a hub-and-spoke system. CET also runs Bend Dial-A-Ride, which provides shared-ride service to people with disabilities and low-income seniors who do not live near fixed-route service. . The IGA between the City and COIC gave COIC the authority to modify and update transit routes within the City. The City recognizes the transit routes as updated by COIC and approved by its board, pursuant to the terms of the IGA, as amended and updated.

CET depended on grants and local contributions for funding of all aspects of the transit system until 2018, when the State of Oregon implemented a payroll tax dedicated to transit expansion. Funding distribution of the funding is administered through the State Transportation Improvement Fund, through a formula program and through two discretionary grant programs. In Central Oregon, funding from the program will be used to enhance public transportation services to access jobs and services and to improve mobility, particularly for historically underserved populations.

CET is developing a regional transit master plan for Central Oregon and beginning a process to identify conceptual transit service over the next 25 years. The 2040 CET Transit Development Plan will identify near-, mid-, and long-term transit service needs for the existing service areas and areas into which CET may extend, including identification of high capacity transit routes.

Once developed, the 2040 Transit Master Plan will provide Central Oregon Intergovernmental Council (COIC) Board of Directors, managers, and staff a framework for providing transit and transit-related

[6] Under ORS 190.030, the IGA designating COIC to perform specified functions related to the transit system within the City vested COIC with all powers, rights, and duties relating to the functions and activities of operating a transit system vested by law in the City, including the authority to establish and change transit routes.

[7] https://cascadeseasttransit.com/

services to Bend and Central Oregon. It is intended to be used by CET to identify new services, further policy discussions, and achieve significant progress in CET departments.

The CET Development Plan will synthesize and update the existing Central Oregon Regional Transit Master Plan (2013) and the Bend Metropolitan Planning Organization's (MPO) Public Transit Plan and Transit Corridor Land Use Assessment (2013).

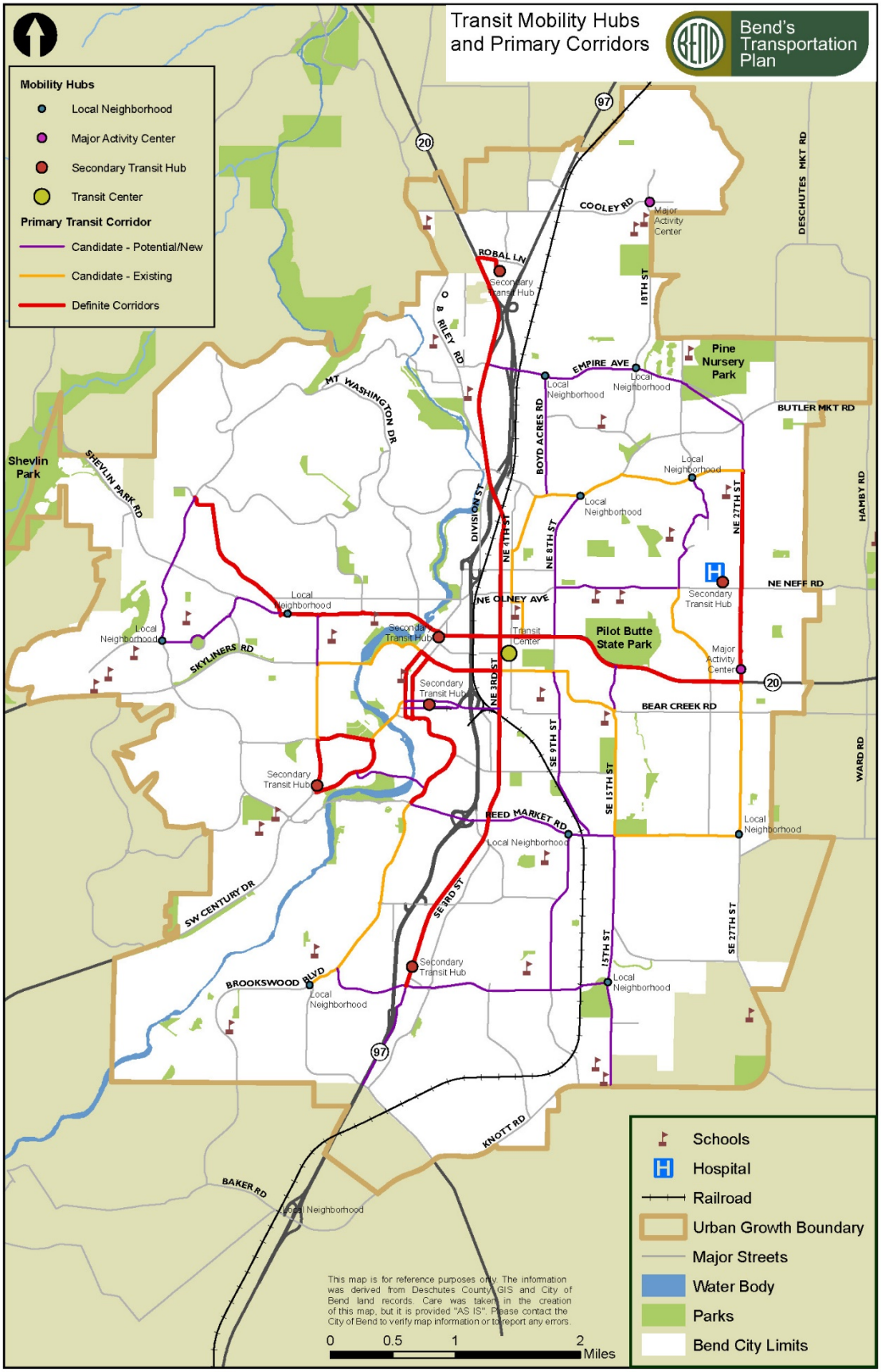
Both the CET and the City's planning efforts identified the following needs:

- Implementation of two high capacity transit routes – one north-south and one east-west; and
- Creation of five mobility hubs[8] in different quadrants of the City.

Figure 4 shows key transit corridors mobility hub locations, as identified within the ongoing CET Master Plan update.

[8] Mobility hubs are places that provide connections between different types of transportation options, often including transit, micromobility, and on-demand services. Mobility hubs may be co-located with transit centers, secondary transit hubs, or places where routes intersect to facilitate easy transfers.

Figure 4. Key Transit Corridors & Mobility Hub Locations



Other Public Transportation Services

Bike/Scooter Share

Oregon State University-Cascades (OSU-Cascades) currently offers a station-based bike share system around its campus and central Bend for students and the general public. There are currently no scooter share programs in Bend.

Ride Bend Microtransit

Ride Bend, a pilot microtransit project initiated by OSU Cascades in cooperation with the City of Bend, and operated by CET starting in 2017, offered a free on-demand summer shuttle with 15-minute headways. It serves Downtown Bend, the Old Mill District, OSU-Cascades, and destinations along Galveston Avenue. It is unknown at this time if the service will continue due to uncertain funding.

Intercity Transportation Options

The following bus services provide intercity travel options originating in the Bend area:

- *Central Oregon Breeze*, operated by CAC transportation, provides daily bus service between Central Oregon and the Portland area.
- *Shuttle Oregon* provides daily bus service between Central Oregon and the Portland area.
- *Amtrak* provides daily shuttle bus services called *High Desert Point* (between Chemult and Redmond), *Eastern Point* (between Ontario and Bend) and *Eugene to Bend* (between Eugene and Bend). These shuttles connect to Amtrak's national passenger rail network.
- *The Point* provides shuttle service between Bend and Newport, Corvallis, Albany, and Salem.
- *The People Mover* provides shuttle bus services three days a week between Prairie City (Grant County) and Bend.
- *Greyhound* provides intercity bus service connecting to a nationwide network of routes.

Roadway Network

Most of the City is served by an established network of streets, which provide mobility and access for automobiles, freight, public transit, emergency response vehicles, bicyclists and pedestrians. The TSP focuses on projects that improve safety and increase the connectivity and efficiency of the existing street system. The TSP also provides for new streets to serve the desired growth patterns envisioned by the Bend Comprehensive Plan.

The needs analysis performed for this TSP (and summarized in Chapter 3) identified arterial and collector streets that:

- Currently experience or are projected to experience traffic congestion and delay;
- Lack pedestrian and bicyclist facilities to comfortably serve a broad range of users, and
- Hinder cost-effective implementation of frequent, reliable transit services.

To meet the identified street system needs, the TSP focuses on strategies that improve connections between existing neighborhoods, employment, and commercial areas; provide connections to newly developed areas; improve safety for all travelers, and increase the use of Transportation Demand Management (TDM) and Transportation System Management (TSM) programs that increase the efficiency of the existing system (see TDM/TSM section below). The policies and potential actions supporting these strategies are detailed in Chapter 2. A list of street-related projects and programs is provided in Chapter 5. Volume 2 details the existing and future needs and deficiencies these projects, policies, and programs address.

Functional Classification of Streets

The term “functional classification” defines a roadway’s primary role in terms of providing mobility and access for all modes of travel. *Mobility* refers to the ability to travel between destinations like home, shopping, and work; *access* is the ability for travelers to access those land uses to meet daily needs.

Typically, the roadway hierarchy is a spectrum of mobility and accessibility. For example, a highway provides the highest level of mobility (higher speeds) with interchange ramps that may be a mile apart or more. On the opposite end of the spectrum, neighborhood streets provide the highest level of access (driveways accessing every property) with low traffic volumes and speeds. An individual street’s classification informs the design and management of the roadway, including right-of-way needs, the number of travel lanes, the type and location of bicycle and pedestrian facilities, whether or not to include on-street parking, spacing standards, and access management. The City’s roadways are classified as Local, Collector, Arterial, and Highway. The Street System Map (Figure 5) shows the Functional Classifications of roadways within the City.

Local Streets

Local streets provide neighborhood circulation and access to individual properties, emphasizing neighborhood-level circulation over through traffic. These streets make up the bulk of the City’s street system. They have the closest spacing of the street classifications, typically established in a street pattern of short blocks, cul-de-sacs or T-courts. Traffic volumes and speeds are very low. Local streets typically have sidewalks and parking on one or both sides, depending on right-of-way width.

Many older local streets in Bend were built before sidewalks were required and continue to lack pedestrian facilities. Traffic calming techniques, such as curb extensions, turn restrictions, raised crosswalks, and traffic circles may be appropriate on certain local streets where cut-through traffic or excessive speeds become a problem or where a Neighborhood Greenway is established.

Although most local streets are found in residential areas, they can serve other land uses, such as industrial, mixed-use, and commercial development. The design of a local street should be context-specific; for example, a local street serving an industrial area may need wider lanes, thicker pavement, and larger turning radii to accommodate freight trucks.

Collector Streets

Collector streets provide a connection between local streets and higher capacity streets such as arterials. Collectors should be designed to serve the context of their land use (e.g., commercial, residential or employment areas). They typically have higher traffic volumes and higher speeds than local streets. Collectors are best designed as complete streets to serve all modes and all abilities along and across the street. They include sidewalks and bikeways.

Some older collector streets in Bend lack certain components of a complete collector, such as curbs, drainage, sidewalks, and bike lanes. Most collectors in Bend have two travel lanes but may have a center turn lane or median, depending on land use context and the amount of desired or permitted access. The abutting land use directs the main design elements of the street, such as posted speed, inclusion of on-street parking, sidewalk width, and bikeway design treatment. [9]

[9] See the Bend bikeway Low Stress Network Map and the Bikeway Design Guide for the appropriate bikeway design.

Arterial Streets

Arterial streets are the main routes connecting different parts of the City. These streets serve through traffic and provide connections to highways, or span across highways to create continuous cross-town travel. One of the key characteristics of arterials is the high degree of connectivity they provide, serving as major access routes to regional destinations such as downtowns, universities, airports, regional shopping centers, and similar major focal points within an urban area. Typically, direct access to individual properties is limited or prohibited on arterials. Arterials are designed as complete streets to serve all modes and all abilities along and across the street. Arterial design elements such as posted speed, sidewalk width, and bikeway design treatment[10] will vary depending on the abutting land use context. On-street parking is typically not allowed on arterials although it may be included in some contexts. In Bend, arterials are further classified as *minor* and *major*.

For *minor* arterials, traffic volumes and speeds are typically moderate. Greater flexibility in design treatment is allowed, depending on land use context, potentially including on-street parking, wider sidewalks, low-stress bikeway treatments, and narrower lane widths. Minor arterials are typically no wider than three lanes with a center turn lane or median.

The defining characteristics of a *major* arterial include higher traffic volumes and sometimes higher speeds than minor arterials, as well as the potential for multiple travel lanes. Access management is important on major arterials. Major arterials serve as the backbone for citywide freight movement.

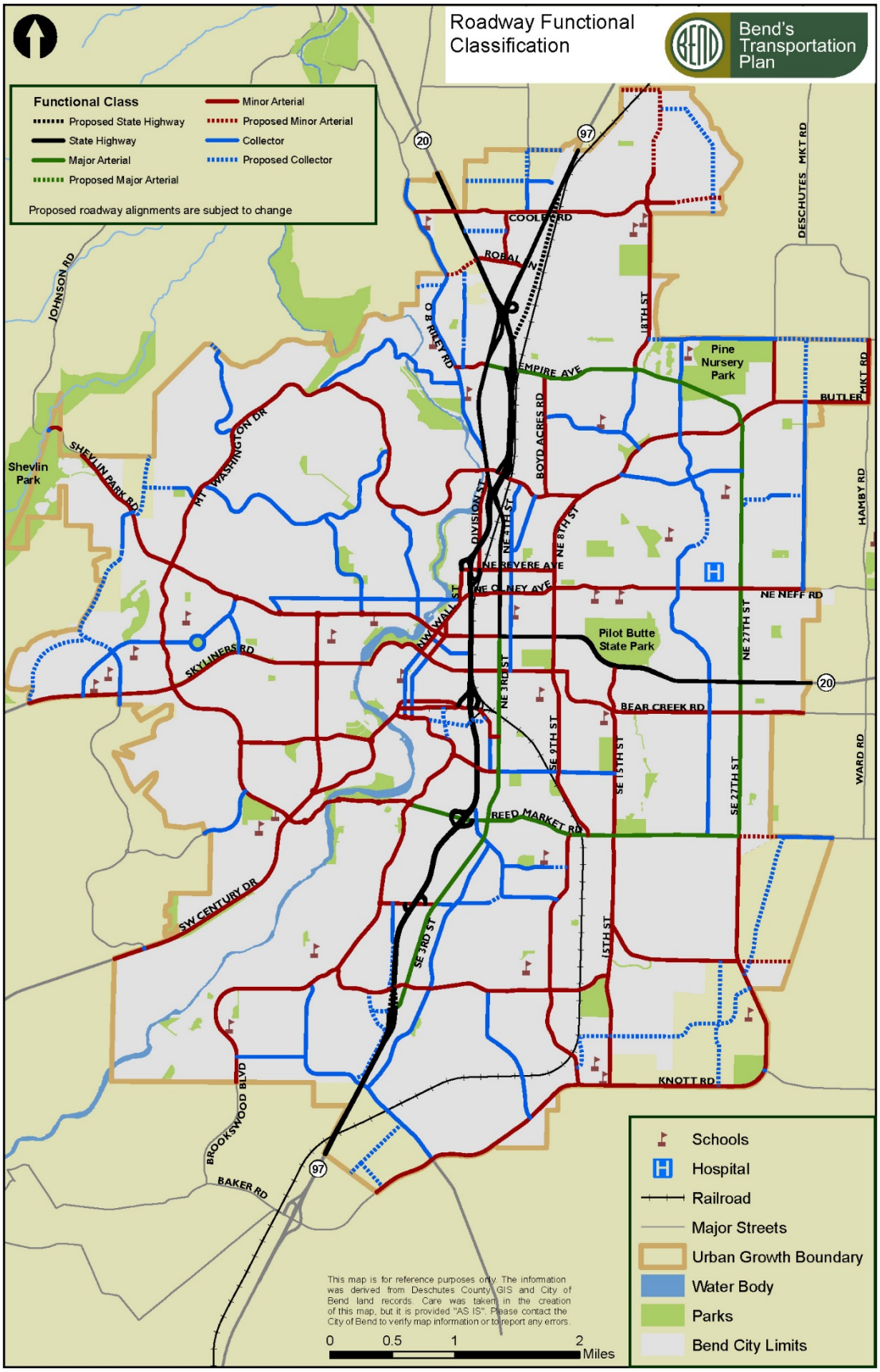
Highways

The City's boundaries include two highways[11] that are owned and operated by ODOT: US 20 and US 97 (also known as the Parkway for a portion of its length through the city). These two facilities serve a significant role in regional transportation and freight movement, as well as providing critical connections for local trips within the City. Design of these facilities is determined by ODOT with an emphasis on high volume traffic movements for interurban travel and connections to major recreation areas with minimal interruptions.

[10] See the Bend bikeway Low Stress Network Map and the Bikeway Design Guide for the appropriate bikeway design.

[11] Highways were called "Principal Arterials" in the 2000 TSP.

Figure 5. Functional Classification Map



Street Design Standards

Street design standards provide information on how streets within each of the functional classifications look and feel. The City's adopted *City of Bend Standard Drawings* set forth how existing streets can be modified and new streets can be constructed to accommodate the needs of people with disabilities and people riding bicycles, using transit, walking, driving automobiles, and moving freight. These standards will be updated to conform to the concepts identified in this TSP.

Freight

Freight routes are designated based on characteristics such as annual truck tonnages and connectivity (to other routes, local land uses, and significant freight generating areas). The designation of a freight route at any level may have implications for roadway design and mobility standards (i.e., wider lanes, curb radii, signal timing) and, potentially, funding. In Bend, there are both Federal and State-designated freight routes.

Federal Designations

Designated Federal freight routes in Bend include the Bend Parkway portion of US 97 (MP 130 to MP 144) and US 20 through the entire City. Critical Urban Freight Corridors (CUFCs) are public roads in urbanized areas that provide important connections to the National Highway Freight Network (NHFN). Adding mileage for CUFCs to the state's NHFN allows expanded use of freight-specific federal funding sources for projects that support the national highway and multimodal freight system goals. In 2019, six miles of roadway within the City of Bend were designated as CUFCs:

- US 97; Bend N City Limits (MP 133.39) to Empire Ave (MP 135.46)
- Empire Ave; US 20 Connection to US 97 NB ramps
- US 20; Cooley Rd (MP 17.40) to US 97 SB on- ramp at Division (MP 19.76)
- US 20; Webster St (MP 20.19) to Greenwood Ave (MP 20.99)
- US 20; 3rd St (MP 0.51) to 8th St (MP 0.94)
- US 20; Old Bend-Redmond Highway (MP 16.70 to MP 16.79)

State Designations

US 97 and US 20 are the two State-designated freight strategic corridors within Bend. The Oregon Freight Plan identifies these routes as critical and strategic because they provide redundancy in the statewide freight system, acting as secondary north-south and east-west cross-state highways.

Emergency Planning & Routes

Deschutes County, the Bend MPO, and the City (including the local police, fire and other public safety and first responders), all play a role in security and emergency planning as it relates to transportation. A number of emergency planning efforts and programs have been developed or are currently underway:

- *Deschutes County Natural Hazard Mitigation Plan, City of Bend Addendum (2014):* includes a list of potential transportation related action items based on identified risks and hazards.
- *Greater Bend Community Wildfire Protection Plan (2016):* contains risk assessments, recommendations, and an action and implementation plan. Classifies "insufficient access and evacuation routes" as a primary hazard and identifies mapping existing transportation and evacuation routes as an implementation action.
- *Deschutes County Emergency Operations Plan (2015):* an all-hazard emergency management plan; identifies transportation as an Emergency Support Function (ESF) and assigns agencies responsibility

for monitoring transportation infrastructure in the event of an emergency, including finding alternative routes, evacuating the population, and identifying and coordinating transportation resources.

- *ODOT Emergency Operations Plan (2014):* statewide processes for preparedness and response to emergencies that affect the state transportation system; describes ODOT's role in coordinating and assisting other agencies.
- *Oregon Resilience Plan (2013):* a statewide plan for infrastructure and resiliency related to a Cascadia 9.0 earthquake event; identifies the critical functions of US 97, rail, and CET in maintaining critical access for the state.
- *Cascades East Transit Contingency Plan (2014):* documents the periodic need and justification to reserve inactive-contingency reserve buses for future emergency use in lieu of selling them.
- *Oregon Oil Train Safety Regulations (2019: HB 2209):* requires railroads that own or operate high hazard train routes to have oil spill contingency plans approved by Oregon Department of Environmental Quality (DEQ).

Deschutes County 9-1-1 produces up-to-date public safety maps for use by emergency service providers. While a specific map of existing transportation and evacuation routes had not been developed at the time this TSP was updated, emergency service providers were in the early stages of developing emergency evacuation tools (PACE) to help identify evacuation routes and strategies based on different circumstances.

Interviews with local emergency providers stressed the importance of east-west and north-south corridors in Bend, particularly where they intersect with the State highway system. Planned interchanges at Murphy Road and planned improvements to Reed Market Road and Empire Avenue will aid in evacuation and other emergency services.

Transportation Demand Management & System Management

Transportation Demand Management

TDM is a strategy to maximize the efficiency of the urban transportation system by implementing various management tools to encourage more efficient use of the existing system. Most TDM tools focus on changing travel behavior (e.g., trip rates, trip length, travel mode, time-of-day) to reduce traffic during congested (peak) periods. TDM strategies can delay or replace the need for capital investments in projects such as new road capacity.

In Bend, some aspects of TDM are implemented through the Bend Development Code, which provides incentives such as trip or parking reduction if showers, lockers, carpool parking and extra bicycle parking is provided. The Juniper Ridge District, Central Oregon Community College[12], and OSU-Cascades[13] all currently have some form of TDM program in place.

In 2019, the City of Bend contracted with Commute Options, a non-profit agency that supports and coordinates a variety of TDM strategies and programs, to provide rideshare and TDM tracking. Commute Options provides estimated cost savings for traveling by a mode other than single-occupancy motor vehicle. Commute Options also promotes the State Safe Routes to School program.

[12] https://www.cocc.edu/about/visitors/transportation.aspx

[13] https://osucascades.edu/transportation/cascades-commuters

The TDM projects and programs identified in Chapter 5 showed a significant contribution to helping projections of future vehicle miles traveled (VMT) per capita stay below a 5% increase over 2010 levels, meeting State planning regulations[14].

Transportation Systems Management

The Oregon Transportation Planning Rule (TPR) defines TSM as the use of "techniques for increasing the efficiency, safety, capacity or level of service of a transportation facility without increasing its size."

TSM strategies include:

- Physical roadway improvements, such as shoulder widening for crash and enforcement pull-off, channelization, and intersection improvements; and
- Operational improvements, also called Intelligent Transportation System (ITS) tools, such as traffic signal coordination, ramp metering, and communication technology.

Several TSM activities are expected to improve the operation and safety of the City's transportation system:

- An update to the Deschutes County ITS Plan that will result in improved signals on a number of major and minor arterials; and
- Operational improvements as part of the Bend Parkway Plan, including closures of right-in/right-out grade ramp and installation of ramp meters at full access interchanges.

These TSM actions are expected to have a significant effect on maintaining capacity on the City's arterials and on the State highway in the future.

Technology & Transportation

A great deal has changed in transportation-related technology in the last 20 years, and even more significant changes are expected over the next 20. Two areas of technology in particular have the potential to greatly affect how the City's transportation system operates over the 20-year planning period: ITS, automated driving systems (ADS), and automated vehicles (AV).

Intelligent Transportation Systems

ITS is the application of technologies and management techniques to relieve congestion, enhance safety, provide services to travelers, and assist transportation system operators. ITS focuses on increasing the efficiency of existing transportation infrastructure, enhancing overall system performance and reducing the need to add capacity (e.g., travel lanes). Efficiency is achieved by providing services and information to travelers so they can make better travel decisions and to transportation system operators so they can better manage the system.

ITS tools offer a significant opportunity to improve the safety and efficiency of the transportation system in Bend. These tools help improve transportation system operations by performing a function more quickly or by providing a service that was not previously available. ITS offers the potential for substantial savings on future construction, particularly on arterials and highways. ITS includes the following tools:

- *Travel & Traffic Management*: upgrading traffic signal controllers and installing traffic cameras.
- *Communications:* providing a network for exchanging information to and from field devices and stakeholder agencies.

[14] OAR 660-012-0035 (5)

- *Public Transportation Management*[15]: placing automatic vehicle location devices on the CET fleet and improving transit traveler information through mobile devices.
- *Emergency Management*: creating a coordinated emergency response.
- *Information Management*: collecting, archiving, and managing transportation-related data.
- *Maintenance & Construction Management*: deploying variable speed limits, incident detection, lane merge controls, travel time estimates, and queue detection with electronic feedback signs.

The Deschutes County ITS Plan is currently being updated and will create details on how these tools will be implemented in Bend. Chapter 2 of this TSP includes technology-related policies, and Chapter 5 includes projects to implement the ITS Plan.

Automated Driving Systems & Automated Vehicles

The tools used to develop this TSP to measure travel choices and roadway capacity are well understood within the parameters of existing travel behavior. However, introduction of automated driving systems (ADS) and automated vehicles (AVs) has implications that are not yet completely understood. It is possible that ADS and AVs may bring safer and more efficient transportation alternatives to the traveling public; however, there are conflicting analyses of the safety and operational interactions with non-ADS/AVs and other transportation system users. For example, early predictions claimed major increases in road system capacity with ADS and AV technology. However, a recent study[16] showed much different results, demonstrating a major degradation of speeds and safety as ADS and AVs were added to the vehicle mix, mainly due to interactions between ADS/AV and non-ADS/AV. In fact, in that study, higher ADS and AV shares resulted in lower the travel speeds and longer travel times due to the expected mix of ADS/AV and non-ADS/AV traffic.

AVs could affect long-range planning through changes in travel choices. When the cost of drivers is removed from the business equation, transportation network companies (TNCs) may significantly increase. Early estimates[17] are that AV-based transport could be as much as 10 times less expensive per mile than buying a new car, and four times cheaper than operating an existing vehicle. If these predictions are realized, it may fundamentally change how people travel around Bend. The effects of this type of change may include higher VMT per vehicle, lower auto ownership, lower travel costs, and a need to regulate curb management. Some estimates[18] are that AV-based TNCs could provide 95% of passenger miles traveled within 10 years of widespread regulatory approval of ADS and AVs.

Overall, both the timing and the travel behavior predictions for ADS and AV fleet penetration are not well enough understood to provide input for planning at this time; however, the policies listed in Chapter 2 and the program described in Chapter 5 will allow the City to track changes and adjust transportation planning as needed.

Parking Management

Parking management is a general term for strategies to encourage the efficient use of parking facilities. Parking management can ensure that a necessary minimum number of parking spots are available, which is important for the economic viability of shopping districts, while preventing excess parking. It is

[15] This task will be managed by CET.

[16] Impacts of Connected Vehicles in a Complex, Congested Urban Freeway Setting Using Multi-Resolution Modeling Methods, International Journal of Transportation Science and Technology, Volume 8, Issue 1, March 2019

[17] RethinkX, Rethinking Transportation Choices 2020-2030, 2017. https://bit.ly/2AeAxJR

[18] ibid

critical to provide the correct amount of parking for projected demand, since excess parking correlates with higher VMT and more congestion[19]. Excess parking may also affect the cost of housing by making it more difficult to efficiently develop urban land. Parking management can be particularly effective when used in downtowns or complete neighborhoods with a good mix of services and walking infrastructure. The most effective parking strategies are those that link parking directly to demand and/or provide incentives[20].

The TPR requires that cities located within metropolitan planning organizations, such as Bend, implement a citywide parking plan[21]. The City completed a Citywide Parking Study in 2017 that demonstrated compliance with the TPR requirements[22]. The City has:

- Reduced minimum off-street parking requirements for all non-residential uses to below 1990 levels;
- Allowed the provision of on-street parking and shared parking to meet minimum off-street parking requirements;
- Established parking maximums;
- Exempted structured parking and on-street parking from parking maximums; and,
- Required landscaping features for all surface parking lots.

The Citywide Parking Study concluded that the City's current minimum parking requirements are near or below 2017 measured rates of actual parking demand for sample office, industrial, hotel, mixed-use, restaurant, and multi-family residential development sites in Bend. The study concluded that, while the City's parking code language met the intent of the TPR, implementing policies were needed. These are included in Chapter 2.

Rail

BNSF Railway operates and maintains the rail line passing through Bend. In 2018, BNSF completed installation of Centralized Traffic Control (CTC) from Washington to approximately 20 miles south of Bend. CTC permits dispatchers to monitor train movements and remotely control switches and signals to route trains into and out of sidings. A new safety system, Positive Train Control (PTC), overlays the CTC territory to ensure trains comply with speed restrictions and wayside signal indications.

There are vertical restrictions on rail containers imposed by several tunnels north of Madras; therefore, double-stacked containers cannot travel through Bend. There are 17 crossings of rail line within the City. Ten of the crossings are at grade and utilize active traffic control devices. Track switching activities frequently and unpredictably disrupt east-west travel through Bend at Reed Market, Wilson Avenue, Olney Avenue, and Revere Avenue at-grade crossings.

In 2019, BNSF was operating 10 to 12 trains per day through the study area. Rail freight in Oregon is projected to be the second fasted growing mode of transportation behind vehicle travel. Rail freight volumes, as well as truck freight volumes are forecast to significantly increase by 2040, both in Oregon and nationally.

There is currently no passenger rail service in Bend. The nearest connection to passenger rail service in central Oregon is in Chemult, about 65 miles south of Bend. In 2000, ODOT began funding a twice-daily bus service from Redmond and Bend that connects to trains at Chemult. ODOT ended financial support

19 Ewing R, Cervero R. (2010). Travel and the built environment. Journal of the American Planning Association 76(3): 265–294.

20 Best Practices Transportation Demand Management (TDM), Seattle Urban Mobility Plan, January 2008.

21 Oregon Administrative Rule (OAR) 660-012-0045

22 City of Bend Parking Code & Policy Assessment, Kittelson & Associates, Inc. December 2017.

of this service starting October 1, 2019; however, as of 2019 Amtrak and CET had an agreement to continue the service. The 2014 Oregon Rail Plan does not identify any future plans for passenger rail service serving the Bend area.

Aviation

The Bend Municipal Airport is approximately three miles east of Bend. The airport was established in the late 1930s for World War II training. Since the war, the airstrip has been owned and managed by the City, though it is located within Deschutes County and therefore under the County's planning jurisdiction. The airport is non-towered and classified as an Urban General Aviation Airport with no scheduled passenger service. The airport sees approximately 160,000 annual aircraft operations (departures and arrivals) with an average of 438 operations per day. Approximately 250 aircraft and 16 aviation-related businesses are currently based at the Airport. The Federal Aviation Administration requires the creation of an Airport Master Plan to assist airports with expansion and improvement plans over a 20-year planning period. The Airport is currently operating under the 2013 Master Plan.

Regional passenger and cargo air service is provided to the Central Oregon area at Roberts Field, the Redmond Municipal Airport, located approximately 17 miles north of Bend. The Redmond airport is designated as a Commercial Service Airport and currently provides both commercial and cargo service. The Redmond Municipal Airport is also home to a United States Forest Service (USFS) Air Tanker Base, in addition to regularly accommodating air ambulance activity.

Waterways

The Deschutes River is the only navigable waterway within Bend. The portion of the river that passes through Bend is used for recreation, not for commercial navigation. Portions of the Deschutes River are federally designated Wild and Scenic and State Scenic Waterway, which may limit the locations of future bridge crossings.

Transmission Pipelines

Gas Transmission Northwest Corporation (GTNC) currently operates high-pressure natural gas pipelines that run through the City. These pipelines extend between Kingsgate, British Columbia and Malin, Oregon traversing a distance of 612 miles before passing through the southeast corner of Bend city limits. They consist of 36- and 42-inch diameter pipelines. There are two pipeline meter stations in or near Bend; one on Knott Road and the other near the Bend Airport. These stations provide measurement and change of custody points for gas service to the Bend area. From the meter stations, natural gas is distributed to the City through pipelines ranging in sizes from ½" to 12". Capacity is evaluated annually and projects are developed as needed to add new facilities or upgrade existing infrastructure. Any transportation projects proposed within the pipeline right of way must be coordinated and approved by GTNC.

Climate Change Planning

The Bend Community Climate Action Plan (CCAP) is a set of strategies that will guide the City to reduce fossil fuel use. The City Council voted to approve the CCAP on December 4, 2019 and will appoint a new climate action/environmental advisory board to guide implementation. The CCAP includes a goal and several strategies that overlap with the TSP.

CCAP Transportation Action Goals

The following CCAP goals reflect the TSP's emphasis on providing choice, increasing efficiency, and stewarding the environment.

1. Encourage residents and tourists to change their behavior and use lower carbon transportation options.
2. Decrease total per capita vehicle miles traveled.
3. Improve urban infrastructure to enable more active transportation options.
4. Support innovative forms of low carbon transportation.
5. Pursue opportunities to make Bend's existing transportation system more efficient.

CCAP Transportation Climate Action Strategies

- T2A – Prioritize Bend's Bike, Pedestrian, and Complete Streets Policies in the Transportation System Plan
- T3A – Create a Mobility Hub program to improve access to a wide range of travel options and support multimodal lifestyles.
- T3B – Create high capacity transit corridors that increase frequency of service on major routes.
- T4A – Encourage the use of carpooling, vanpooling, and other modes of ride sharing.

Agenda Item No. 9:
Draft Chapter 2

Bend's Transportation Plan

Chapter 2: Goals, Policies, and Actions

Note: This chapter includes Steering Committee modifications to the draft chapter recommended by CTAC. Modifications are shown in "track changes" in an attached version of this chapter.

Introduction

Bend's Transportation System Plan (TSP) Goals define the community's desired outcomes for the transportation system. The Goals shape the policies and actions in the TSP and guide its projects and programs.

Goals

Preamble: The Goals articulated in this document were developed by the Citywide Transportation Advisory Committee (CTAC) after consideration and review of the City Council's articulated goals for CTAC, and through an extensive CTAC-led process of identifying issues and potential solutions from stakeholders in our regional and city transportation systems.

Increase System Capacity, Quality, and Connectivity for All Users (e.g., drivers, walkers, bicyclists, transit riders, mobility device users, commercial vehicles, and other forms of transportation)

- Increase route choices and connections for all users
  - Roads: increase capacity and efficiency
  - Sidewalks: increase access and connectivity
  - Bicycle facilities: increase total miles of bike routes/facilities
  - Transit: increase transit participation
- Use technology to enhance system performance, including accessible technology (i.e., audible signals)
- Increase the number of people who walk, ride a bike, and/or take transit
- Provide reliable travel times for commuters, emergency vehicles, and commercial users
- Minimize congestion
- Reduce vehicle operating and maintenance costs due to poor pavement conditions
- Emphasize asset management

Ensure Safety for All Users

- Reduce serious injuries and fatalities
- Maximize safe routes within and between neighborhoods and throughout the community for all users
- Design and build facilities and routes that maximize safety for pedestrians and bicyclists
- Ensure safe speeds

Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth

- Build new roads and upgrade existing roads to serve areas targeted for growth (prioritizing opportunity and expansion areas) and job creation
- Provide access and connectivity to expanded housing supply
- Improve connectivity and route choices for commercial users

Protect Livability and Ensure Equity and Access

- Incorporate a complete streets approach for all new road projects and road reconstruction
- Increase Safe Routes to Schools
- Ensure that people of all income levels and abilities have access to the transportation options that best meet their needs
- Encourage the use of roads for their stated classification
- Keep through freight traffic on ODOT facilities

Steward the Environment

- Minimize the impacts of the transportation system on natural features
- Minimize the impacts of the system on air and water quality and noise
- Reduce carbon emissions from transportation

Have a Regional Outlook and Future Focus

- Coordinate and partner with other public and private capital improvement projects and local/regional planning initiatives
- Create a system that is designed to implement innovative and emerging transportation technologies

Implement a Comprehensive Funding and Implementation Plan

- Identify stable, equitable, adequate, and achievable funding for transportation programs and projects
- Ensure that the financial plan and investment priorities are transparent, understandable, and broadly supported by the community
- Produce a funding plan that includes contributions from residents, visitors, and businesses and that delivers benefits to all users and geographies equitably and in a timely manner
- Include performance measures/benchmarks and a formal process to periodically assess progress to date and adjust or update the plan as needed
- Achieve financial stability

Policies & Actions

Introduction

The public policies in the TSP form the long-term foundation for the City of Bend's transportation system. They provide a consistent course of action to move the community toward the goals of the TSP. These policies are used to evaluate any proposed changes to the Bend Development Code and Bend Comprehensive Plan, of which the TSP is an element, and other regulatory documents. They are used to guide other work programs and long-range planning projects and to prepare the budget and capital improvement program. The policies are implemented through the City's land use regulations such as the zoning ordinance, subdivision ordinance, and Standards and Specifications.

Decisions about the City's transportation system will be guided by the goals and policies, but ultimately will be made within the overall context of the City's land use plans and the practical constraints of the City. This includes but is not limited to funding availability and compliance with all applicable federal and state laws, rules and regulations, and constitutional limitations.

Policies may be followed by actions, which are guidelines for implementing the policies. Actions are suggested approaches designed to help the City implement the TSP through its land use regulations and other City actions. The actions listed here are advisory recommendations for achieving the stated policies and do not limit the City to a single approach.

Safety

The City of Bend aspires to an accessible, welcoming, and comfortable transportation system for all users, including the most vulnerable. This system should allow zero serious injuries or fatal crashes. The City recognizes that we must design and manage our transportation system with this end in mind.

1. The City will balance safety, connectivity, and travel time reliability for all modes of transportation in design and construction of transportation projects, and in transportation program implementation.

Actions:

- *Adopt and implement the 2019 Transportation Safety Action Plan, including mapping identified crash emphasis areas.*
- *Amend the Bend Development Code to include safety mitigation as part of development review.*

2. The City is desires to reduce transportation-related fatalities or serious injuries through design, operation, maintenance, education, and enforcement activities, with the objective of zero injuries and fatalities.

***Action**:*

- *By 2021, the City will develop and adopt an action plan to move the City towards zero traffic deaths or serious injuries (e.g. Vision Zero). The plan will set a clear goal of eliminating traffic deaths and serious injuries among all road users within an explicit timeframe and actively engage key City departments.*

3. The City will consider the needs and safety of all users in transportation projects, programs, and funding decisions, with special attention to the needs of vulnerable users (including but not limited to older people, children, and people with disabilities).

Action:

- *Identify, prioritize, and/or allocate funding for projects and programs to improve safety for vulnerable users.*

4. The City will establish and enforce appropriate travel speeds based on the posted speed limit.

Actions:

- *The City will plan for, design, construct, and/or reconstruct streets to achieve consistency between motorists' speeds and target speed limits and prioritize speeding and reckless driving enforcement programs on problematic routes.*
- *Create a citywide speed management program to address safety issues related to speed.*
- *Review street design in coordination with emergency services; amend Standards and Specifications accordingly.*

5. The City will provide transparent, easy to understand, and effective communication programs to encourage safe travel on the transportation system.

Action:

- *Develop a comprehensive education program that promotes safe behavior by all roadway users. Apply an interdisciplinary approach that aims to adjust community norms regarding identified crash causation factors including, but not limited to, speeding, DUII, crosswalk yielding, red-light running, and distracted driving.*

6. Emergency response time goals will be considered in all transportation planning, design, and maintenance activities, including the capacity and design of roads and intersections (including roundabouts), traffic calming devices, and installation of traffic signals that allow preemption for emergency vehicles.

Mobility

The City will design, construct, maintain, and operate its transportation system to provide a comprehensive and integrated network that safely serves all modes and people of all ages and abilities. The transportation system will promote commerce and support the Comprehensive Plan's vision for responsible, efficient growth and development.

7. The City will plan for efficient access for employees, customers, emergency services, and freight carriers to and from employment, commercial, and industrial lands by all modes of travel.

8. The City will improve connectivity and address deficiencies in the street network with the understanding that connectivity needs and conditions may vary based on an area's existing and planned land uses and street network (e.g., large lot industrial areas may have different needs than residential areas).

9. The City will limit the location and number of driveways and vehicular access points on higher order streets (arterials and collectors) to maintain public safety and future traffic carrying capacity, while preserving appropriate access to existing and future development.

10. The City's preferred intersection treatment is a roundabout, for reasons of safety, capacity, and traffic flow. The City may select a different intersection treatment, considering land acquisition needs, operational considerations, topography, and other engineering factors.

Action:

- *Update the Bend Roundabout Design Guide, incorporate in Standards and Specifications.*

11. The City's policy is to reduce the impact of cut-through traffic in residential neighborhoods.

12. The City's standard for collectors and arterials is a three-lane configuration, but it will also consider a two-lane configuration with medians where appropriate for pedestrian crossing safety and traffic flow.

13. The City will design roadways to reflect the land use context as well as the roadway classification.

14. The City will strive to relieve congestion through management of the transportation infrastructure network to achieve travel time reliability for all users.

15. The City requires applicants with new land use proposals to assess the adequacy of the transportation system and ensure safe and efficient transportation for people using all modes. The City will assess the motor vehicular adequacy of the transportation system based on a peak hour analysis unless specified by the City Engineer. The City currently uses volume to capacity (v/c) targets and safety to evaluate intersection performance for motor vehicles. The City may adjust the v/c target, temporarily or permanently, for a specific intersection based on locational constraints, safety concerns, road classification, and/or surrounding existing or planned land uses. The City may impose reasonable conditions and mitigation requirements on development in proportion to their impacts. The City may use a measurement other than v/c in the future.

16. The City may waive off-site improvements for certain development types based on Council goals and other identified City priorities. If the City implements such waivers, it will identify other funding sources for infrastructure development. The City will monitor the effect of any waiver and adjust as needed based on its funding needs.

Action:

- *Consider supplemental SDCs, LIDs, or other funding mechanisms to supplement or replace infrastructure that would otherwise be provided by new development.*

17. The City's policy is to manage congestion/corridor demand before adding motor vehicle lanes (not including center turn lanes). Adding travel lanes for motor vehicles will be considered only after the City has evaluated:

a. The safety effects for all users and modes of travel;

b. The potential to add capacity through intersection improvements;

c. The potential to add capacity through increasing system connectivity with parallel routes;

d. Whether appropriate transit, bicycle and pedestrian facilities, including safe crossings can be provided as part of a travel lane project;

e. The effect of transportation demand management or other tools;

f. The full cost of property acquisition in monetary and social terms, and.

g. The potential to add capacity through technologies such as upgraded traffic control devices and other intelligent transportation system applications.

18. The City's policy is to preserve the function of both local and State of Oregon transportation facilities, with emphasis on stated functional classification hierarchy, through continued coordination with the Oregon Department of Transportation (ODOT).

Action:

- *Continue to coordinate with ODOT to determine when to implement modifications to City streets and closures or modifications to approaches on City streets that will be impacted by improvements to US 20 or US 97.*

Equity

The City of Bend believes that we thrive when all individuals, from all parts of our City, have affordable and equitable access to a full range of transportation choices to meet their daily needs, including, but not limited to employment, housing, healthcare, education, recreation, and shopping**.** The City recognizes that the transportation system has historically underserved some community members, and that their needs require particular attention as transportation investments, programs, and services are prioritized and funded. Those historically underserved populations include but are not limited to: people who cannot or choose not to drive (including children); persons with disabilities; people who cannot afford a motor vehicle; people living in areas where there are concentrations of impoverished and/or minority populations; and groups that have been subjected to racism and/or discrimination.

The City defines transportation equity as being achieved when *everyone* has access to safe, comfortable, affordable, and reliable transportation choices to meet their daily transportation needs. Transportation equity helps ensure that disparities are reduced and access to daily needs and key destinations are fairly provided.

19. The City is committed to equitably distributing the benefits and costs of transportation system plans and improvements. The City will develop and support programs and projects, both capital and maintenance, that reduce transportation-related disparities faced by populations that have historically had significant unmet transportation needs or who have experienced disproportionately negative impacts from the existing transportation system.

Actions:

- *Fund data collection to identify historically underserved populations in order to better identify and understand their transportation needs, and to target projects and programs to improve transportation-related conditions for these residents.*
- *Analyze crash and fatality data to determine if rates are higher in neighborhoods that are more diverse than the City as a whole. Ensure that the annual CIP process includes projects that will improve safety outcomes and processes that build trust within these areas.*
- *Create an equity lens for analyzing transportation project and program benefits and shortcomings.*
- *Analyze the impacts of transportation projects and programs on areas with greater proportions of low-income, health-challenged, minority, youth and/or elderly citizens than the City as a whole. Use national best practices as a guide.*

20. The City will actively engage and support all community members in the City in transportation planning issues, outcomes and decisions. It will actively engage and support those who have been historically underserved (for example those living in areas where the median income is less than the average).

Actions:

- *Develop, fund, and implement a set of citywide outreach and engagement protocols that build trust and promote community empowerment in transportation issues and planning.*

- *Ensure that transportation planning staff have the training resources they need to address equity and diversity issues in infrastructure planning.*

21. The City will strive to avoid, minimize, and/or mitigate disproportionately high and adverse human health, economic, or environmental effects of transportation projects on those who have been historically underserved, especially in identified areas with concentrations of impoverished and/or minority populations.

Technology

Technology is a critical and evolving set of tools that can allow the City to maximize the efficiency and effectiveness of the transportation system and the regional and local environmental, economic, and social benefits of the Bend transportation system.

22. The City will partner with the public and private sectors to test new mobility technologies and consider implementing them. Pilot and/or demonstration projects will create efficient opportunities to test emerging mobility techniques and technologies and better understand their impacts, costs, and opportunities.

23. The City will develop the capability for collecting, managing, integrating, and analyzing transportation data to inform City decision-making on transportation.

Actions:

- *The City will create guidelines to require mobility providers, connected vehicle infrastructure, and any private data communications devices installed in the City right-of-way to use open data standards to report anonymized, accurate, complete, and timely information on use, compliance, and other aspects of operations.*
- *The City will establish a centralized transportation data system and provide transportation-related data to the public to increase transparency and accountability in meeting identified transportation performance measures.*
- *The City will explore regional and national initiatives for transportation data collection, management, analysis, and reporting, adopting regional and national data and interoperability standards wherever appropriate and established.*
- *The City will provide public access to all anonymized transportation data to the degree legally permitted, including dashboard reporting on identified transportation performance measures and tools to enable data interrogation, extraction, and analysis by third parties.*

24. The City recognizes that micromobility devices (e.g., small-wheeled vehicles such as bikes, e-bikes, e-scooters, etc.) that provide increased mobility options may be an important part of our transportation system, and that demand for such services will likely increase in the future.

Action:

- *The City will evaluate and develop clear guidelines to maximize benefits, and address concerns, governing the location and management of shared active transportation (or "micromobility") vehicles in the right-of-way, as approved by the City.*

25. The City will support the expansion of infrastructure to accommodate and encourage electric vehicles and other alternatives to the internal combustion engine. The City will act as a role model by replacing appropriate City fleet vehicles with alternatives to the internal combustion vehicle as replacement opportunities occur.

Action:

- *Create a Community Electric Vehicle Infrastructure Plan that identifies how the City will prepare for and implement actions that support increased use of electric vehicles in Bend. The plan will identify appropriate policies, ordinances, outreach programs, zoning, and permitting practices that encourage use of electric vehicles and provide infrastructure to support electric vehicle growth. Amend the Bend Development Code and Standards and Specifications to implement.*
- *Identify City fleet vehicles best suited for electrification and develop standards for replacing vehicles with electric when opportunities arise. Develop a plan to convert vehicles that are not suited for electrification to alternative fuels.*

26. The City recognizes that autonomous vehicles (which do not require the performance of a human operator for part or all of their functions) will be a part of the City's transportation system in the near future.

Action:

- *The City will develop and implement autonomous vehicle strategies to ensure safety, equity, travel time reliability, and system efficiency, and to reduce vehicle miles traveled and carbon emissions.*

27. The City will manage the curb zone area of the right-of-way to ensure flexibility and adaptability as parking and mobility technologies change.

Actions:

- *Create guidelines for curb management and amend the Standards and Specifications and Bend Development Code to implement.*
- *The City will use adjacent land use characteristics, building type, and other physical attributes to determine the appropriate curb use (e.g., on-street parking, pick-up/drop-off of passengers or freight, shared active transportation facilities, bikeways, transit stops, and enhanced transit stops).*

28. The City will implement the Intelligent Transportation System Plan and work with ODOT and the Metropolitan Planning Organization (MPO) to regularly update the Plan.

Transportation Demand Management

Transportation Demand Management is a critical tool for maximizing the efficiency and effectiveness of the transportation system and the regional and local environmental, economic, and social benefits of the Bend transportation system.

29. The City will continue to develop, document and promote its own internal TDM plan to serve as a role model for others.

30. The City will develop a program to require institutions and larger businesses to implement and track a transportation demand management (TDM) plan that outlines targets, strategies, and evaluation measures to reduce vehicle miles traveled and single-occupancy vehicle trips, particularly at peak hours.

Transit

Transit is a critical tool for maximizing the equity and efficiency of the City's transportation system. Recognizing the importance of an effective transit system, the City will continue to closely coordinate with transit service providers.

31. In coordination with the City's public transportation providers, the City will work to improve the availability of all forms of transportation and transportation technologies by establishing mobility hubs.

Action:

- *Establish mobility hubs in all four city quadrants and in the core to improve the accessibility of all forms of transportation and transportation technologies. Mobility hubs are a concentration of transportation services that may include but are not limited to transit stops or transfer stations, secure bicycle parking, car- and bike-share services, shuttle services, and other assistance for the traveling public.*

32. In order to increase transportation options and support existing and planned land uses, the City will work with its public transportation provider to improve the efficiency and effectiveness of existing services in Bend; expand services to underserved areas; and support regional systems that encourage residents of nearby communities to travel to Bend by public transit.

33. The City will plan, prioritize, and implement needed improvements on corridors identified for high-capacity transit, such as complete street elements to improve transit access, and signal prioritization.

34. The City will work with its public transportation providers to develop mobility on demand and mobility as a service trip planning and payment tools across multiple mobility platforms.

35. The City will support its public transportation provide in replacing the fleet of transit vehicles with energy-efficient and/or alternative-fuel vehicles that minimize the transit system's impact on the environment as replacement opportunities occur.

Parking

Parking is a critical tool for maximizing the efficiency and effectiveness of the transportation system and the regional and local environmental, economic, and social benefits of the Bend transportation system

36. The City will fully implement the Downtown Parking Plan (2017).

37. The City will adopt parking management and enforcement technologies to optimize use of existing public and private parking supply and to reduce conflicts.

38. The City will enable the creation of parking districts in areas where residents or stakeholders have identified an issue that could be resolved by parking management, and/or in locations where data supports the development of a parking district.

Actions:

- *Amend the Bend Code Title 6 to implement parking districts and identify and fund staff to manage them.*
- *If needed, amend the Bend Development Code to adjust parking requirements.*

39. The City will monitor and update parking requirements to allow for adjustments based on changes in behavior and parking demand over time.

Bicycles, Pedestrians, & Complete Streets

The City of Bend's transportation system will be an interconnected network of complete streets that provides safe, optimized travel for all modes. The system is intended to increase connectivity, safety, and travel time reliability while encouraging walking, biking, and opportunities for using transit and other transportation options.

40. The City's policy is that all streets should be "complete streets." A complete street is one that is designed to allow everyone to travel safely and comfortably along and across the street by all travel modes. Arterials, collectors, and most local streets will have buffered sidewalks. Arterials, collectors, and select local streets will have facilities in compliance with the Low Stress Network and the Pedestrian Master Plan.

Actions*:*

- *Adopt the Low Stress Bikeway Map and Bikeway Design Guide.*
- *Create and adopt a Pedestrian Master Plan.*
- *Update the Standards and Specifications and/or Bend Development Code to identify how complete street elements will be incorporated during development and redevelopment, new construction, reconstruction, and maintenance activities.*

41. The City will create and implement a Pedestrian Master Plan to establish a pedestrian network that safely and comfortably serves the community year round. The Pedestrian Master Plan will identify key pedestrian routes, including crossings.

***Actions**:*

- *Create and adopt a Pedestrian Master Plan that identifies key routes including enhanced crossing locations. The Pedestrian Master Plan will include (1) an infill program to systematically fund the construction of missing sidewalks and crosswalks on key routes with identified mechanisms for funding, and (2) identify appropriate pedestrian facilities for local streets and how to implement those facilities in existing neighborhoods.*
- *The Pedestrian Master Plan will include a Sidewalk Maintenance Plan to address issues including but not limited to: sidewalk maintenance, winter operations and snow removal, and ADA Compliance.*
- *Amend the Bend Development Code and Standards and Specifications for sidewalk construction.*
- *Develop and implement a wayfinding program for the pedestrian network.*

42. The City will establish a network of low stress bikeway facilities (level of traffic stress 1 or 2; See Bikeway Design Guideline) as shown on the bicycle Low Stress Network Map, to provide connections to schools, parks, and other destinations, as well as cross-City travel. It will accommodate small-wheeled vehicles, including shared micromobility transportation solutions, within local regulation and legal requirements. Implementation will focus on the key routes shown on the bicycle Low Stress Network Map.

43. The City will balance accessibility, mobility, travel time reliability, emergency vehicle access, and safety when considering traffic calming and traffic management tools to manage motor vehicle speed, volume, and turning movements to meet the requirements of the bicycle Low Stress Network and Pedestrian Master Plan.

44. The City is committed to providing safe and comfortable walking and biking routes to schools.

***Action**:*

- *In collaboration with the school district, the City will develop Safe Routes to School plans and implementation programs for **existing schools**. The school district, in collaboration with the City, will develop Safe Routes to School plans and implementation programs for **new schools**.*

45. The City is committed to providing safe and comfortable walking and biking routes to parks.

***Action**:*

- *In collaboration with the Bend Park and Recreation District (BPRD), the City will develop low stress route plans and implementation programs for **existing parks**. BPRD, in collaboration with the City, will develop low stress route plans and implementation programs for **new parks**.*

46. The City recognizes the BPRD Urban Trails map, as represented in BPRD's Comprehensive Plan, as an element of the transportation system and will collaborate with the BPRD for bikeway and pedestrian facility planning and construction within the City.

47. The City requires enhanced crosswalks at key intervals to complete the walking and bicycling networks (established by the respective master plans), including school and trail crossings. All intersections are legal crosswalks; "enhanced" means that there are additional pedestrian safety treatments including, but not limited to, striping, safety islands, and enhanced lighting and flashing beacons where warranted.

Actions:

- *Develop requirements and clear and objective criteria for the installation of enhanced crosswalks and amend the Bend Development Code and the City's Standards and Specifications to incorporate these.*
- *Update the Standards and Specifications to provide adequate illumination at crosswalks and intersections.*

48. The City is committed to maintaining bicycle and pedestrian facilities along key routes (as identified on the bikeway Low Stress Network map) for year-round use.

Actions:

- *Update the City's Maintenance and Operations plan to incorporate walking and biking facilities along key routes.*
- *Create an intergovernmental agreement with BPRD and other agencies to clarify ownership, construction, and maintenance responsibilities for trails and other walking and biking facilities.*

49. The City will work with BPRD to acquire, develop, and maintain the trails designated on the *Bikeway Low Stress Network* and *Urban Trails* maps. Construction and dedication of these trails for public use will be required as part of new development and capital transportation projects whenever possible. The alignments depicted should be considered general in nature. Flexibility should be permitted during the development and design of private lands and transportation construction projects to locate these trails to fit the context of the natural terrain, to minimize trail grade, to consider street crossings and other safety issues, to account for the pattern and design of the development, and/or to consider right-of-way extents and any other topographic or geographic barriers or issues.

***Action*:**

- *Update Bend Development Code if necessary.*

Funding

The City's Transportation Plan defines capital projects and programs that meet ongoing operation and maintenance needs, add system capacity; improve safety; increase transit, pedestrian and bicycle mobility; support new growth; and meet ongoing operating and maintenance needs.

50. The City's transportation funding plan will use a variety of tools to achieve balance and resilience, intended to generate revenues that are stable and flexible over the planning period and through economic market cycles, and that provide sufficient funding for the full range of project types and programs.

51. The City's transportation funding plan will ensure that all transportation system users, including but not limited to visitors, commuters, residents, new development, institutions, and businesses (including property tax exempt organizations and entities), and freight pay a fair and equitable share for transportation system development, operations, and maintenance.

52. The City's transportation funding plan will generate sufficient capital and operations/maintenance revenue to cover the full life-cycle costs of priority projects, from initial construction to ongoing operations and maintenance, including depreciation. It will also cover programs and staffing required to successfully manage and accomplish projects with an explicit focus on near-term and priority projects.

53. The City will implement a transportation funding plan that is broadly supported by the community.

***Actions**:*

- *Discern community priorities and build community support for new funding tools, especially those that require a public vote, through outreach, polling, education, and other efforts to gather and share information.*
- *Where possible and appropriate, identify alternate tools (a "plan B") for those funding sources that have a lesser degree of predictability or stability. These might include mechanisms subject to voter approval, subject to a sunset or limited duration, or vulnerable to variability due to the nature of larger economic cycles or other factors.*

54. The City's transportation funding plan will recognize that technologies will change in ways that affect costs and also change the City's ability to monitor, use, and collect revenues. The transportation funding plan should consider funding for innovation and adaptation/inclusion of new technologies that may become available over time.

55. The City will regularly evaluate existing funding sources and explore the use of new funding opportunities to increase resources for maintenance operations and capital improvements.

56. The selection of transportation improvements to be funded within the City's capital improvement program (CIP) will be based on the prioritized list of projects included in this TSP. The CIP is subject to public review and comment through a City Council public hearing process.

57. Funding for transportation infrastructure in expansion areas, as identified in the 2016 urban growth boundary (UGB) expansion, will be determined either before or upon area plan and/or master plan approval (unless exempted). Funding must be established prior to, or concurrently with, annexation. Transportation and infrastructure funding agreements will be memorialized for each expansion area property or properties in a development agreement as part of master plan or area plan approval and/or annexation. City/private developer cost sharing may be based on the following:

a. Adequate resources are provided for ongoing maintenance, operation, and preservation of new infrastructure, including technology;

b. Construction and modernization of existing infrastructure is to City standards and specifications;

c. The investment in transportation infrastructure helps solve existing transportation safety, capacity, and/or other apparent functional issue within the existing City limits;

d. There is an opportunity for local, state and/or federal grants to leverage the private investments and provide partnerships;

e. Other factors as determined by the City Manager.

58. The City will continuously seek and leverage interagency and other outside funds whenever possible throughout the implementation of the 20-year TSP.

Environmental

The City recognizes the need to steward the environment when constructing and maintaining transportation infrastructure. The City has many policies embedded throughout this Chapter intended to reduce greenhouse gases and vehicle miles traveled (VMT) by encouraging bicycling, walking, transit, and electric or other alternately fueled vehicles, as well as using appropriate new technologies to efficiently manage the system. The following policies were identified as gaps in the City's environmental policies.

59. The City will consider the environmental impacts of the overall transportation system and act to mitigate negative effects and enhance positive features.

Action:

- As part of project design, evaluate and implement (where feasible) the use of environmentally friendly materials and design approaches.

60. The City understands the importance of managing stormwater runoff from transportation infrastructure and will design and operate transportation infrastructure to keep stormwater properly collected, treated, and out of water supplies.

Agenda Item No. 10:
Draft Chapter 2 -
Track Changes

Bend's Transportation Plan

DRAFT Chapter 2: Goals, Policies, and Actions

Introduction

Bend's Transportation System Plan (TSP) Goals define the community's desired outcomes for the transportation system. The Goals shape the policies and actions in the TSP and guide its projects and programs.

Goals

Preamble: The Goals articulated in this document were developed by the Citywide Transportation Advisory Committee (CTAC) after consideration and review of the City Council's articulated goals for CTAC, and through an extensive CTAC-led process of identifying issues and potential solutions from stakeholders in our regional and city transportation systems.

Increase System Capacity, Quality, and Connectivity for All Users (e.g., drivers, walkers, bicyclists, transit riders, mobility device users, commercial vehicles, and other forms of transportation)

- Increase route choices and connections for all users
  - Roads: increase capacity and efficiency
  - Sidewalks: increase access and connectivity
  - Bicycle facilities: increase total miles of bike routes/facilities
  - Transit: increase transit participation
- Use technology to enhance system performance, including accessible technology (i.e., audible signals)
- Increase the number of people who walk, ride a bike, and/or take transit
- Provide reliable travel times for commuters, emergency vehicles, and commercial users
- Minimize congestion
- Reduce vehicle operating and maintenance costs due to poor pavement conditions
- Emphasize asset management

Ensure Safety for All Users

- Reduce serious injuries and fatalities
- Maximize safe routes within and between neighborhoods and throughout the community for all users
- Design and build facilities and routes that maximize safety for pedestrians and bicyclists
- Ensure safe speeds

Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth

- Build new roads and upgrade existing roads to serve areas targeted for growth (prioritizing opportunity and expansion areas) and job creation
- Provide access and connectivity to expanded housing supply
- Improve connectivity and route choices for commercial users

Protect Livability and Ensure Equity and Access

- Incorporate a complete streets approach for all new road projects and road reconstruction
- Increase Safe Routes to Schools
- Ensure that people of all income levels and abilities have access to the transportation options that best meet their needs
- Encourage the use of roads for their stated classification
- Keep through freight traffic on ODOT facilities

Steward the Environment

- Minimize the impacts of the transportation system on natural features
- Minimize the impacts of the system on air and water quality and noise
- Reduce carbon emissions from transportation

Have a Regional Outlook and Future Focus

- Coordinate and partner with other public and private capital improvement projects and local/regional planning initiatives
- Create a system that is designed to implement innovative and emerging transportation technologies

Implement a Comprehensive Funding and Implementation Plan

- Identify stable, equitable, adequate, and achievable funding for transportation programs and projects
- Ensure that the financial plan and investment priorities are transparent, understandable, and broadly supported by the community
- Produce a funding plan that includes contributions from residents, visitors, and businesses and that delivers benefits to all users and geographies equitably and in a timely manner
- Include performance measures/benchmarks and a formal process to periodically assess progress to date and adjust or update the plan as needed
- Achieve financial stability

Policies & Actions

Introduction

The public policies in the TSP form the long-term foundation for the City of Bend's transportation system. They provide a consistent course of action to move the community toward the goals of the TSP. These policies are used to evaluate any proposed changes to the Bend Development Code and Bend Comprehensive Plan, of which the TSP is an element, and other regulatory documents. They are used to guide other work programs and long-range planning projects and to prepare the budget and capital improvement program. The policies are implemented through the City's land use regulations such as the zoning ordinance, subdivision ordinance, and Standards and Specifications.

Decisions about the City's transportation system will be guided by the goals and policies, but ultimately will be made within the overall context of the City's land use plans and the practical constraints of the City. This includes but is not limited to funding availability and compliance with all applicable federal and state laws, rules and regulations, and constitutional limitations.

Policies may be followed by actions, which are guidelines for implementing the policies. Actions are suggested approaches designed to help the City implement the TSP through its land use regulations and other City actions. The actions listed here are advisory recommendations for achieving the stated policies and do not limit the City to a single approach.

Safety

The City of Bend aspires to an accessible, welcoming, and comfortable transportation system for all users, including the most vulnerable. This system should allow zero serious injuries or fatal crashes. The City recognizes that we must design and manage our transportation system with this end in mind.

1. The City will balance safety, connectivity, and travel time reliability for all modes of transportation in design and construction of transportation projects, and in transportation program implementation.

Actions:

- *Adopt and implement the 2019 Transportation Safety Action Plan, including mapping identified crash emphasis areas.*
- *Amend the Bend Development Code to include safety mitigation as part of development review.*

2. The City is ~~committed~~ desires to reduce ~~to~~ zero transportation-related fatalities or serious injuries through design, operation, maintenance, education, and enforcement activities, with the objective of zero injuries and fatalities.

***Action**:*

- *By 2021, the City will develop and adopt an action plan to move the City towards zero traffic deaths or serious injuries (e.g. Vision Zero). The plan will set a clear goal of eliminating traffic deaths and serious injuries among all road users within an explicit timeframe and actively engage key City departments.*

3. The City will consider the needs and safety of all users in transportation projects, programs, and funding decisions, with special attention to the needs of vulnerable users (including but not limited to older people, children, and people with disabilities~~), and other users of the transportation system)~~.

Action:

- *Identify, prioritize, and/or allocate funding for projects and programs to improve safety for vulnerable users.*

4. The City will establish and enforce appropriate ~~motorist~~ travel speeds based on the posted speed limit.

Actions:

- *The City will plan for, design, construct, and/or reconstruct streets to achieve consistency between motorists' speeds and target speed limits and prioritize speeding and reckless driving enforcement programs on problematic routes.*
- *Create a citywide speed management program to address safety issues related to speed.*
- *Review street design in coordination with emergency services; amend Standards and Specifications accordingly.*

5. The City will provide transparent, easy to understand, and effective communication programs to encourage safe travel on the transportation system.

Action:

- *Develop a comprehensive education program that promotes safe behavior by all roadway users. Apply an interdisciplinary approach that aims to adjust community norms regarding identified crash causation factors including, but not limited to, speeding, DUII, crosswalk yielding, red-light running, and distracted driving.*

6. Emergency response time~~s are an important component of transportation planning. Emergency response time~~ goals will be considered in all transportation planning, design, and maintenance activities~~ and intersection design~~, including the capacity and design of roads and intersections (including roundabouts)~~roundabout design~~, traffic calming devices, and installation of traffic signals that allow preemption for emergency vehicles.

Mobility

The City will design, construct, maintain, and operate its transportation system to provide a comprehensive and integrated network that safely serves all modes and people of all ages and abilities. The transportation system will promote commerce and support the Comprehensive Plan's vision for responsible, efficient growth and development.

7. The City will plan for efficient access for employees, customers, emergency services, and freight carriers to and from employment, commercial, and industrial lands by all modes of travel.

8. The City will improve connectivity and address deficiencies in the street network with the understanding that connectivity needs and conditions may vary based on an area's existing and planned land uses and street network (e.g., large lot industrial areas may have different needs than residential areas).

9. The City will limit the location and number of driveways and vehicular access points on higher order streets (arterials and collectors) to maintain public safety and future traffic carrying capacity, while preserving appropriate access to existing and future development.

10. The City's preferred intersection treatment is a roundabout, for reasons of safety, capacity, and traffic flow~~, and safety~~. The City may select a different intersection treatment, considering land acquisition needs, operational considerations, topography, and other engineering factors.

Action:

- *Update the Bend Roundabout Design Guide, incorporate in Standards and Specifications.*

11. The City's policy is to reduce the impact of cut-through traffic in residential neighborhoods.

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b. ~~Evaluated~~ The potential to add capacity through intersection improvements;

c. ~~Evaluated~~ The potential to add capacity through increasing system connectivity with parallel routes;

d. ~~Provided~~ Whether appropriate transit, bicycle and pedestrian facilities, including safe crossings can be provided;

e. ~~Implemented~~ The effect of transportation demand management or other tools; ~~and~~

f. ~~Assessed~~ The full cost of property acquisition in monetary and social terms, and.

~~f.~~ g. The potential to add capacity through technologies such as upgraded traffic control devices and other intelligent transportation system applications.

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Action:

- *Continue to coordinate with ODOT to determine when to implement modifications to City streets and closures or modifications to approaches on City streets that will be impacted by improvements to US 20 or US 97.*

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~~18.~~**19.** The City is committed to equitably distributing the benefits and costs of transportation system plans and improvements. The City will develop and support programs and projects, both capital and maintenance, that reduce transportation-related disparities faced by populations that have historically had significant unmet transportation needs or who have experienced disproportionately negative impacts from the existing transportation system.

Actions:

- *Fund data collection to identify historically underserved populations in order to better identify and understand their transportation needs, and to target projects and programs to improve transportation-related conditions for these residents.*
- *Analyze crash and fatality data to determine if rates are higher in neighborhoods that are more diverse than the City as a whole. Ensure that the annual CIP process includes projects that will improve safety outcomes and processes that build trust within these areas.*
- *Create an equity lens for analyzing transportation project and program benefits and shortcomings.*
- *Analyze the impacts of transportation projects and programs on areas with greater proportions of low-income, health-challenged, minority, youth and/or elderly citizens than the City as a whole. Use national best practices as a guide.*

~~19.~~**20.** The City will actively engage and support all ~~populations~~ community members ~~with respect to age, race, disability, gender, income, or location~~ in the City in transportation planning issues, outcomes and decisions. It will actively engage and support those who have been historically underserved~~,~~ (for example those living in areas where the median income is less than the average)~~especially in identified areas with concentrations of poverty and/or minority populations~~.

Actions:

- *Develop, fund, and implement a set of citywide outreach and engagement protocols that build trust and promote community empowerment in transportation issues and planning.*
- *Ensure that transportation planning staff have the training resources they need to address equity and diversity issues in infrastructure planning.*

~~20.~~21. The City will strive to avoid, minimize, and/or mitigate disproportionately high and adverse human health, economic, or environmental effects of transportation projects on those who have been historically underserved, especially in identified areas with concentrations of impoverished and/or minority populations.

Technology~~, Transit, & Transportation Demand Management~~

Technology~~, transit, and transportation demand management tools (including parking management)~~ is ~~are~~ a critical and evolving set of tools that can allow the City to~~s for~~ maximize~~ing~~ the efficiency and effectiveness of the transportation system and the regional and local environmental, economic, and social benefits of the Bend transportation system.

~~21.~~22. The City will partner with the public and private sectors to test new mobility technologies and consider implementing them. Pilot and/or demonstration projects will create efficient opportunities to test emerging mobility techniques and technologies and better understand their impacts, costs, and opportunities.

~~22.~~23. The City will develop the capability for collecting, managing, integrating, and analyzing transportation data to inform City decision-making on transportation.

Actions:

- *The City will create guidelines to require mobility providers, connected vehicle infrastructure, and any private data communications devices installed in the City right-of-way to use open data standards to report anonymized, accurate, complete, and timely information on use, compliance, and other aspects of operations.*
- *The City will establish a centralized transportation data system and provide transportation-related data to the public to increase transparency and accountability in meeting identified transportation performance measures.*
- *The City will explore regional and national initiatives for transportation data collection, management, analysis, and reporting, adopting regional and national data and interoperability standards wherever appropriate and established.*
- *The City will provide public access to all anonymized transportation data to the degree legally permitted, including dashboard reporting on identified transportation performance measures and tools to enable data interrogation, extraction, and analysis by third parties.*

~~23.~~24. The City recognizes that micromobility devices (e.g., small-wheeled vehicles such as bikes, e-bikes, e-scooters, etc.) that provide increased mobility options may be an important part of our transportation system, and that demand for such services will likely increase in the future.

Action:

- *The City will evaluate and develop clear guidelines to maximize benefits, and address concerns, governing the location and management of shared active transportation (or "micromobility") vehicles in the right-of-way, as approved by the City.*

~~24.~~ 25. The City will support the expansion of infrastructure to accommodate and encourage electric vehicles and other alternatives to the internal combustion engine. The City will act as a role model by replacing appropriate City fleet vehicles with alternatives to the internal combustion vehicle as replacement opportunities occur.

Action:

- *Create a Community Electric Vehicle Infrastructure Plan that identifies how the City will prepare for and implement actions that support increased use of electric vehicles in Bend. The plan will identify appropriate policies, ordinances, outreach programs, zoning, and permitting practices that encourage use of electric vehicles and provide infrastructure to support electric vehicle growth. Amend the Bend Development Code and Standards and Specifications to implement.*
- *Identify City fleet vehicles best suited for electrification and develop standards for replacing vehicles with electric when opportunities arise. Develop a plan to convert vehicles that are not suited for electrification to alternative fuels.*

~~25.~~ 26. The City recognizes that autonomous vehicles (which do not require the performance of a human operator for part or all of their functions) will be a part of the City's transportation system in the near future.

Action:

- *The City will develop and implement autonomous vehicle strategies to ensure safety, equity, travel time reliability, and system efficiency, and to reduce vehicle miles traveled and carbon emissions.*

~~26.~~ 27. The City will manage the curb zone area of the right-of-way to ensure flexibility and adaptability as parking and mobility technologies change.

Actions:

- *Create guidelines for curb management and amend the Standards and Specifications and Bend Development Code to implement.*
- *The City will use adjacent land use characteristics, building type, and other physical attributes to determine the appropriate curb use (e.g., on-street parking, pick-up/drop-off of passengers or freight, shared active transportation facilities, bikeways, transit stops, and enhanced transit stops).*

28. The City will implement the Intelligent Transportation System Plan and work with ODOT and the Metropolitan Planning Organization (MPO) to regularly update the Plan.

Transportation Demand Management

Transportation Demand Management is a critical tool for maximizing the efficiency and effectiveness of the transportation system and the regional and local environmental, economic, and social benefits of the Bend transportation system.

29. The City will continue to develop, document and promote its own internal TDM plan to serve as a role model for others.

30. The City will develop a program to require institutions and larger businesses ~~with larger institutions~~ to implement and track a transportation demand management (TDM) plan that outlines targets, strategies, and evaluation measures to reduce vehicle miles traveled and single-occupancy vehicle trips, particularly at peak hours.

Transit

Transit is a critical tool for maximizing the equity and efficiency of the City's transportation system. Recognizing the importance of an effective transit system, the City will continue to closely coordinate with transit service providers.

~~27.~~**31.** In coordination with the City's public transportation providers, the City will work to improve the availability of all forms of transportation and transportation technologies by establishing mobility hubs.

Action:

- *Establish mobility hubs in all four city quadrants and in the core to improve the accessibility of all forms of transportation and transportation technologies. Mobility hubs are a concentration of transportation services that may include but are not limited to transit stops or transfer stations, secure bicycle parking, car- and bike-share services, shuttle services, and other assistance for the traveling public.*

~~28.~~**4.** ~~The City will continue to develop, document and promote its own internal TDM plan to serve as a role model for others.~~

~~29.~~**32.** In order to increase transportation options and support existing and planned land uses, the City will work with its public transportation provider to improve the efficiency and effectiveness of existing services in Bend; expand services to underserved areas; and support regional systems that encourage residents of nearby communities to travel to Bend by public transit.

~~30.~~**33.** The City will plan, prioritize, and implement needed improvements on corridors identified for high-capacity transit, ~~including~~ such as complete street elements to improve transit access, and signal prioritization.

~~31.~~**34.** The City will work with its public transportation providers to develop mobility on demand and mobility as a service trip planning and payment tools across multiple mobility platforms.

35. The City will support its public transportation provide~~r~~ in replacing the fleet of transit vehicles with energy-efficient and/or alternative-fuel vehicles that minimize the transit system's impact on the environment as replacement opportunities occur.

Parking

Parking is a critical tool for maximizing the efficiency and effectiveness of the transportation system and the regional and local environmental, economic, and social benefits of the Bend transportation system

~~32.~~36. The City will fully implement the Downtown Parking Plan (2017).

~~33.~~37. The City will adopt parking management and enforcement technologies to optimize use of existing public and private parking supply and~~,~~ to reduce conflicts~~, and to reduce the share of land occupied by parking~~.

~~34.~~38. The City will enable the creation of parking districts in areas where residents or stakeholders have identified an issue that could be resolved by parking management, and/or in locations where data supports the development of a parking district.

Actions:

- *Amend the Bend Code Title 6 to implement parking districts and identify and fund staff to manage them.*
- *If needed, amend the Bend Development Code to adjust parking requirements.*

~~35.~~39. The City will monitor and update parking requirements to allow for adjustments based on changes in behavior and parking demand over time.

Bicycles, Pedestrians, & Complete Streets

The City of Bend's transportation system will be an interconnected network of complete streets that provides safe, optimized travel for all modes. The system is intended to increase connectivity, safety, and travel time reliability while encouraging walking, biking, and opportunities for using transit and other transportation options.

~~36.~~40. The City's policy is that all streets should be "complete streets." A complete street is one that is designed to allow everyone to travel safely and comfortably along and across the street by all travel modes. Arterials, collectors, and most local streets will have buffered sidewalks. Arterials, collectors, and select local streets will have facilities in compliance with the Low Stress Network and the Pedestrian Master Plan.

Actions*:*

- *Adopt the Low Stress Bikeway Map and Bikeway Design Guide.*
- *Create and adopt a Pedestrian Master Plan.*

- *Update the Standards and Specifications and/or Bend Development Code to identify how complete street elements will be incorporated during development and redevelopment, new construction, reconstruction, and maintenance activities.*

~~37.~~41. The City will create and implement a Pedestrian Master Plan to establish a pedestrian network that safely and comfortably serves the community year round. The Pedestrian Master Plan will identify key pedestrian routes, including crossings.

***Actions**:*

- *Create and adopt a Pedestrian Master Plan that identifies key routes including enhanced crossing locations. The Pedestrian Master Plan will include (1) an infill program to systematically fund the construction of missing sidewalks and crosswalks on key routes with identified mechanisms for funding, and (2) identify appropriate pedestrian facilities for local streets and how to implement those facilities in existing neighborhoods.*
- *The Pedestrian Master Plan will include a Sidewalk Maintenance Plan to address issues including but not limited to: sidewalk maintenance, winter operations and snow removal, and ADA Compliance.*
- *Amend the Bend Development Code and Standards and Specifications for sidewalk construction.*
- *Develop and implement a wayfinding program for the pedestrian network.*

~~38.~~42. The City will establish a network of low stress bikeway facilities (level of traffic stress 1 or 2; See Bikeway Design Guideline) as shown on the bicycle Low Stress Network Map, to provide connections to schools, parks, and other destinations, as well as cross-City travel. It will accommodate small-wheeled vehicles, including shared micromobility transportation solutions, within local regulation and legal requirements. Implementation will focus on the key routes shown on the bicycle Low Stress Network Map.

~~39.~~43. The City ~~may use~~ will balance accessibility, mobility, travel time reliability, emergency vehicle access, and safety when considering traffic calming and traffic management tools ~~as appropriate~~ to manage motor vehicle speed, volume, and turning movements to meet the requirements of the bicycle Low Stress Network and Pedestrian Master Plan.

~~40.~~44. The City is committed to providing safe and comfortable walking and biking routes to schools.

***Action**:*

- *In collaboration with the school district, the City will develop Safe Routes to School plans and implementation programs for **existing schools**. The school district, in collaboration with the City, will develop Safe Routes to School plans and implementation programs for **new schools**.*

~~41.~~45. The City is committed to providing safe and comfortable walking and biking routes to parks.

***Action**:*

- *In collaboration with the Bend Park and Recreation District (BPRD), the City will develop low stress route plans and implementation programs for **existing parks**. BPRD, in collaboration with the City, will develop low stress route plans and implementation programs for **new parks**.*

~~42.~~ **46.** The City recognizes the BPRD Urban Trails map, as represented in BPRD's Comprehensive Plan, as an element of the transportation system and will collaborate with the BPRD for bikeway and pedestrian facility planning and construction within the City.

~~43.~~ **47.** The City requires enhanced crosswalks at key intervals to complete the walking and bicycling networks (established by the respective master plans), including school and trail crossings. All intersections are legal crosswalks; "enhanced" means that there are additional pedestrian safety treatments including, but not limited to, striping, safety islands, and enhanced lighting and flashing beacons where warranted.

Actions:

- *Develop requirements and clear and objective criteria for the installation of enhanced crosswalks and amend the Bend Development Code and the City's Standards and Specifications to incorporate these.*
- *Update the Standards and Specifications to provide adequate illumination at crosswalks and intersections.*

~~44.~~ **48.** The City is committed to maintaining bicycle and pedestrian facilities along key routes (as identified on the bikeway Low Stress Network map) for year-round use.

Actions:

- *Update the City's Maintenance and Operations plan to incorporate walking and biking facilities along key routes.*
- *Create an intergovernmental agreement with BPRD and other agencies to clarify ownership, construction, and maintenance responsibilities for trails and other walking and biking facilities.*

~~45.~~ **49.** The City will work with BPRD to acquire, develop, and maintain the trails designated on the *Bikeway Low Stress Network* and *Urban Trails* maps. Construction and dedication of these trails for public use will be required as part of new development and capital transportation projects whenever possible. The alignments depicted should be considered general in nature. Flexibility should be permitted during the development and design of private lands and transportation construction projects to locate these trails to fit the context of the natural terrain, to minimize trail grade, to consider street crossings and other safety issues, to account for the pattern and design of the development, and/or to consider right-of-way extents and any other topographic or geographic barriers or issues.

***Action*:**

- *Update Bend Development Code if necessary.*

Funding

The City's Transportation Plan defines capital projects and programs that meet ongoing operation and maintenance needs, add system capacity; improve safety; increase transit, pedestrian and bicycle mobility; support new growth; and meet ongoing operating and maintenance needs.

~~46.~~**50.** The City's transportation funding plan will use a variety of tools to achieve balance and resilience, intended to generate revenues that are stable and flexible over the planning period and through economic market cycles, and that provide sufficient funding for the full range of project types and programs.

~~47.~~**51.** The City's transportation funding plan will ensure that all transportation system users, including but not limited to visitors, commuters, residents, new development, institutions, and businesses (including property tax exempt organizations and entities), and freight pay a fair and equitable share for transportation system development, operations, and maintenance.

~~48.~~**52.** The City's transportation funding plan will generate sufficient capital and operations/maintenance revenue to cover the full life-cycle costs of priority projects, from initial construction to ongoing operations and maintenance, including depreciation. It will also cover programs and staffing required to successfully manage and accomplish projects with an explicit focus on near-term and priority projects.

~~49.~~**53.** The City will implement a transportation funding plan that is broadly supported by the community.

***Actions**:*

- *Discern community priorities and build community support for new funding tools, especially those that require a public vote, through outreach, polling, education, and other efforts to gather and share information.*
- *Where possible and appropriate, identify alternate tools (a "plan B") for those funding sources that have a lesser degree of predictability or stability. These might include mechanisms subject to voter approval, subject to a sunset or limited duration, or vulnerable to variability due to the nature of larger economic cycles or other factors.*

~~50.~~**54.** The City's transportation funding plan will recognize that technologies will change in ways that affect costs and also change the City's ability to monitor, use, and collect revenues. The transportation funding plan should consider funding for innovation and adaptation/inclusion of new technologies that may become available over time.

~~51.~~**55.** The City will regularly evaluate existing funding sources and explore the use of new funding opportunities to increase resources for maintenance operations and capital improvements.

~~52.~~**56.** The selection of transportation improvements to be funded within the City's capital improvement program (CIP) will be based on the prioritized list of projects included in this TSP. The CIP is subject to public review and comment through a City Council public hearing process.

~~53.~~57. Funding for transportation infrastructure in expansion areas, as identified in the 2016 urban growth boundary (UGB) expansion, will be determined either before or upon area plan and/or master plan approval (unless exempted). Funding must be established prior to, or concurrently with, annexation. Transportation and infrastructure funding agreements will be memorialized for each expansion area property or properties in a development agreement as part of master plan or area plan approval and/or annexation. City/private developer cost sharing may be based on the following:

a. Adequate resources are provided for ongoing maintenance, operation, and preservation of new infrastructure, including technology;

~~a.~~b. Construction and modernization of existing infrastructure is to City standards and specifications;

~~b.~~c. The investment in transportation infrastructure helps solve existing transportation safety, capacity, and/or other apparent functional issue within the existing City limits;

~~c.~~d. There is an opportunity for local, state and/or federal grants to leverage the private investments and provide partnerships;

~~d.~~e. Other factors as determined by the City Manager.

~~54.~~58. The City will continuously seek and leverage interagency and other outside funds whenever possible throughout the implementation of the 20-year TSP.

Environmental

The City recognizes the need to steward the environment when constructing and maintaining transportation infrastructure. The City has many policies embedded throughout this Chapter intended to reduce greenhouse gases and vehicle miles traveled (VMT) by encouraging bicycling, walking, transit, and electric or other alternately fueled vehicles, as well as using appropriate new technologies to efficiently manage the system. The following policies were identified as gaps in the City's environmental policies.

~~55.~~59. The City will consider the environmental impacts of the overall transportation system and act to mitigate negative effects and enhance positive features.

Action:

- As part of project design, evaluate and implement (where feasible) the use of environmentally friendly materials and design approaches.

~~56.~~60. The City understands the importance of managing stormwater runoff from transportation infrastructure and will design and operate transportation infrastructure to keep stormwater properly collected, treated, and out of water supplies.

Agenda Item No. 11:
Draft Chapter 5

DRAFT Chapter 5: Transportation Projects and Programs

Note: Modifications to the chapter since CTAC 14 are noted in red text.

Introduction

This chapter of the TSP provides an overview of a set of coordinated transportation investments that address transportation needs within the City of Bend over the next 20 years, including planning level cost estimates.

The Role of the TSP in Prioritization and Funding

The TSP is Bend's long-term transportation planning document. It addresses a comprehensive set of Bend's transportation system needs, integrated with land use and other community needs and aspirations. The priorities and funding plans in the TSP create clarity for Bend regarding **what** projects and programs are most important, **when** they should be constructed or implemented, and **how** they should be funded.

It is important to note that these are planning-level recommendations and subject to refinement and change over time. Typical factors influencing refinements include population and employment growth rates; more concentrated growth in specific areas (such as opportunity areas and Urban Growth Boundary (UGB) expansion areas); City Council priorities expressed through goals, budgets, and the Capital Improvement Program (CIP); partner agency projects; annual fluctuations in revenue collections; and external grants or funding opportunities. The scope and scale of projects may also be revised as each is more fully developed through a specific design process. Using the TSP as guidance, the City Council will authorize the funding of programs and the design and construction of individual projects.

Elements of the Transportation Investment Priorities

Transportation investments within this chapter are organized into the following categories:

- **Existing Capital Improvement Program** (CIP) – These projects were included in the CIP at the time the TSP was adopted. Existing funding sources are dedicated to these projects.
- **Capital Projects** – These projects are intended to meet identified roadway capacity, safety, key walking and biking routes, and transit-supportive infrastructure through the year 2040.
- **Existing Failed Roadway Reconstruction Projects** – These are roadway reconstruction projects that address existing roads in a state of disrepair. The City intends to address these projects with capital and programs through the horizon of the TSP.

- **Transportation Programs** – These programs can help to improve roadway conditions, prioritize the continued addition of multimodal facilities throughout the City, implement key plan recommendations, and reduce vehicular demand.

The following sections expand of the details of these elements and an overall assessment of the effectiveness of implementation.

Defining the Timing of Priorities

The Bend TSP organizes projects into those that should be funded within the near-, mid-, or long-term planning horizon. Chapter 6 identifies the existing funding gap and additional funding sources the City needs to fund all the planned projects and programs within these phasing categories.

(1) ***Near-term Priorities (Implementation Years 1 – 10)*****:** This category includes the projects within the current 5-year CIP (2020-2024) as well as additional projects and programs that rank as high priorities appropriate for the 6- to 10-year timeframe.[1]

(2) ***Mid-term Priorities (Implementation Years 11 – 15)*****:** This category includes projects and programs that support TSP goals and economic and community health, or which are anticipated to be triggered by growth.

(3) ***Long-term Priorities (Implementation Years 16-20)*****:** This category includes projects and programs that are not likely to be triggered by growth or system needs until the long-term horizon. Even with that long-term frame of reference, these projects and programs help meet year 2040 transportation system needs and implement the Bend Comprehensive Plan.

(4) ***Expansion Area Projects***: The timing for this category of projects is driven by significant land development near the project or program. Expansion Area projects may address important system needs, such as neighborhood streets needed to connect pedestrians, cyclists and motorists in growth areas with the regional arterial and collector roadway system. They may also include improvements that are implemented using "public" funding sources, such as Transportation System Development Charge (TSDC) funding, Development Agreements, or an area-planning process. Specific timing for implementation is dependent on market conditions related to the pace of development in specific areas. These projects and programs contribute to the overall multimodal system and are an important component of the TSP.

A detailed funding action plan recommendation[2] was developed by the Citywide Transportation Advisory Committee (CTAC) for the near-term priorities. The mid-term and long-term project lists have more general funding strategies to reflect the need to be flexible and adaptable over time. The improvements to City of Bend roads and facilities included in the 2040 project list are reasonably likely to be provided by the end of the planning period with projected revenue, as detailed in Chapter 6 of this TSP. The City also has the projected revenue to provide its

[1] The City's fiscal commitment in the TSP is for project planning. All actual funding authorizations are subject to subsequent Council action. City Council may also modify the 2020-2024 CIP to add, remove, or refine projects and programs to reflect funding availability, but only in compliance with the City's TSP. Pursuant to the City's fiscal policies, the 5-year CIP is prepared and updated annually.

[2] See Appendix A of Chapter 6.

assumed match for projects on the ODOT system as indicated by the funding assumptions in the project table, and in certain cases the TSP assumes the City will fully fund identified projects on the ODOT system. Projects on the ODOT system are also reasonably likely to be provided by the end of the planning period based on coordination with ODOT and assumed state or federal revenue, grants, or other funding sources that will likely be available within the planning horizon.

The TSP is a living document that should be updated every 5-7 years and can be amended as needed based on new information or changing conditions.

Existing Capital Improvement Program

Table 1 presents the current transportation projects included in the 2020-2024 City of Bend CIP. This list includes projects with funds allocated for construction or design and totals approximately $73 million. The list reflects thoughtful review and consideration based on a public process initiated by the City Council. The City has allocated funds and staff resources to initiate these projects by 2024. Several projects on the CIP are already in-process as of the adoption of this TSP.

In addition to the CIP, ODOT and other partner agencies have projects programmed within the near-term horizon that have direct benefits to the City's transportation system. Most notably, ODOT is pursuing Phase 1 of the North Corridor Final Environmental Impact Statement (FEIS) in partnership with the City of Bend and Deschutes County. This is a major project that would realign US 97 on Bend's north end to address existing congestion at several at-grade intersections.

Table 1. 2020-2024 City of Bend Transportation Capital Improvement Program

Project	Cost Estimate
Neff & Purcell Intersection Design	$4,150,000equity
14th Street Reconstruction Plant Establishment	$50,000
Reed Mkt: 3rd to Newberry Plant Establishment	$100,000
Murphy & Brosterhous Roundabout	$2,518,500
15th & Murphy Roundabout	$2,972,500
15th Street Sidewalk	$84,300
Empire Avenue Extension	$8,647,200
Hwy 20/Greenwood Sidewalk Improvement	$1,500,000
Empire & 27th Intersection	$3,001,800
Purcell/Butler Market	$2,206,500
Murphy extension from Brosterhous to 15th	$3,089,400
Murphy & Country Club Intersection Design	$608,000
Murphy Railway Overcrossing	$4,869,700
Bicycle Greenways	$620,000
Bond & Reed Market Roundabout	$750,000
Archie Briggs Bridge Replacement Design	$72,000
Citywide Safety Improvements	$1,000,000

Project	Cost Estimate
Murphy Corridor Improvement from Parrell to Brosterhous	$10,356,700
Purcell Blvd Modernization	$1,604,100
Newport Ave Pipe Replacement and Road Upgrade	$4,022,000
Columbia & Simpson Roundabout	$1,000,000
3rd & Reed Market Intersection	$5,000,000
9th & Wilson Traffic Signal Improvement	$5,000,000
Brosterhous & Chase Intersection	$5,000,000
27th & Conners Intersection	$2,500,000
Butler Market & Wells Acres Intersection Improvement	$3,000,000
Total:	**$73,722,700**

Operations & Maintenance of Existing Facilities [inset]

As noted in Chapter 6, the operations and maintenance of existing facilities, including pavement and right-of-way maintenance on the existing road system, street sweeping, and snow removal and winter operations, etc. is a regular funding priority for the City of Bend. Existing revenue sources are used to support these efforts.

Capital Projects

A major component of Bend's transportation plan is identifying capital projects that are needed to support household and employment growth consistent with the adopted Comprehensive Plan. These projects address vehicular congestion, identified safety needs, pedestrian and bicycle system needs, and the transit system.

Each of the identified Capital Projects were assessed based on Prioritization Criteria and categorized into one of the phasing categories through robust input and deliberation from the TSP advisory committee[3]. In general, project categorization considered the following questions:

- Which projects most meaningfully address the project and program prioritization criteria?
- What is the likely funding available for each of the phasing categories and how can the City "right-size" the project and program list to best match the funding sources?
- What projects and programs build upon and/or rely on synergies provided by other capital improvements projects within each timing phase?

Based on that process, Tables 3 through 6 present the projects identified in each of the priority categories.

Key Walking & Biking Route Priority Recommendations

The TSP update process identified Key Walking and Biking Routes that are essential to implementing portions of the bicycle Low Stress Network as well as continuous walking routes throughout the City. Based on recommendations from the Citywide Transportation Advisory

[3] As documented in Volume 2,

Committee, these Key Walking and Biking routes are all included as a near-term priority. The routes will be implemented through the capital projects identified in Table 3b.

Transit System

The City of Bend had regular and ongoing coordination with Cascades East Transit (CET), the transit provider for Central Oregon and the City of Bend, through the development of the TSP in order to collaborate regarding long-term vehicular, bicycle, pedestrian and transit needs. Those discussions revealed several key synergies between the projects planned within the TSP and those that support the long-term vision of the area transit system. The City TSP, which owns and plans for improvements within the City right-of-way, identifies several projects that support transit by:

- Planning for infrastructure needs to support future north-south and east-west high capacity transit routes (as identified by CET), which may include sidewalk infill, bus stop improvements, etc.
- Identification of up to 5 mobility hubs;
- Traffic signal infrastructure upgrades to better serve transit; and
- Facilities that enhance pedestrian and bicycle access to transit improvements.

In addition, the implementation of this TSP would result in a well-connected transportation network, which benefits transit through reduced congestion, increased route choice, and robust infrastructure for all travel modes. The coordination between the TSP and CET's transit planning is an on-going process; the TSP is intended to be dynamic and adaptive to transit strategies and investments over time.

ODOT Coordination

The Bend TSP was developed in close coordination with the ODOT Parkway Study, which identifies near-term and long-term improvement projects for the US 97 corridor through Bend. The specific improvement projects identified through that effort have been incorporated into this TSP, reflected in both the project list and associated cost estimates[4].

Other Planning Efforts

Key outcomes from several other ongoing or completed planning efforts have been included in this TSP, including the Deschutes County and Bend Transportation Safety Action Plan, the Deschutes County Intelligent Transportation Systems (ITS) Plan, and the Bend Park and Recreation District Trails Map.

Transportation Programs

In addition to Capital Projects, the TSP identifies a number of programs in the near-term that will continue to be refined and used throughout the duration of the TSP. These programs will

[4] Cost estimates generally reflect a 10% City funding contribution to ODOT projects. Higher contributions are assumed for some projects based on various factors, including City priorities. Actual City funding shares will be determined as specific projects are implemented.

improve roadway conditions and safety, prioritize the continued addition of multimodal facilities throughout the City, and implement key plan recommendations.

The implementation, timing and ongoing operational elements of these programs will be further refined as the City moves forward with implementation of the TSP. However, for the purpose of allocating estimated funding revenues, the TSP includes estimates of funding needed to implement each program and the funding needed to operate the program on a year to year basis. Each element is described further below. The recommended programs and estimated costs are shown in Table 2.

Existing Failed Roadway Reconstruction Projects

The City has identified existing failed roadways that require approximately $56 million for reconstruction (i.e., roads that require full reconstruction due to a state of disrepair). These facilities are primarily classified as local roads. City staff is currently addressing reconstruction needs with existing Operation and Maintenance (O&M) funding but is unable to address the full reconstruction needs without additional funding becoming available either through new sources or the reallocation of existing sources.

To fully address the reconstruction needs, the current estimate for reconstruction of existing failed roads in the system has been included as part of the TSP project list. The full project costs have been divided amongst the near-term, mid-term, and long-term priority lists, acknowledging that these needs will be addressed with capital and programs over time in coordination with the existing Streets Department O&M Program, other City Utility projects, and CIP projects. Existing, new, or leveraged (i.e., grants, etc.) funding sources should be considered to proactively address these reconstruction needs as funding becomes available.

Effectiveness of Transportation Investments

The transportation investments identified in this chapter were evaluated based on a variety of criteria to determine the effectiveness against the specific goals and objectives of this TSP. Specifically, the TSP includes projects and programs that were shown to have significant benefits in the following categories:

- **Mode Split**: There is a significant shift to modes other than single-occupancy vehicles (SOVs) and a decrease in daily SOV trips by 3.5% with implementation of the 2040 Investment Priorities over the 2040 Baseline Scenario. This shift was achieved through the combination of land use planning[5] aligned with key services and programs, including planned traffic demand management; downtown parking pricing; high capacity transit lines with mobility hubs; and investment in the bicycle Low-Stress Network and connected pedestrian system (Key Routes).
- **Vehicle Miles Travelled (VMT) per Capita**: With the additional mode shift and intentional investment in a combination of multimodal and connectivity projects, the 2040 Investment Priorities decreases projected VMT per capita by over 4% when compared to

[5] Plan, zone and policy recommendations adopted in Bend's 2016 Comprehensive Plan update.

the 2040 Baseline Scenario. This reduces VMT per capita to levels similar to 2010 conditions even with expansion of the Bend UGB.

- **Vehicle Hours of Delay**: Similarly, there is also an improvement (i.e., reduction) in vehicle hours of delay across the system during the projected PM peak hour in the 2040 TSP Project List Scenario. Total vehicle hours of delay decreases by nearly 18% with the combined investment of the TSP Project List compared to the 2040 Baseline Scenario.

Beyond citywide metrics, the 2040 Investment Priorities address several significant specific transportation needs identified through the TSP update process, including the following:

- **Bend Parkway (US 97) Congestion and Safety:** With the implementation of the North Parkway FEIS, the Powers Road Interchange, and other Parkway Study Improvements, such as ramp metering and right-in right-out closures, the entire length of US 97 in Bend is anticipated to operate under capacity during an average weekday, which is a significant improvement over the 2040 Baseline Scenario. These improvements are also expected to significantly improve safety by limiting at-grade access on the Parkway.
- **East-West Corridor Congestion**: Improvement projects will make notable improvements in congestion and queuing at spot locations along east-west corridors, including Portland Avenue, Colorado Avenue, and Reed Market Road. Overall vehicle demand is reduced through TDM strategies, improved facilities for people walking and biking, and improved high capacity transit connecting the east and west sides of the city. However, the system in 2040 is still constrained and over capacity at the major bridge crossings. Some solutions include:
    - A study for a new long-term southern river crossing between Powers Road and Murphy Road connecting Century Drive to US97 or 3rd Street may help identify a solution for the continued congestion on east-west corridors. Beyond the transportation solution analysis, such a study would address land use and natural resource considerations.
    - Congestion at the major bridge crossings should continue to be monitored to determine if/when additional improvements are appropriate at key locations on east-west routes. Improvements may include targeted widening or other intersection improvements as indicated by future conditions and application of TSP policies. Improvements may also include further use of demand-management strategies, or adoption of alternative mobility standards.
- **North-South Corridor Congestion in Eastern Bend**: Intersection improvements along 27th Street and 15th Street, in addition to the Empire Avenue Extension currently under way, will help alleviate some congestion on the north-south routes in eastern Bend.

  However, portions of these corridors are expected to still be over capacity in the 2040 even with the identified Transportation Investment Priorities and should continue to be monitored to determine if/when additional improvements are appropriate. Improvements may also include further use of demand-management strategies, targeted widening or intersection improvements, or adoption of alternative mobility standards.

- **Bicycling and Walking Facilities**: With the addition of projects to complete key walking and biking routes, a commitment to building complete streets, and an emphasis on programmatic approaches to addressing walking and bicycling needs on all levels of the system, the 2040 Transportation Investment Priorities make important steps to address the need for a connected network of low stress facilities. Starting these programs in the near term will help address existing needs while continuing to make improvements into the future.
- **Transit**: The TSP identifies east-west and north-south high-capacity transit routes combined with five future mobility hubs. These transit-supportive improvements make significant improvements in the transit network in Bend. The specific alignment of the high capacity routes and mobility hubs will be determined in coordination with CET. These improvements (combined with investment in low stress pedestrian and bicycle networks and TDM strategies) will help contribute to the shift away from SOVs, reduce VMT per capita and reduce p.m. peak hour motor vehicle delay.
- **Transportation Safety:** Key outcomes from the Bend Transportation Safety Action Plan (TSAP) are included in the projects and programs, including near-term improvement projects to address high priorities as identified by TSAP and an ongoing programmatic approach to address and implement systemic safety improvements.

Table 2. Recommended Near-term Program Funding Allocation

Program IDs	Program	Description	Estimated Initial Cost	Estimated Annual Cost[6]	Notes
P-1	Address ongoing maintenance needs for new capital projects identified within the TSP	City program to fund new maintenance needs associated with new capital projects, including new roads, intersections, bridges, and other transportation infrastructure.	N/A	$500k to $1 million	Program to ensure operation and maintenance funding associated with new capital projects.
P-2	TDM Program for major employers and institutions	TDM program for major employers and institutions.	$200k (Initial study)	$150k (1-2 FTE)	Travel demand modeling has shown TDM implementation to be an effective tool for addressing future and existing congestion by limiting demand on the transportation system.
P-3	Transportation Safety Action Plan (TSAP) implementation	Safety projects and programs as defined by the Transportation Safety Action Plan including street lighting and other systemic treatments.	N/A	$1 million	Improving transportation safety is a goal of the Bend TSP and has been continually highlighted as a priority among CTAC members. Program would include implementation of key elements of the TSAP report, including systemic treatment options.
P-4	Bicycle Program	This includes implementing the bicycle Low Stress Network, Neighborhood Greenways, wayfinding, crossings, and traffic calming.	$200k (Initial study)	$1 million	This is a comprehensive program to facilitate bicycle travel within the city. Program would include implementation and updates to the bicycle Low Stress Network Plan.
P-5	Pedestrian Program	This includes creating a Pedestrian Master Plan to identify and prioritize pedestrian system improvements (local, collector, arterial sidewalk infill), transit access, safe routes to schools and parks, and wayfinding.	$200k (Initial study)	$2 million	This is a comprehensive pedestrian program to plan for and implement pedestrian infill and enhancement projects, including the Pedestrian System Master Plan and safe routes to school program. This may include enhanced access to transit facilities in collaboration with Cascades East Transit.
P-6	Bicycle and Pedestrian Facility Maintenance Program	City program to improve snow and year-round debris clearing along key pedestrian and bicycle facilities.	$2 million (Equipment purchase)	$500k	Program will require coordination with partner agencies, including the Bend Parks and Recreation District, which own and maintain key elements of the walking and biking system within Bend.
P-7	Parking pricing and management in downtown Bend	Implement the 2017 Downtown Parking Plan.	$1 million (Equipment purchase)	TBD[7]	Program will be coordinated with other City of Bend parking efforts and may be consolidated within a citywide program, as appropriate.
P-8	Implementation of the Deschutes County ITS Plan, including traffic signal coordination improvements along signalized corridors, including freight and transit Signal Priority	Includes US 97 (mainline and ramp terminals), 3rd Street, 27th Street, Colorado/Arizona couplet, and US 20 (3rd Street and Greenwood) corridors.	N/A	$500k	Program will require coordination with partner agencies, especially ODOT, which maintains traffic signals within the city. Program cost estimates may be updated upon completion of the Deschutes County ITS Plan.
P-9	Transportation Equity Program	City program to address equity in funding and implementation of transportation projects.	N/A	$150k (1-2 FTE)	Program would fund staff and data collection to better identify and understand transportation needs and target projects/programs to improve transportation-related conditions for underserved populations. Would also implement outreach and engagement protocols to address equity issues in transportation infrastructure.

[6] Actual annual funding requirements will be based on further review by the City of Bend during the implementation phase of each program.

[7] Program costs may be covered by parking revenue

Figure 1. Near-term project map

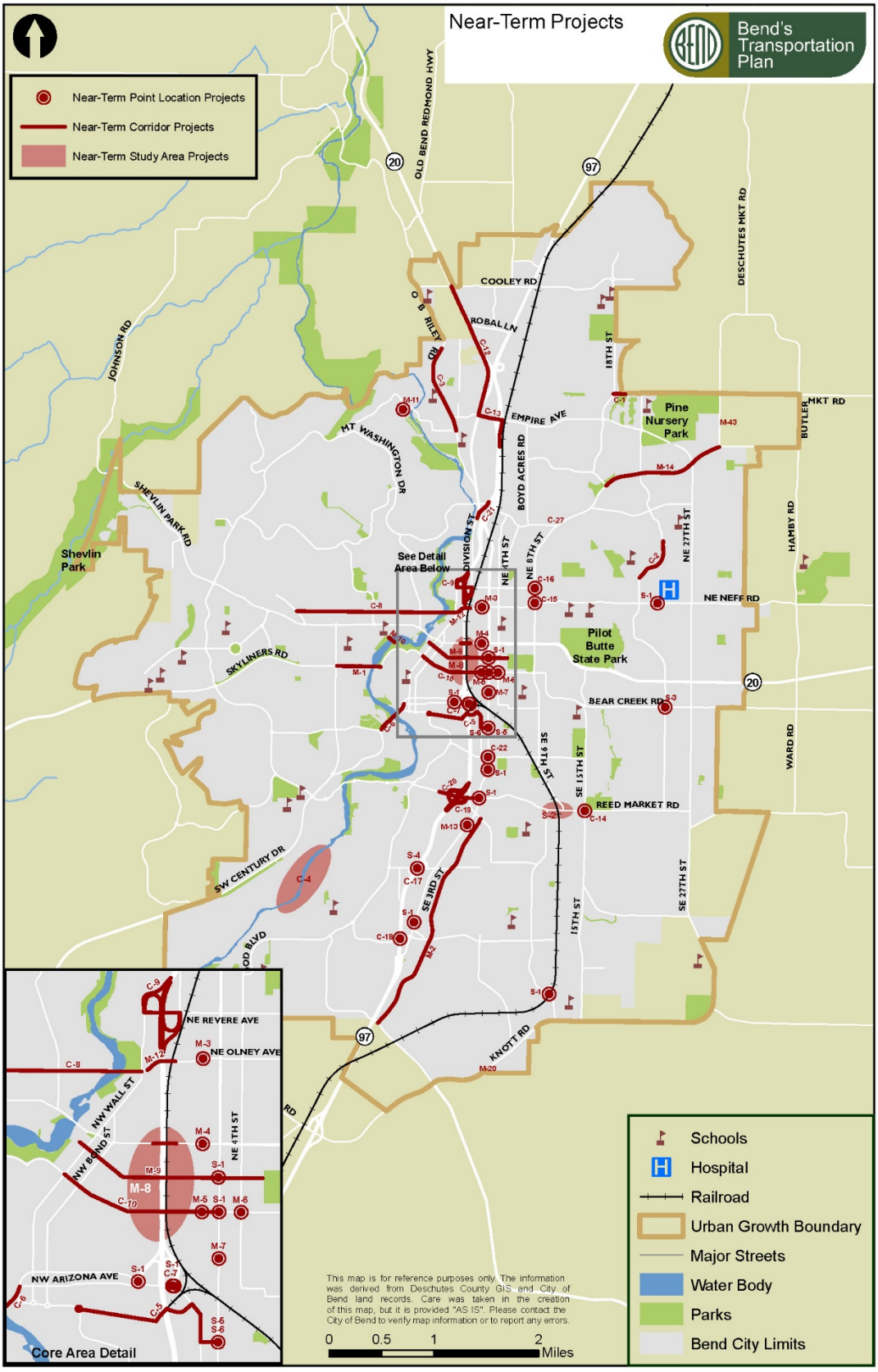


Table 3a: Near-term Investment Priorities

Project ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
C-1	Yeoman Road extension from 18th Street to western terminus	Includes two lane extension and bridge to cross canal.	Connectivity/Capacity	$5,000,000	$5,000,000
C-2	Purcell Boulevard extension From Full Moon Drive to Jackson Avenue	Includes two lane extension.	Connectivity/Capacity	$2,288,000	$2,288,000
C-3	O.B. Riley Road Arterial Corridor upgrade from Hardy Road south to Archie Briggs Road	Includes upgrade to three-lane arterial with curb, sidewalk, and bike lane improvements.	Connectivity/Capacity	$6,700,000	$6,700,000
C-4	Study for southern river crossing	Study to identify new river crossing location between Powers Road and Murphy Road, connecting Century Drive to US 97 or 3rd Street.	Connectivity/Capacity	$500,000	$500,000
C-5	Aune Road extension from Bond Street to 3rd Street	Two lane extension of Aune Road to connect 3rd Street and Bond Street. Includes intersection improvement at 3rd Street and a RAB at the intersection of Bond Street and Industrial Way.	Connectivity/Capacity	$13,500,000	$13,500,000
C-6	Colorado Avenue corridor capacity improvements from Simpson Avenue to Arizona Avenue	Includes incremental approach for Colorado Avenue widening, including right-of-way acquisition and monitoring for if/when widening is appropriate. Implement alternate mobility targets and identify smaller projects to incrementally improve mobility, reliability and safety. Includes intersection capacity improvements at Colorado Avenue/Simpson Avenue roundabout and Colorado Avenue/Industrial Way. Includes complete streets upgrade.	Connectivity/Capacity	$21,000,000	$21,000,000
C-7	Colorado Avenue/US 97 northbound ramp intersection safety and capacity improvements	Includes traffic signal or roundabout.	Connectivity/Capacity	$4,300,000	$430,000 (Contribution to ODOT project)
C-8	Portland Avenue corridor project from College Way to Deschutes River; assumes two intersection improvements	Multi-modal transportation facility and safety improvements to help with pedestrian, bicycle, and vehicular connectivity.	Connectivity/Capacity	$17,700,000	$17,700,000
C-9	Revere Avenue interchange improvements	Parkway coordination project to construct roadway upgrades, including modifications to the existing traffic signals and an improvement at the Wall Street/Revere Avenue intersection.	Connectivity/Capacity	$8,500,000	$8,500,000
C-10	Franklin Avenue corridor study	Conduct a corridor study to determine roadway and intersection improvement needs to serve all users.	Connectivity/Capacity	$200,000	$200,000
C-11	Study to evaluate congestion pricing	Add study to evaluate the feasibility of congestion pricing within the City of Bend. Study should consider effect of congestion pricing on demand management.	Connectivity/Capacity	$75,000	$75,000
C-12	US 20 southbound roadway widening from Cooley Road to Empire Avenue	US 20 southbound widening to two lanes.	Connectivity/Capacity	$4,800,000	$4,800,000 (Contribution to ODOT project)
C-13	Empire Avenue widening to five lanes near US 97 interchange, widening at northbound off ramp, and install traffic signal at southbound ramp	Widen Empire Avenue to five lanes from US 20 to US 97 northbound ramp and widen northbound off ramp to two lanes.	Connectivity/Capacity	$10,000,000	$1,000,000 (Contribution to ODOT project)
C-14	Reed Market Road/15th Street intersection safety and capacity improvements	Includes expanding the partial multi-lane roundabout to a full multi-lane roundabout.	Connectivity/Capacity	$1,100,000	$1,100,000

Project ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
C-15	Olney Avenue/8th Street intersection improvement	Improve intersection capacity.	Connectivity/Capacity	$3,700,000	$3,700,000
C-16	Revere Avenue/8th Street intersection improvement	Improve intersection capacity.	Connectivity/Capacity	$3,700,000	$3,700,000
C-17	Powers Road/US 97 preliminary engineering and ROW acquisition for interchange	May include interchange or overcrossing, pending outcome of the Parkway Study.	Connectivity/Capacity	$6,500,000	$650,000 (Contribution to ODOT project)
C-18	US 97 northbound on ramp and southbound off ramp at Murphy Road	Construct northbound on ramp and southbound off ramp at Murphy Road.	Connectivity/Capacity	$10,000,000	$10,000,000 (Contribution to ODOT project)
C-19	Reed Market Road/US 97 interchange improvement study	Study at Reed Market Road/US 97 interchange.	Connectivity/Capacity	$500,000	$50,000 (Contribution to ODOT project)
C-20	Construct Reed Market Road/US 97 interchange improvement	Construct improvement.	Connectivity/Capacity	$10,000,000	$1,000,000 (Contribution to ODOT project)
C-21	Butler Market Road/US 20/US 97 Improvement.	Improve connectivity, functionality, and safety. Consider addition of frontage roads.	Connectivity/Capacity	$6,180,000	$3,090,000 (Contribution to ODOT project)
C-22	3rd Street/Wilson Avenue intersection improvement	Improve intersection capacity and safety.	Connectivity/Capacity	$5,000,000	$5,000,000
T-1	East-west high-capacity transit (to be completed with T-3)	Includes HCT transit service connecting key east-west destinations (to be coordinated with CET). Includes improved transit connections from neighborhoods to HCT stops.	Transit	$2,000,000	$2,000,000
T-2	North-south high-capacity transit (to be completed with T-3)	Includes HCT transit service connecting key north-south destinations (to be coordinated with CET). Includes improved transit connections from neighborhoods to HCT stops.	Transit	$2,000,000	$2,000,000
T-3	Mobility hubs (to be completed with T-1 & T-2)	Citywide implementation of mobility hubs in coordination CET and HTC routes. Assumes up to five hubs, including consideration of Hawthorne Station (owned by CET).	Transit	$7,500,000	$7,500,000
S-1	Citywide safety improvements	Includes 3rd Street/Hawthorne Avenue, 3rd Street/COID Canal, 3rd Street/Pinebrook Boulevard, Brosterhous Road/railroad bridge, and Colorado Avenue/US 97 improvements.	Safety	$1,000,000	$1,000,000
S-2	Study of crossing solutions to at-grade railroad crossing near Reed Market Road	Study the cost and feasibility of relocating the BNSF switchyards compared to a Reed Market Road overcrossing of the railroad.	Safety	$200,000	$200,000
S-3	Pettigrew Road/Bear Creek Road long term safety improvement	Construct single lane roundabout.	Safety	$3,700,000	$3,700,000
S-4	US 97/Powers Road interim improvements identified by TSAP	Includes enhanced pedestrian crossings and exit ramp widening.[8]	Safety	$100,000	$100,000

[8] Through ARTS funding is allocated for crosswalk treatments and illumination at US 97/Powers. The City is responsible for the cost of exit ramps. The cost estimate reflects the exit ramps only.

Project ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
S-5	3rd Street/Miller Avenue intersection improvements and 3rd Street modifications study (Phase 1)	Study of intersection improvements and 3rd Street modifications.	Safety	$100,000	$100,000
S-6	3rd Street/Miller Avenue intersection improvements and 3rd Street modifications implementation (Phase 2)	Construct intersection improvements and 3rd Street modifications.	Safety	$3,100,000	$3,100,000
M-1	Galveston Avenue corridor improvements	Multi-modal transportation facility improvements from 14th Street to Riverside Boulevard to help with pedestrian, bicycle, and vehicular connectivity in Galveston Avenue corridor. City is currently completing design effort for this project.	Pedestrian/Bicycle	$3,900,000	$3,900,000
M-2	Parrell Road Urban Upgrade from China Hat Road to Brosterhous Road	Construct complete street upgrades and reconstruct roadway from China Hat Road to Brosterhous Road including a roundabout at Chase Road and Powers Road (upon completion of Chase Road extension).	Pedestrian/Bicycle	$29,100,000	$29,100,000
M-3	Olney Avenue/2nd Street intersection improvement	Pedestrian/bicycle crossing improvement.	Pedestrian/Bicycle	$210,000	$210,000
M-4	Greenwood Avenue/2nd Street intersection improvement	Pedestrian/bicycle crossing improvement.	Pedestrian/Bicycle	$210,000	$210,000
M-5	Franklin Avenue/2nd Street intersection improvement	Pedestrian/bicycle crossing improvement.	Pedestrian/Bicycle	$210,000	$210,000
M-6	Franklin Avenue/4th Street intersection improvement	Pedestrian/bicycle crossing improvement.	Pedestrian/Bicycle	$210,000	$210,000
M-7	Clay Avenue/3rd Street intersection improvement	Pedestrian/bicycle crossing improvement.	Pedestrian/Bicycle	$210,000	$210,000
M-8	Midtown Bicycle & Pedestrian Crossing Study	Conduct a study to identify the timing, feasibility, and needs associated with the Midtown Crossing projects including the Greenwood Avenue undercrossing, Franklin Avenue undercrossing, and Hawthorne Avenue overcrossing.	Pedestrian/Bicycle	$500,000	$500,000
M-9	**Midtown Bicycle & Pedestrian Crossings** Greenwood Undercrossing Sidewalk Widening Hawthorne Parkway Overcrossing Franklin Avenue Underpass	Widen Parkway undercrossing to include improved multimodal facilities. Close sidewalk gap along Hawthorne and create a grade-separated footbridge over BNSF RR and Hwy 97. Shared use path adjacent to roadway: Widen sidewalk paths under RR and Hwy 97 to modernize design for roadside safety.	Pedestrian/Bicycle	$24,000,000 (Assumes one complete crossing improvement and interim improvements to two other crossings)	$24,000,000
M-10	Improve Drake Park pedestrian bridge across the Deschutes River	Evaluate and repair/replace bridge to accommodate pedestrian and bicycle traffic.	Pedestrian/Bicycle	$1,275,000	$1,275,000
M-11	Archie Briggs Road trail crossing improvement design	Design to improve pedestrian crossing at the Deschutes River Trail crossing of Archie Briggs Road.	Pedestrian/Bicycle	$500,000	$500,000
M-12	Olney Avenue protected bicycle lanes and Parkway undercrossing	Provide protected bicycle lanes on Olney Avenue at Parkway undercrossing.	Pedestrian/Bicycle	$1,820,000	$1,820,000

Project ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
M-13	3rd Street canal crossing just south of 3rd Street/Brosterhous Road	Construct pedestrian facilities on 3rd Street across the canal bridge.	Pedestrian/Bicycle	$980,000	$980,000
M-14	Butler Market Road Sidewalk Improvements	Fill in sidewalk gaps on Butler Market Road between Brinson Boulevard to Deschutes Market Road Project will be coordinated with private partnerships and current CIP projects to complete infill.	Pedestrian/Bicycle	$3,100,000	$3,100,000
Q-1	Existing failed roadway reconstruction project	Reconstruction up to $25 million in identified roadway reconstruction needs.	Reconstruction	$25,000,000	$25,000,000
		Near-Term Total		**$252,168,000**	**$220,908,000**
		Key Route Projects (Listed in Table 5b):			**$24,139,000**
		Subtotal			**$245,047,000**
		Estimated Administrative Costs		***~12% of Subtotal***	***$29,406,000***
		Total			***$274,453,000***

TSDC – Project is on current Transportation System Development Charge Project List (TSDC) and eligible for existing TSDC revenue

Core Area Urban Renewal Area – Project is within possible Core Area Urban Renewal Area and may be eligible for future funding from that area.

Murphy Crossing or Juniper Ridge Urban Renewal Area – Project is within existing urban renewal area and may be eligible for funding from that area.

TSDC and Urban Renewal Area – Project is on the current Transportation System Development Charge Project List and in one existing or proposed Urban Renewal Area.

Table 3b: Key Walking & Biking Routes & Associated Capital Improvement Projects

Key Routes & Projects	Project Extents	Facility Type & Description	Cost Projection
ROUTE 1: Juniper Ridge to SE Elbow: Route runs north-south through the central portion of Bend connecting SE 15th Shared Use Path, 6th St Neighborhood Greenway, Boyd Acres Rd Shared Use Path			
R1-A	SE 9th St: Wilson Ave to Reed Market Rd	Shared use path adjacent to roadway: Close sidewalk gap and create low-stress bikeway.	$1,155,000
R1-B	SE 9th St: Wilson Ave to Glenwood Ave	Buffered bike lane: Re-stripe roadway to include buffered bike lanes when roadway is repaved.	$3,000
R1-C	NE Boyd Acres Rd: Butler Market Rd to Empire Ave	Shared use path adjacent to roadway: Close sidewalk gap and create low-stress bikeway.	$1,884,000
R1-D	SE 15th Street: Reed Mkt Rd to 300’ south of King Hezekiah	Shared use path adjacent to roadway: Convert an existing curb-tight sidewalk to a separated shared use path.	$1,185,000
ROUTE 2: NW Crossing to new Affordable Housing: Route runs east-west connecting Skyliners Rd, Franklin Ave and Bear Creek Rd			
R2-A	NW Franklin Ave: Harriman Ave to RR undercrossing	Improve transition at Hill St: Project would manage the conflict between right turns and crosswalk to sidewalk under RR. Crosswalk: Create safe crossing of Franklin at Harriman.	$176,000
R2-B	Franklin Ave Underpass: Hill St to 1st St	Shared use path adjacent to roadway: Widen sidewalk paths under RR and Hwy 97 to modernize design for roadside safety.	Cost assumed as part of “Midtown Bicycle & Pedestrian Crossings” project
R2-C	Franklin Ave: 1st St to 5th St	Buffered bike lane: Re-stripe roadway to include buffered bike lane westbound; includes crosswalks at 2nd St & 4th St and signal timing enhancements at 3rd St.	$164,000
R2-D	Bear Creek SRTS: Larkspur Trail to Coyner Trail	Trail: Close sidewalk gap and create a connection between Coyner and Larkspur Trail.	$385,000
R2-E	Bear Creek Rd: Cessna Ave to east UGB	Shared use path adjacent to roadway: Close sidewalk gap and create low-stress bikeway extending to 170 new affordable housing units.	$2,700,000
ROUTE 3: Shevlin Park to Big Sky Park: Route runs east-west connecting Shevlin Park Rd, Portland Ave, Olney Ave, and Neff Rd			
R3-A	Norton Ave: NE 6th St to NE 12th St	Neighborhood greenway: Create a low-stress bikeway on NE Norton Ave (SRTS3).	$196,000

R3-B	Hillside Trail: Connects NE 12th to Neff Rd	Hillside path: Close sidewalk gap and create a switchback shared use path (SRTS); includes school zone enhancements.	$241,000
R3-C	Neff Rd: NE 12th to Big Sky Park	Shared use path adjacent to roadway: Close sidewalk gaps and create a low-stress bikeway.	$3,634,000
R3-D	Deschutes River Footbridge: Drake Park	Upgrade footbridge: Accessibility upgrades and widen to reduce user conflicts.	Cost captured in M-10
R3-E	Olney Avenue: Wall Street to railroad	Shared use path adjacent to roadway: close sidewalk gap over railroad and remove existing barrier to east-west bicycle connectivity and create right-turn hook crash countermeasure.	$421,000 Onley Parkway Undercrossing Improvement costs captured in M-14
Route 4: West UGB to Portland Ave: Route runs north-south connecting Haul Rd Trail to 15th St Neighborhood Greenway			
R4-A	NW 15th St: Lexington Ave to Milwaukie Ave	Hillside path: Close sidewalk gap and create a hillside switchback shared use path within the 15th St neighborhood greenway.	$110,000
R4-B	NW 14th St: Ogden Ave to Portland Ave	Hillside path: Close sidewalk gap and create a hillside switchback shared use path within 14th St right-of-way to connect route to Portland Ave.	$110,000
Route 5: Route runs along Butler Market Rd			
R5-A	Butler Market Rd: Brinson Blvd to NE 6th St	Shared use path adjacent to roadway: Close sidewalk gap along both sides of Butler Market Rd and create low-stress bikeway.	$1,962,000
Route 6: Hawthorne Overcrossing: Core Area connectivity			
R6-A	Hawthorne Overcrossing Bridge: NE 1st St to NE 5th St	Grade separated overpass: Close sidewalk gap along Hawthorne and create a grade-separated footbridge over BNSF RR and Hwy 97.	Cost assumed as part of “Midtown Bicycle & Pedestrian Crossings” project
Route 7: 3rd St at RR to Connect KorPine to 3rd St			
R7-A	3rd St	Crosswalk: Create a safe crossing of 3rd St between BNSF RR and Wilson Ave using RRFB5 and safety islands.	$215,000
R7-B	3rd St	Crosswalk: Create a safe crossing of 3rd St between BNSF RR and Franklin Ave using RRFB and safety islands.	$215,000
R-7C	3rd St	3rd Street Underpass: Near Term Enhancements to sidewalk.	$210,000

Route 8: 27th St: Route runs north-south connecting neighborhoods to services and transit			
R8-A	27th St: Hwy 20 to Reed Mkt Rd	Shared use path adjacent to road: Close sidewalk gap along 27th Street and create a low-stress bikeway.	$4,815,000
Route 9: Route runs north-south parallel to 3rd Street			
R9-A	Parrell Rd: Murphy Rd to Brosterhous Rd	Shared use path adjacent to road: Close sidewalk gap along Parrell Rd and create a low-stress bikeway on both sides of the street.	Costs captured in M-2
Route 10: O.B. Riley Rd: Route runs north-south along O.B. Riley Road to Blakely Road			
R10-A	O.B. Riley Road & Blakeley Road: North of Cooley Road to Knott Road	Shared use path adjacent to roadway: Close sidewalk gaps and create a low-stress bikeway.	Cost captured in C-45, C-3, M-30. No further capital projects associated with Route 10
Route 11: Route runs along Murphy Road			
R11-A	Murphy Road: Powers Road to 15th Street	Shared use path adjacent to roadway: Close sidewalk gaps and create a low-stress bikeway.	Route on current CIP list
Route 12: Wilson Ave: Route runs east-west connecting neighborhoods to services and transit			
R12-A	Wilson Ave: 2nd Street to SE 9th Street	Shared use path adjacent to roadway: Close sidewalk gap along Wilson Avenue and create a low-stress bikeway.	$2,179,000
R12-B	Wilson Avenue: 9th to 15th Street	Shared use path adjacent to roadway: Create a low-stress bikeway to connect near SE neighborhoods to Old Mill and Deschutes River Trail.	$2,179,000

Figure 2. Mid-term project map

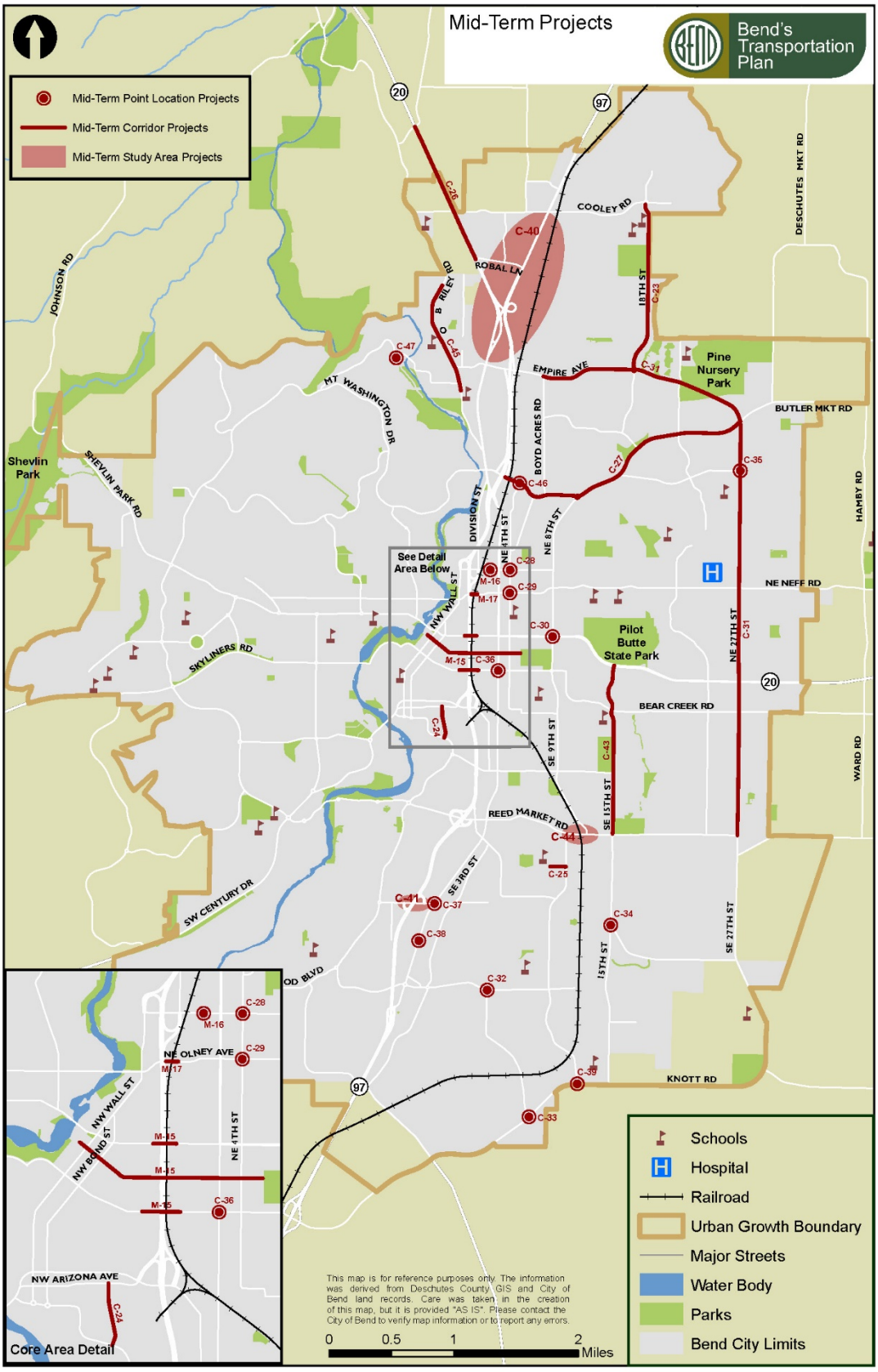


Table 4: Mid-term Investment Priorities

Project ID	Project	Description/ Location	Project Type	Total Cost	City Proportionate Cost
C-23	18th Street arterial corridor upgrade from Cooley Road to Butler Market Road	Includes upgrade to three lane arterial.	Connectivity/Capacity	$7,800,000	$7,800,000
C-24	Sisemore Street extension	Construct street extension from Arizona avenue to Bond Street.	Connectivity/Capacity	$2,400,000	$2,400,000
C-25	Brentwood Avenue extension	Extend a 2-lane collector from Whitetail Street to American Lane	Connectivity/Capacity	$2,300,000	$2,300,000
C-26	US 20 intersection safety and capacity improvements	Intersection improvement at US20/Robal Road and the roadways in the vicinity.	Connectivity/Capacity	$10,000,000	$1,000,000 (Contribution to ODOT project)
C-27	Butler Market Road intersection safety and capacity improvements	From US 97 to 27th Street. Includes roundabouts or traffic signals at 4th Street, Brinson Boulevard, and Purcell Boulevard. Wells Acres Road roundabout is a separate project.	Connectivity/Capacity	$7,000,000	$7,000,000
C-28	Revere Avenue/4th Street intersection improvement	Improve intersection capacity.	Connectivity/Capacity	$3,700,000	$3,700,000
C-29	Olney Avenue/4th Street intersection improvement	Improve intersection capacity.	Connectivity/Capacity	$3,700,000	$3,700,000
C-30	Greenwood/8th Street intersection improvement	Pedestrian/Bicycle Crossing Improvement	Connectivity/Capacity	$2,100,000	$2,100,000
C-31	Incremental mobility, reliability, and safety improvements to Empire Boulevard/27th Street Corridor from Boyd Acres Road to Reed Market Road	Includes incremental approach for Empire Boulevard/27th Street widening, including right-of-way acquisition and monitoring for if/when widening is appropriate. Implement alternate mobility targets and identify smaller projects to incrementally improve mobility, reliability and safety. Includes complete streets upgrade.	Connectivity/Capacity	$41,800,000	$41,800,000
C-32	Country Club Road/Murphy Road intersection improvement	Improve intersection capacity and safety	Connectivity/Capacity	$3,700,000	$3,700,000
C-33	Country Club Road/Knott Road intersection improvement	Improve intersection capacity and safety	Connectivity/Capacity	$3,700,000	$3,700,000
C-34	Ferguson Road/15th Street intersection improvement	Improve intersection capacity and safety	Connectivity/Capacity	$3,700,000	$3,700,000
C-35	NE 27th Street/Wells Acres Road intersection improvement	Improve intersection capacity and safety	Connectivity/Capacity	$3,700,000	$3,700,000
C-36	3rd Street/Franklin Avenue signal modification	Improve intersection capacity and safety	Connectivity/Capacity	$500,000	$500,000
C-37	3rd Street/Powers Road signal modification	Improve intersection capacity and safety	Connectivity/Capacity	$500,000	$500,000
C-38	3rd Street/Badger Road signal modification	Improve intersection capacity and safety	Connectivity/Capacity	$500,000	$500,000

Project ID	Project	Description/ Location	Project Type	Total Cost	City Proportionate Cost
C-39	Brosterhous Road/Knott Road intersection improvement	Improve intersection capacity and safety	Connectivity/Capacity	$3,700,000	$3,700,000
C-40	US 97 North parkway extension (Phase 2)	Includes remaining improvements in the US 97 Bend North Corridor Project FEIS after construction of initial phase.	Connectivity/Capacity	$30,000,000	$3,000,000 (Contribution to ODOT project)
C-41	Powers Road interchange	Grade separated interchange or overcrossing of US 97 (pending Parkway Study).	Connectivity/Capacity	$20,000,000	$2,000,000 (Contribution to ODOT project)
C-42	US 97 operational and safety management improvements (as identified in the Parkway Study) and associated City street improvements Phase 1 – Consider right-in, right-out turn restrictions or safety improvements Phase 2 – Implement ramp metering based on outcomes of Phase 1	Includes elements of the Parkway Study not currently defined in the project list, such as turn restrictions on and off the Parkway, improvements to implement ramp metering or other interchange improvements.	Connectivity/Capacity	Phase 1 - $20,000,000 Phase 2 – 15,000,000	Phase 1 - $2,000,000 Phase 2 - $1,500,000 (Contribution to ODOT project)
C-43	15th Street corridor safety and capacity improvements	From US 20 to Reed Market Road. Includes roundabout at Wilson Avenue.	Connectivity/Capacity	$16,800,000	$16,800,000
C-44	Reed Market rail crossing implementation	Project to implement outcomes of Reed Market at-grade rail study. Implementation costs could vary significantly based on study findings.	Connectivity/Capacity	$25,000,000	$25,000,000
C-45	O.B. Riley Road/Empire Road intersection safety and capacity improvement	Intersection Improvement.	Connectivity/Capacity	$1,900,000	$1,900,000
C-46	4th Street/Butler Market Road intersection improvement	Improve intersection capacity and safety.	Connectivity/Capacity	$3,700,000	$3,700,000
C-47	Archie Briggs Road bridge replacement	Replace Archie Briggs Road bridge.	Connectivity/Capacity	$6,000,000	$6,000,000
M-15	**Midtown Bicycle & Pedestrian Crossings** Greenwood Undercrossing Sidewalk Widening Hawthorne Parkway Overcrossing Franklin Ave. Underpass	Widen Parkway undercrossing to include improved multimodal facilities. Close sidewalk gap along Hawthorne and create a grade-separated footbridge over BNSF RR and Hwy 97. Shared use path adjacent to roadway: Widen sidewalk paths under RR and Hwy 97 to modernize design for roadside safety.	Pedestrian/Bicycle	$12,000,000 (Assumes funding to address remaining crossing improvements needed)	$12,000,000

Project ID	Project	Description/ Location	Project Type	Total Cost	City Proportionate Cost
M-16	Revere Avenue/2nd Street Intersection improvement	Pedestrian/Bicycle Crossing Improvement.	Pedestrian/Bicycle	$210,000	$210,000
M-17	Olney Avenue Railroad Crossing Improvements	Upgrade the railroad crossing to include dedicated sidewalks and bike lanes.	Pedestrian/Bicycle	$500,000	$500,000
Q-2	Existing Failed Roadway Reconstruction Project	Reconstruction of up to $16 million in identified roadway reconstruction needs.	Reconstruction	$16,000,000	$16,000,000
		Mid-Term Total		**$267,910,000**	**$182,410,000**
		Estimated Administrative Costs		***~12% of Mid-term***	***$21,889,000***
		Total			***$204,299,000***

TSDC – Project is on current Transportation System Development Charge Project List (TSDC) and eligible for existing TSDC revenue

Core Area Urban Renewal Area – Project is within possible Core Area Urban Renewal Area and may be eligible for future funding from that area.

Murphy Crossing or Juniper Ridge Urban Renewal Area – Project is within existing urban renewal area and may be eligible for funding from that area.

TSDC and Urban Renewal Area – Project is on the current Transportation System Development Charge Project List and in one existing or proposed Urban Renewal Area.

Figure 3. Long-term project map

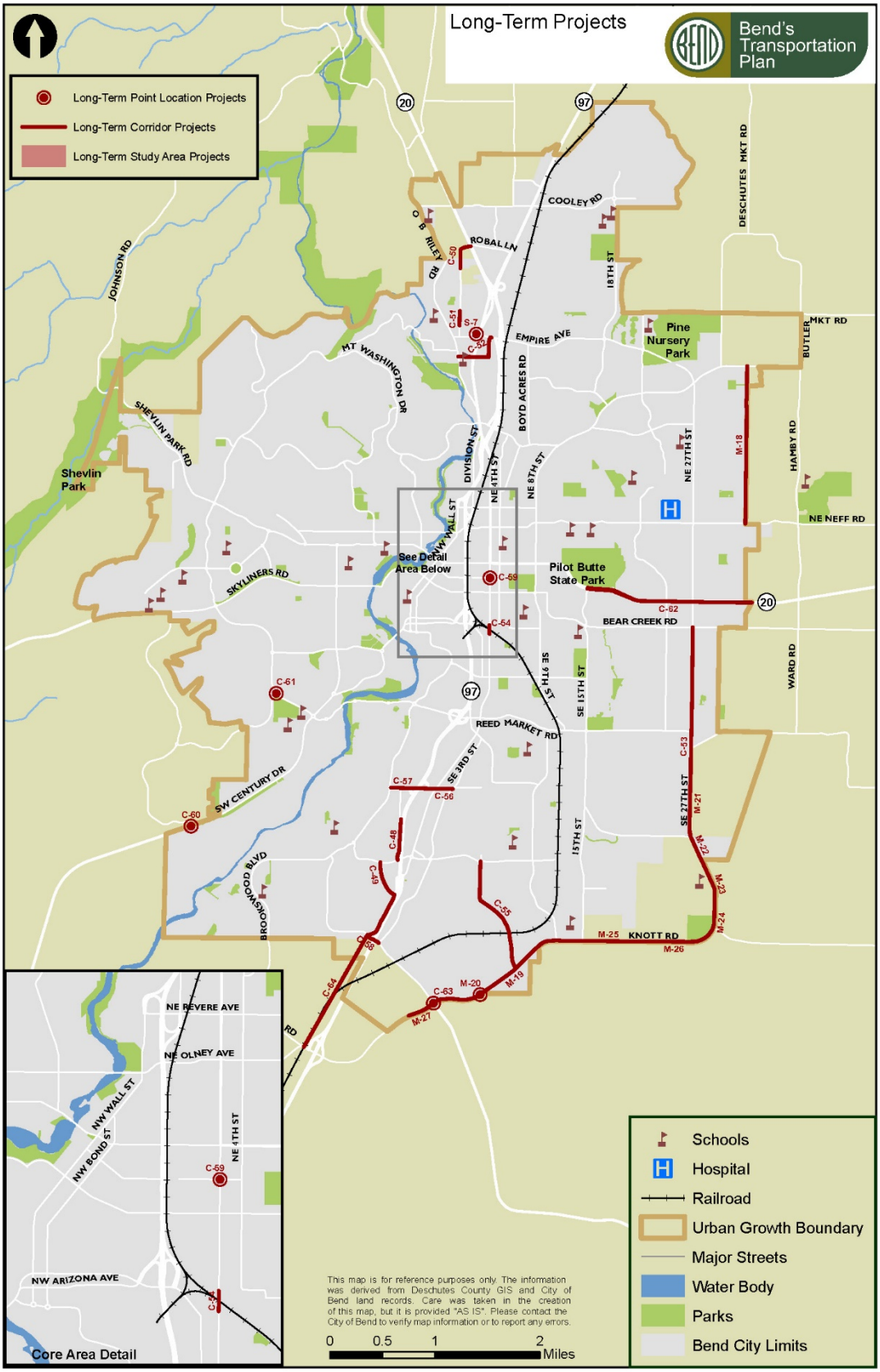


Table 5: Long-termM-3 Investment Priorities

Project ID	Project	Description/ Location	Project Type	Total Cost	City Proportionate Cost
C-48	New North Frontage Road near Murphy Road	Improvements to be determined.	Connectivity/Capacity	$5,400,000	$5,400,000
C-49	New South Frontage Road near Murphy Road	Improvements to be determined.	Connectivity/Capacity	$13,800,000	$13,800,000
C-50	Britta Street extension (north section)	Includes two lane extension from Hardy Road to Robal Road.	Connectivity/Capacity	$2,700,000	$2,700,000
C-51	Britta Street extension (south section)	Includes two lane extension from Halfway Road to Ellie Lane.	Connectivity/Capacity	$1,000,000	$1,000,000
C-52	Mervin Sampels Road / Sherman Road Collector Corridor upgrade	Includes upgrade to two lane collector roadway and a traffic signal at US 20 from O.B. Riley Road to Empire Boulevard.	Connectivity/Capacity	$6,100,000	$6,100,000
C-53	27th Street Arterial Corridor upgrade from Bear Creek Road to Ferguson Road	Includes upgrade to three lane arterial and intersection improvements at Ferguson Road	Connectivity/Capacity	$8,600,000	$8,600,000
C-54	3rd Street railroad undercrossing widening	Widen 3rd Street to 4-lanes under the railroad, including complete street design from Emerson Avenue to Miller Avenue.	Connectivity/Capacity	$13,700,000	$13,700,000
C-55	Country Club Road Urban Upgrade from Knott Road to Murphy Road	Upgrade roadway to urban standards including pedestrian/bicycle improvements	Connectivity/Capacity	$10,900,000	$10,900,000
C-56	Powers Road urban upgrades from 3rd Street to Parrell Road	Construct complete street upgrades and reconstruct roadway	Connectivity/Capacity	$1,000,000	$1,000,000
C-57	Powers Road urban upgrades from Brookswood Boulevard to 3rd Street	Construct complete street upgrades and reconstruct roadway	Connectivity/Capacity	$4,200,000	$4,200,000
C-58	Ponderosa Street / China Hat Road overcrossing	Vehicle, pedestrian and bicycle access over US 97 at Ponderosa Street/China Hat Road. Includes intersection improvement at Parrell Road/China Hat Road.	Connectivity/Capacity	$15,000,000	$15,000,000 (Contribution to ODOT project)
C-59	Hawthorne Avenue/3rd Street Intersection improvement	Improve intersection capacity.	Connectivity/Capacity	$3,800,000	$3,800,000
C-60	Century Drive/Skyline Ranch Road roundabout	Address existing and future safety and operational needs at intersection; specific improvements to be evaluated in next phase of work.	Connectivity/Capacity	$3,700,000	$3,700,000
C-61	Mt. Washington Drive/Metolius Drive roundabout	Address existing and future safety and operational needs at intersection; specific improvements to be evaluated in next phase of work.	Connectivity/Capacity	$3,700,000	$3,700,000
C-62	US 20 Operational Improvements from 15th Street to east UGB	Identify and construct improvements that enhance mobility along the corridor, including at the US 20/NE 27th Street intersection	Connectivity/Capacity	$10,000,000	$1,000,000 (Contribution to ODOT project)
C-63	China Hat Road/Knott Road Intersection Improvement	Improve intersection capacity and safety	Connectivity/Capacity	$3,700,000	$3,700,000
C-64	US 97 Frontage Road	Construct frontage road from Ponderosa Street to Baker Road.	Connectivity/Capacity	$6,550,000	$3,275,000 (Contribution to ODOT project)
S-7	Empire Avenue/Jamison Street Turning Restrictions	Restrict turning movements on the Jamison approach to right in, right out	Safety	$107,000	$107,000

Project ID	Project	Description/ Location	Project Type	Total Cost	City Proportionate Cost
M-18	Eagle Road Functional Urban Upgrade	Classify roadway as Minor Collector from Neff Road to Butler Market Road and construct complete street upgrades.	Pedestrian/Bicycle	$14,500,000	$14,500,000
M-19	Knott Road Urban Upgrade from China Hat Road to 15th Street	Upgrade roadway to urban standards including pedestrian/bicycle improvements	Pedestrian/Bicycle	$15,600,000	$15,600,000
M-20	Knott Canal Crossing	Widen the Knott Road Canal to accommodate multimodal facilities	Pedestrian/Bicycle	$700,000	$700,000
M-21	SE 27th Street rural road upgrade from Stevens Road to Ferguson Road	Includes curb, sidewalk, and bike lane on east side of 27th Street.	Pedestrian/Bicycle	$1,300,000	$1,300,000
M-22	SE 27th Street rural road upgrade from Ferguson Road to Diamondback Lane	Includes curb and sidewalk on east side, bike lanes for both directions on 27th Street.	Pedestrian/Bicycle	$600,000	$600,000
M-23	SE 27th Street rural road upgrade from Diamondback Lane to access road	Includes curb and sidewalk on east side of 27th Street.	Pedestrian/Bicycle	$100,000	$100,000
M-24	SE 27th Street rural road upgrade from access road to Knott Road	Includes curbs and sidewalks on both sides of 27th Street.	Pedestrian/Bicycle	$1,300,000	$1,300,000
M-25	Knott Road rural road upgrade from 15th Street to Raintree Court	Includes curbs, sidewalks and bike lanes for both directions on Knott Road.	Pedestrian/Bicycle	$500,000	$500,000
M-26	Knott Road rural road upgrade from Raintree Court to SE 27th Street	Includes curbs, sidewalks and bike lanes for both directions on Knott Road.	Pedestrian/Bicycle	$5,500,000	$5,500,000
M-27	Knott Road rural road upgrade south of China Hat Road	Includes curb and sidewalk on north side of Knott Road.	Pedestrian/Bicycle	$300,000	$300,000
Q-3	Existing Failed Roadway Reconstruction Project	Reconstruction up to $15 million in identified roadway reconstruction needs.	Reconstruction	$15,000,000	$15,000,000
		Long-Term Total		**$169,357,000**	**$157,082,000**
		Estimated Administrative Costs		***~12% of Long-term***	***$18,850,000***
		Total			***$175,932,000***

TSDC – Project is on current Transportation System Development Charge Project List (TSDC) and eligible for existing TSDC revenue

Core Area Urban Renewal Area – Project is within possible Core Area Urban Renewal Area and may be eligible for future funding from that area.

Murphy Crossing or Juniper Ridge Urban Renewal Area – Project is within existing urban renewal area and may be eligible for funding from that area.

TSDC and Urban Renewal Area – Project is on the current Transportation System Development Charge Project List and in one existing or proposed Urban Renewal Area.

Figure 4. Expansion area driven project map

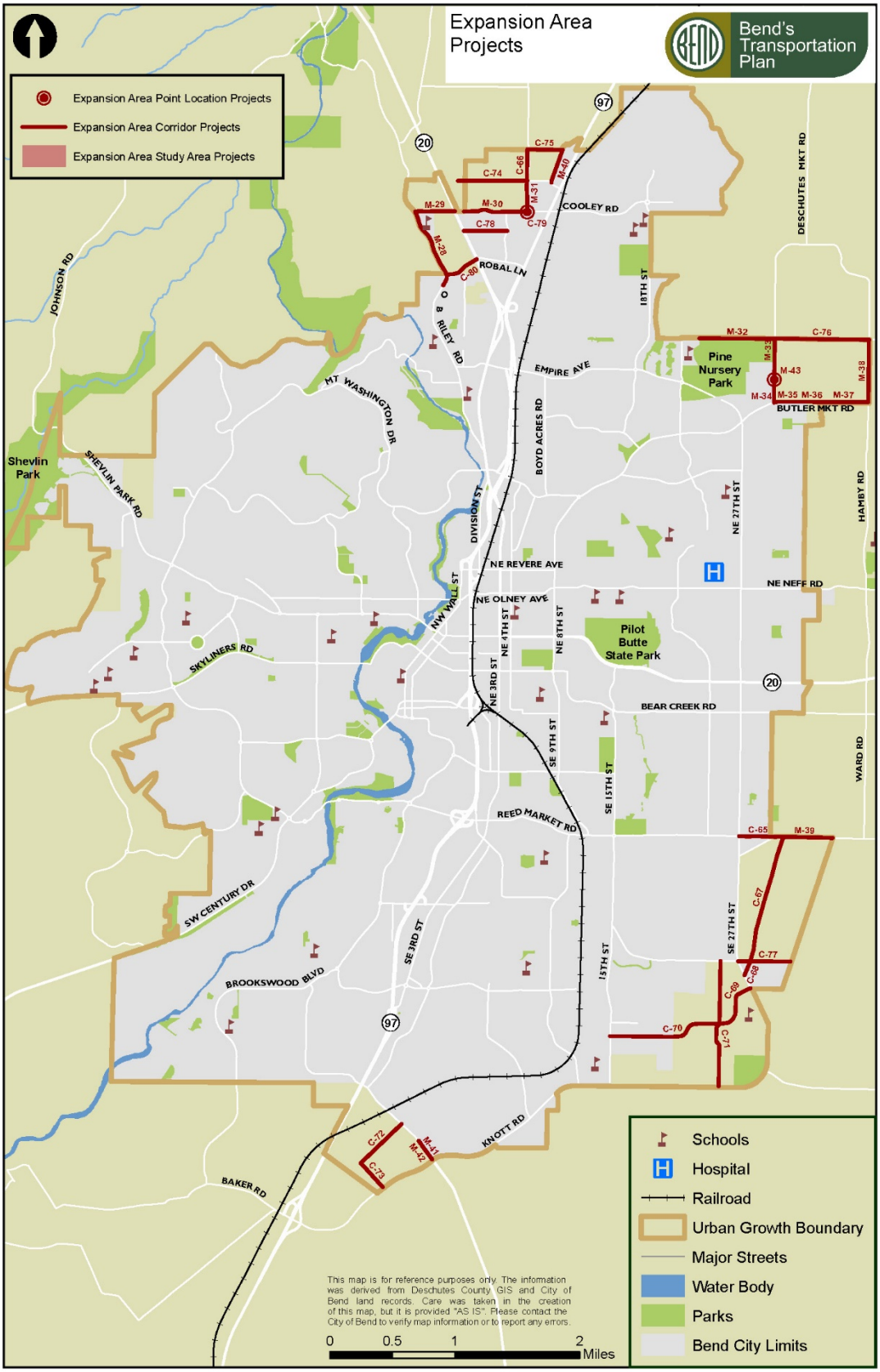


Table 6: Expansion Area Driven Projects

Project ID	Project	Description/ Location	Project Type	Total Cost	City Proportionate Cost
C-65	Stevens Road realignment	Includes connection to Reed Market Road and bridge to cross canal	Connectivity/Capacity	$4,700,000	$4,700,000
C-66	Hunnell Road extension	Construct a two-lane collector roadway in the Triangle UGB expansion area.	Connectivity/Capacity	$2,400,000	$2,400,000
C-67	New Road in DSL UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$9,500,000	$9,500,000
C-68	New Road in DSL UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$1,100,000	$1,100,000
C-69	New Road in the Elbow UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$4,000,000	$4,000,000
C-70	New Road in the Elbow UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$10,200,000	$10,200,000
C-71	New Road in the Elbow UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$7,100,000	$7,100,000
C-72	New Road in the Thumb UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$4,300,000	$4,300,000
C-73	New Road in the Thumb UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$2,500,000	$2,500,000
C-74	Loco Road extension	Construct a two-lane collector.	Connectivity/Capacity	$5,300,000	$5,300,000
C-75	New Road in Triangle UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$2,500,000	$2,500,000
C-76	Yeoman Road extension from Deschutes Market Road to Hamehook Road	Construct a two-lane collector.	Connectivity/Capacity	$10,900,000	$10,900,000
C-77	New Road in DSL UGB expansion area	Construct a two-lane collector.	Connectivity/Capacity	$3,900,000	$3,900,000
C-78	Collector between US20 and Hunell Rd	Construct new collector between US 20 and Hunnell Road. Road would be south of Cooley road and north of Robal Road.	Connectivity/Capacity	$4,000,000	$4,000,000
C-79	Cooley Road/Hunnell Road Intersection Improvement	Add intersection improvement at Cooley/Hunnell to Cooley Road.	Connectivity/Capacity	$3,700,000	$3,700,000
C-80	Robal Road extension	Construct a new road segment of Robal Road between US 20 and O.B. Riley Road	Connectivity/Capacity	$2,900,000	$2,900,000
S-8	Projects of Regional Significance from Subarea Planning Efforts	Subarea planning efforts will identify infrastructure needs to serve Opportunity and Expansion Areas, which are key development areas for the City. Projects that result should be added to the 2040 project list as necessary.	Safety	TBD	TBD
M-28	O.B. Riley Road rural road upgrade from Hardy Rd to Cooley Rd	Includes curb and sidewalk on east side, bike lanes both directions.	Pedestrian/Bicycle	$2,400,000	$2,400,000
M-29	Cooley Road rural road upgrade from O.B. Riley Road to US 20	Includes curbs, sidewalks and bike lanes both directions.	Pedestrian/Bicycle	$1,300,000	$1,300,000
M-30	Cooley Road rural road upgrade from US 20 to Hunnell Road	Includes curb and sidewalk on north side, bike lanes both directions, and an intersection improvement at Cooley Road/Hunnell Road.	Pedestrian/Bicycle	$1,100,000	$1,100,000
M-31	Hunnell Road rural road upgrade from Cooley Road to Loco Road	Includes sidewalk on west side of Hunnell Road.	Pedestrian/Bicycle	$200,000	$200,000

Project ID	Project	Description/ Location	Project Type	Total Cost	City Proportionate Cost
M-32	Yeoman Road rural road upgrade from western terminus to Deschutes Market Road	Includes curbs, sidewalks and bike lanes both directions.	Pedestrian/Bicycle	$2,500,000	$2,500,000
M-33	Deschutes Market Road rural road upgrade from Yeoman Road to canal	Includes curb and sidewalk on east side, bike lanes both directions.	Pedestrian/Bicycle	$500,000	$500,000
M-34	Deschutes Market Road rural road upgrade from canal to Butler Market Road	Includes curb and sidewalk on east side of Deschutes Market Road.	Pedestrian/Bicycle	$400,000	$400,000
M-35	Butler Market Road rural road upgrade from Deschutes Market Road to Eagle Road	Includes curb and sidewalk on north side of Butler Market Road.	Pedestrian/Bicycle	$300,000	$300,000
M-36	Butler Market Road rural road upgrade from Eagle Road to Clyde Lane	Includes curbs, sidewalks and bike lanes for both directions on Butler Market Road.	Pedestrian/Bicycle	$400,000	$400,000
M-37	Butler Market Road rural road upgrade from Clyde Lane to Hamby Road	Includes curb and sidewalk on north side, bike lanes for both directions on Butler Market Road.	Pedestrian/Bicycle	$1,100,000	$1,100,000
M-38	Butler Market Road rural road upgrade from Hamby Road to Hamehook Road	Includes curbs and sidewalks on both sides of Butler Market Road.	Pedestrian/Bicycle	$1,100,000	$1,100,000
M-39	Stevens Road rural road upgrade from Stevens realignment to Bend UGB boundary	Includes curbs, sidewalks and bike lanes for both directions of Stevens Road.	Pedestrian/Bicycle	$1,900,000	$1,900,000
M-40	Clausen Drive rural road upgrade from Loco Road to northern terminus	Includes sidewalk on west side of Clausen Drive.	Pedestrian/Bicycle	$200,000	$200,000
M-41	China Hat Road rural road upgrade north of Knott Road	Includes sidewalks on both sides of China Hat Road.	Pedestrian/Bicycle	$200,000	$200,000
M-42	China Hat Road canal bridge widening	Widen bridge to include sidewalk on both sides of China Hat Road.	Pedestrian/Bicycle	$400,000	$400,000
M-43	Deschutes Market Road canal bridge widening	Widen bridge to include sidewalk on west side of Deschutes Market Road.	Pedestrian/Bicycle	$400,000	$400,000
		Expansion Area Driven Total		**$93,400,000**	**$93,400,000**

TSDC – Project is on current Transportation System Development Charge Project List (TSDC) and eligible for existing TSDC revenue.

Core Area Urban Renewal Area – Project is within possible Core Area Urban Renewal Area and may be eligible for future funding from that area.

Murphy Crossing or Juniper Ridge Urban Renewal Area – Project is within existing urban renewal area and may be eligible for funding from that area.

TSDC and Urban Renewal Area – Project is on the current Transportation System Development Charge Project List and in one existing or proposed Urban Renewal Area.

Agenda Item No. 12:
Draft Chapter 6

Bend's Transportation Plan

DRAFT Chapter 6: Transportation Funding Strategy

This chapter provides direction about how to fund the projects identified in the BTP, using a range of existing and new sources. This chapter includes the following:

- Existing transportation funding sources, including estimated revenue expectations and revenue commitments.
- Summary of rough cost estimates for the transportation facilities and major improvements, organized by general estimate of the timing for planned facilities, and a summary of the estimated costs associated with operations, maintenance, and on-going programs (collectively referred to as OM&P).
- A discussion of the City's existing funding mechanisms and the ability of these and possible new mechanisms to fund the development of each transportation facility and major improvement, and the estimated funding gap based on expected revenue from existing sources.
- A preferred set of new and expandable funding tools to address the funding gap.

A note about the economic conditions at the time of adoption, summer 2020:
The outbreak of the novel coronavirus (COVID-19), declared a global pandemic by the World Health Organization on March 11, 2020, has caused heightened uncertainty in local, regional, national, and global market conditions. Oregon Governor Kate Brown declared a state of emergency in Oregon on March 8, 2020, and President Donald Trump declared a national state of emergency on March 13, 2020. The Oregon emergency declaration and subsequent orders shut down and significantly altered substantial portions of the state economy in an attempt to slow the spread of COVID-19 in Oregon, protect the health and lives of Oregonians, particularly those at highest risk, and avoid overwhelming local and regional healthcare capacity. These orders significantly altered or completely shut down significant portions of the state economy. The resulting economic impact has been unprecedented, with uncertain and fluid short and long term consequences.

The modeling supporting this final document used conservative growth and revenue estimates in anticipation of potential future economic downturns, with the expectation that, over the 20 year life of the plan, revenues would follow economic cycles. The Funding Plan is designed to be implemented flexibly over the 20 year life of the plan, in response to changing financial and economic conditions, including changes in revenue.

Legal Framework

This chapter addresses requirements for the Transportation Financing Plan, OAR 660-012-0040, under the Transportation Planning Rule. Specifically, it responds to the requirement for transportation system plans to identify the City's existing funding mechanisms and describe how these, along with possible new funding sources, can fund the projects identified in the plan.

In addition to the legal requirements that guide this chapter, this chapter is supported by the lists of transportation facilities and major improvements planned through 2040, the estimate of costs and timing of those projects (Chapter 4), and the City's funding policies (Chapter 2).

Funding Analysis

Existing Funding

Summary of Existing Funding Mechanisms

The City of Bend currently collects revenue for transportation from federal, state, and local funding sources, including:

- **Surface Transportation Block Grant Program (STBG).** A major federal transportation program that provides flexible funds for transportation projects at the state and local level. Funds may be used to preserve and improve the conditions and performance of any Federal-aid highway, bridge, and tunnel projects; on any public road, pedestrian, and bicycle infrastructure; and on transit capital projects (including intercity bus terminals). The City of Bend has historically allocated all STBG revenue to bringing the Pavement Condition Index to an acceptable level. As the City reaches its goal of improving pavement conditions, a portion of STBG revenue is expected to be allocated to capital projects (local street reconstruction).
- **State Highway Fund (SHF).** A state funding program, composed of several major funding sources: State Motor Vehicle Registration and Title Fees, Driver License Fees, State Motor Vehicle Fuel Taxes, and Weight-Mile Tax. SHF funds are apportioned to three jurisdictional levels in the following amounts: State (50%), Counties (30%), and Cities (20%). Funds must be spent on roads, including bikeways and walkways within the State-owned highway right-of-way. State funds can be used for both capital expenditures and OM&P of state roads. The City of Bend historically allocated all SHF funds to OM&P.
- **General Fund Subsidy.** Revenues that come from the City of Bend's discretionary General Fund resources. The allocation of these revenues to transportation and to specific transportation expenditures is determined by City Council each biennium through the budget process. Funding amounts fluctuate over time based on Council priorities and available revenues.
- **Water and Sewer Franchise Fees.** A charge on revenue generated by water and sewer franchises. The majority of revenues are currently used for transportation capital expenditures, but this funding allocation is determined by City Council through the biennial budget process.
- **Garbage Franchise Fees.** A charge on revenue generated by garbage waste franchises. The City of Bend has historically used these revenues for OM&P, but funding allocation is determined by an ordinance adopted by the City Council.

- **Transportation System Development Charges (TSDCs).** Fees collected when new development and some redevelopment occurs within the City. Revenues are used to fund growth-related capital improvements that are on the City's adopted TSDC project list, as prioritized by Council.
- **Urban Renewal.** A tool that diverts property tax revenues from growth in assessed value inside an urban renewal area (URA) for investment in eligible capital projects. Eligible projects must be located within the URA boundary, be identified in the URA plan, and contribute to the alleviation of blight within the URA. The City has two existing URAs, both of which have funding for transportation projects included in their project lists. However, revenues have been slow to accumulate, making the actual timing and amount of available funding uncertain.
- **Grants.** The City of Bend applies for and receives grants for specific transportation capital projects. Grants are not included in the funding forecasts in this chapter because they are too project-specific and uncertain to predict. However, project costs listed in this plan are the City's share of total costs; some projects (such as those on state highways) are assumed to receive state funding.
- **Other, or Miscellaneous, Tools.** Miscellaneous revenues allocated to capital expenditures and OM&P.

Existing Funding Revenue Projections and Commitments

The City's existing funding sources for capital projects are estimated to generate roughly $138 million in years 1-10 and approximately $151 million in years 11-20. However, some revenues from existing sources are already committed to paying debt obligations on transportation projects that have already been built and to projects in the City's existing, five-year Capital Improvements Program (2020-2024 CIP). All Water/Sewer Franchise Fee revenues are fully committed over the 20-year planning horizon to paying debt service on transportation projects. In the near-term (first 10 years), TSDC revenues are fully committed to debt service and the 2020-2024 CIP project list. In the mid- and long-term, a portion of TSDC revenue is committed to on-going debt payments.[1]

Table 1 summarizes the projected revenue and estimated existing commitments to show the approximate amount of funding from existing sources available to pay for new transportation facilities and major improvements (capital projects).

Table 1. Summary of Revenue from Existing Sources by Phasing Bucket, Available for Capital Expenditures after accounting for Funding Commitments (2018 dollars), FY Ending 2021–2040

	Near-Term (Years 1–10)	Mid- and Long-Term (Years 11–20)
Total Revenue from Existing Sources	$138,147,000	$150,977,000
Committed Revenue	($122,955,000)	($45,000,000)
Total Available for New Projects	**$15,192,000**	**$105,977,000**

Source: Calculations by ECONorthwest.

[1] Debt service obligations are estimated at a total of $4.5 million per year. TSDC revenue is assumed to pay the portion of the obligation that is not paid by Water/Sewer Franchise Fees.

Note: Values are in 2018 dollars and rounded to the thousand.

On average, the City's existing funding sources will generate approximately $12.5 million per year to fund OM&P. Existing OM&P obligations are largely on-going needs that will continue throughout the planning horizon, including pavement and right-of-way maintenance on the existing road system, street sweeping, snow removal and winter operations, etc. This means that existing funding for OM&P is fully committed to continuing the current OM&P activities.

Funding Gap: Project and Program Costs and Existing Sources

As shown in Table 2, the projected available revenue from existing funding sources will not be adequate to fund the capital projects identified in this plan. The total funding gap is approximately $624 million over the 20-year planning horizon.

Table 2. Estimated Funding Gap for Capital Projects by Estimated Project Timing, (2018 dollars), FY Ending 2021–2040

	Near-Term (Years 1–10)	Mid- and Long-Term (Years 11–20)	Expansion Areas (Development Driven)
Existing Revenue Available for New Projects	$15,192,000	$105,977,000	N/A
Total New Project Costs (including administration/ overhead where applicable)	($274,453,000)	($380,231,000)	($90,500,000)
Estimated Funding Gap	**($259,261,000)**	**($274,254,000)**	**($90,500,000)**

Source: Calculations by ECONorthwest.

Note: Values are in 2018 dollars and rounded to the thousand.

In addition, the new programs recommended for implementation in this plan along with the new OM&P costs attributable to planned new transportation facilities are estimated to cost a total of $5.8-6.3 million per year. As with the capital project needs noted above, the new OM&P costs are based on significant new capital projects identified in this plan.

The OM&P expenditures identified in this plan will all require funding beyond what has historically been available for OM&P, since nearly all existing revenue will continue to be needed for existing OM&P activities. This means the City has a gap of approximately $5.8-6.3 million per year to fund the desired new and increased OM&P identified in the plan.

Potential New Funding

Preferred New and Expanded Tools

To address the funding gap and fund the transportation facilities identified to meet the City's transportation needs through the year 2040, seventeen funding mechanisms were evaluated, including new tools and expansion of existing tools. The evaluation covered a range of criteria to gauge the tools' ability to close the funding gap, including the impact new or expanded tools would have on payers. The analysis identified the preferred new or expanded tools described below. Tools are organized by project eligibility as some tools may only be used to fund capital projects and others may be flexibly used for capital projects or OM&P.

Funding Sources for Capital Projects Only

- **General Obligation (GO) Bonds.** GO Bonds are debt issued for infrastructure improvements. The GO bond, which requires a public vote, is paid for by increased property taxes over the life of the bond, which typically last for 20 to 30 years for transportation projects. Funds must be used for capital projects, and because the tool requires a public vote, projects are often selected that will resonate with voters city-wide. The City of Bend has used GO bonds for transportation in the past. The City currently has outstanding GO bond debt of $19.4 million (total). State statute (ORS 287A.050(2)) limits cities to issuing GO bonds equal to or less than 3% of the real market value (RMV) of taxable property within its boundaries. Based on the Deschutes County 2019-2020 certified tax assessment roll, 3% of Bend's RMV exceeds $670 million. This limit will increase as RMV grows. Based on the current RMV limitations and outstanding GO bond debt, the maximum the City could issue in additional GO bond is over $650 million, for all City capital needs, including but not limited to transportation. The assumed GO bond amount for transportation projects is a smaller amount, detailed below.
- **City-wide Transportation System Development Charges (TSDCs): rate increase.** TSDCs are charges on new development, set by City Council, and established based on a list of projects to be funded with the revenues and a methodology for uniformly assessing costs. The City of Bend currently imposes a TSDC (see *Existing Sources*); however, the rate the City charges is not the maximum possible under the current methodology, and an update to the methodology and project list could result in a higher rate and additional funding. The City is planning an update to the TSDC project list and methodology to reflect eligible components identified in this TSP, which may result in a different maximum rate.
- **Supplemental Area-Specific TSDCs**. Supplemental TSDCs are additional one-time fees (layered on top of the City-wide TSDCs). These fees are paid by new development within a defined geographic area. Funds can only be used for TSDC-eligible capital projects that increase capacity and benefit/serve the defined area. The City's Expansion Areas or other places with concentrated transportation needs and substantial growth expected could be appropriate locations to implement these fees.
- **New Urban Renewal Areas (URAs).** URAs divert property tax revenues from growth in assessed value inside a defined area. The City currently has two URAs (see *Existing Sources*) but is considering a third URA in the Core Area, which would expand the urban renewal funding available for transportation projects in that area. Revenue must be spent on capital projects located within the URA (projects must also be identified in the URA plan and contribute to the alleviation of blight within the URA). Projects that make the URA more desirable for development or that alleviate conditions that were a barrier to development are the best candidates for URA revenues.
- **Local Improvement Districts (LIDs).** LIDs are a type of special assessment district where nearby property owners inside a defined area are assessed a fee to pay for capital improvements within the LID boundary. Local infrastructure improvements that benefit specific properties in a defined area may be funded by LID assessments. For example, LIDs may be appropriate for use in the City's Expansion Areas, or in other areas to support infrastructure with a localized benefit to surrounding properties. The City already has regulations that allow LIDs, but they have not been widely used for transportation infrastructure. To generate additional revenue from this tool, a more robust program would need to be developed and implemented.

Flexible Funding Sources for Capital or OM&P

- **Transportation Utility Fee (TUF).** A TUF applies the same concept as water and sewer utility fees to collect revenues for transportation projects. Fees are assessed to all businesses and households in the jurisdiction. While jurisdictions typically use TUF revenue for OM&P (because of the on-going nature of the funding), there are no restrictions on use of funds and revenues may be used for capital projects as well. The fee may be assessed by the City Council.
- **Vehicle Registration Fee (VRF).** VRFs are recurring charges to businesses and individuals that own cars, trucks, and other vehicles. VRFs are assessed and collected at the county level and revenue is allocated to the county and cities within the county: 60% to the county and 40% to the cities. Revenue allocated to each city is based on the share of registered vehicles located in each city. The current maximum allowed rate is set in statute ($56 per vehicle per year).[2] Funds may be flexibly used for capital projects or OM&P related to the roads. The fee may be assessed by Deschutes County, following approval at a county-wide vote. If implemented, it may be appropriate to target the use of the City's portion of VRF revenue to projects with regional or county-wide benefits, so that County officials and voters county-wide see more value in implementing the fee.
- **Fuel Tax with Seasonal Variation.** The seasonal fuel tax is a tax on the sale of fuel with levy rates that fluctuate based on the month. Funds may be used flexibly for capital projects or OM&P. The tax may be assessed by the City Council, following approval at a city-wide vote, pursuant to the Bend Charter. [3]
- **Prepared Food and Beverage Sales Tax with Seasonal Variation.** A tax on the sale of prepared food and non-alcoholic beverages, typically added to the price at the point of sale.[4] The recommended version is a seasonal, targeted tax with a levy rate that would fluctuate based on the time of the year (such as peak tourist seasons).[5] The tax may be assessed by the City Council, following approval at a city-wide vote, pursuant to the Bend Charter. Funds may be used flexibly for capital projects and OM&P.

Estimated Revenue Potential of New Sources

Table 3 summarizes the estimated revenue potential of the possible new mechanisms (the preferred new funding sources) to fund the development of the transportation facilities and improvements identified in this plan.

[2] The $56 per year VRF rate is legal, but no Oregon county currently imposes a rate this high (yet).

[3] Local jurisdictions in Oregon may enact their own fuel taxes, which apply in addition to state and federal taxes on fuel. Local fuel tax revenues can be used for operations, maintenance, and capital costs but are restricted to roadway use (which includes sidewalks, enforcement, etc.) and cannot be used for transit.

[4] Oregon does not currently have a state sales tax, though state law does not preclude cities from adopting one. It is possible for a jurisdiction to adopt a sales tax on specific items, such as prepared foods or transportation-related items. However, state law prohibits local taxation of alcoholic beverages, whether wholesale or retail (restaurant). Bend's charter requires a citywide vote on any direct sales tax. Based on input from the FWG, this tax is assumed to apply to prepared food and non-alcoholic beverages for immediate consumption.

[5] This reflects the input of the FWG and a preference for a tax that would vary seasonally; however, the practical implications of varying the rate seasonally merit additional evaluation to determine whether this is a reasonable approach.

Table 3. Potential New and Expanded Funding Tools and Reasonably Likely Revenue (2018 dollars)

Funding Tool	Overall Revenue Assumptions	Projected Revenue Potential Years 1-10	Projected Revenue Potential Years 11-20	Applicability to Expansion Area Projects
General Obligation Bond	Bond amounts of up to $225-250m may be possible based on FWG conversations and early testing in focus groups.	One bond of up to about $250m is reasonably likely in the near-term, depending on Council and community support. The amount and potential projects would be determined through public opinion research.	A second bond, of up to about $250m, is reasonably likely towards to the end of the 20-year planning period, to allow more time to pass after the City has finished implementing the first bond.	Potentially applicable, depending on timing of need relative to timing of bond, but not assumed.
City-wide Transportation System Development Charge (TSDC) increase	With a rate increase from $8,000 per Peak Hour Trip (the rate as of Jan. 1, 2020) to $10,000 per Peak Hour Trip, TSDC revenue could generate approximately $3.0m of additional revenue per year above the revenue from the current rate.	A rate increase is reasonably likely about mid-way through the first 10 years of the plan. If implemented in year 5, this expanded tool could generate approximately $14.6m.	With the assumed rate increase, this expanded tool could generate approximately $29.2m in additional revenue over the mid- and long-term.	Potentially applicable, for appropriate projects with development of additional project lists and methodology.
Supplemental Area-Specific Transportation System Development Charge (TSDCs)	The revenue potential of this tool would depend on the amount of development expected to occur in areas selected for the additional charge, and how much developers already pay toward the citywide TSDC.	Revenue potential would be dependent on the timing of implementation, the rate, and the timing of development.	Revenue potential would be dependent on the timing of implementation, the rate, and the timing of development.	Assumed as a likely funding source for Expansion Area projects.
Urban Renewal (Proposed Core Area)	Transportation funding from the proposed Core Area URA is estimated at roughly $21.4m for projects in the BTP through 2040, plus additional funding for streetscape enhancements that are outside the BTP project list. The amounts, timing, and project allocations will be determined through the urban renewal plan process and through subsequent implementation of the urban renewal plan.	Implementation of an additional URA in the Core Area is reasonably likely in the near-term, with the area collecting initial revenues in 2022. Based on preliminary analysis of a new URA, roughly $10.4m could be available for transportation projects in the BTP in the near-term.	Based on preliminary analysis of a new URA, roughly $11.0m could be available for transportation projects in the BTP in years 11-20.	Not applicable given current proposed new URA boundaries. Forming a new URA to fund expansion area transportation (or other infrastructure) projects may not be feasible or desirable and is not assumed as a possible new funding mechanism in this plan.

Funding Tool	Overall Revenue Assumptions	Projected Revenue Potential Years 1-10	Projected Revenue Potential Years 11-20	Applicability to Expansion Area Projects
Local Improvement Districts (LIDs)	Assumed to be used for smaller, local projects, of about $350,000 in project costs per LID. The City is unlikely to establish more than two per year.	Dependent on projects selected and number of LIDs formed.	Dependent on projects selected and number of LIDs formed.	Assumed as a likely funding source for Expansion Area projects.
Transportation Utility Fee (TUF)	A fee rate of $10 per month per household and a charge to businesses of $2 per month per employee could generate approximately $5m per year.	Implementation of this source is reasonably likely within the first 10 years. If implemented in year 1 (collecting revenue in year 2), this fee could generate approximately $47.1m through year 10.	Over 10 years, this fee could generate approximately $48.5m.	Potentially applicable, but not assumed.
Vehicle Registration Fee (VRF)	A $56 per year ($112 per biennium) rate – the maximum allowed under statute – could generate approximately $3.5m per year for the City of Bend.	Implementation of this source is reasonably likely roughly mid-way through the first 10 years of the plan. If implemented in year 5 at $56 per year per vehicle, this fee could generate approximately $18.6m for the City of Bend.	Over 10 years, at $56 per year per vehicle, this fee could generate approximately $34.1m for the City of Bend.	Potentially applicable, but not assumed.
Seasonal Fuel Tax	A fuel tax of 1-5 cents per gallon with fluctuating rates by season could generate approximately $1.2m per year.	Implementation of this source may be possible, if needed, roughly mid-way through the first 10 years of the plan. If implemented in year 5, the tax could generate approximately $6.8m.	Over 10 years, this tax could generate approximately $10.8m.	Potentially applicable, but not assumed.
Seasonal Food and Non-alcoholic Beverage Sales Tax	A 5% seasonal, prepared food and non-alcoholic beverage sale tax could generate approximately $5.0m per year on average (assuming revenue collection during one-third of the year).	This option was identified as less promising in the near-term by the FWG. If implemented in year 5, the tax could generate approximately $22.3m.	If implemented mid-term, over 10 years, this tax could generate approximately $53m.	Potentially applicable, but not assumed.

Conclusion

Funding for Capital Projects

The combined revenue potential of new or expanded tools described above as "reasonably likely" and primarily intended for capital projects is up to $712.5 million[6] over the 20-year planning horizon (based on the assumptions described in Table 3). This exceeds the total funding gap of approximately $624 million for capital projects over the 20-year planning horizon based on estimated available revenue from existing sources and provides options for the City to select tools to implement or reduce the revenue required from a given tool. **This demonstrates that the City's existing funding mechanisms, with some combination of the potential new and expanded funding tools, are reasonably likely to be sufficient to fund the development of the transportation facilities and major capital improvements identified in this plan.** In addition, the City of Bend will continuously seek to identify potential funding partners, where possible and appropriate.

Projects identified on the Expansion Area project list (those not included on the City's near-, mid-, or long- term priority list), are assumed to funded by development either directly through developer contributions or indirectly through tools such as local improvement districts, supplemental transportation system development charges, and/or negotiated agreements.

Funding for Operations, Maintenance, and Programs

New revenue from the transportation utility fee (TUF) at the rates analyzed is projected to cover most, but not all, of the estimated cost of new OM&P. Additional revenue for OM&P could come from higher TUF rates, funding capital elements of the programs through small contributions from new capital funding sources (such as a GO bond), or directing a portion of new flexible funding sources towards OM&P.

Implementation Actions

This Funding Plan is designed to be implemented flexibly over the 20 year life of the plan, in response to changing financial and economic conditions. Council actions will determine the specific timing of and needed rates for any new funding sources, given unanticipated changes in existing revenue sources. As they move through implementation, Council will also take into consideration new revenue sources or grants that may not have been anticipated when this plan was drafted.

Appendix A provides a Near-Term Funding Action Plan that presents options for how the City could implement the potential new and expanded funding tools over the next 10 years to fund the projects identified as prioritized for FY Ending 2021-2030.

[6] This estimate aggregates the 20-year revenue projections for the following sources: (1) vehicle registration fee; (2) seasonal fuel tax; (3) seasonal, prepared food and non-alcoholic beverage sales tax; (4) transportation system development (i.e., additional revenue from a rate increase); (5) Core Urban Renewal; and (6) general obligation bond (i.e., two bonds at $250 million each).

Appendix A. Near-term Funding Action Plan

The City wants to ensure that there is a realistic plan in place to fund the near-term project and program list within the first 10 years. To support this goal, the City will need to implement new or expanded funding sources to address the capital project funding gap of approximately $259 million in the near-term (see Chapter 5, Table 2).

This Action Plan is intended as guidance for implementing the funding strategy described in Chapter 5. The Action Plan identifies approaches recommended by the Citywide Transportation Advisory Committee (CTAC) to implement the TSP funding strategy in the near-term. The Action Plan is an advisory recommendation for achieving the stated strategy and policies and does not limit the City to a single approach.

This section outlines CTAC's recommendation of two potential approaches (a preferred and an alternative option) to fund the near-term capital projects and operations, maintenance and programs (OM&P). The intent here is to provide clear guidance on what will be needed to fund Bend's near-term transportation needs, recognizing that these approaches are not binding; the City Council will have discretion about which new / expanded funding tools to implement. Additionally, the implementation of many of the proposed funding tools will rely on a successful public vote. Given that uncertainty, Figure 1 and Figure 2 are presented as alternative ways to fund the vision of the BTP, between FY Ending 2021–2030.

- Option A (presented in Figure 1) emphasizes a large GO bond as the primary source of new revenue to fund the capital costs of the near-term project list, with supplemental revenue from an increase to TSDCs and urban renewal funding in a new URA in the Core Area of the city.[7] Option A also assumes that a TUF is implemented to fund new and increased OM&P costs.

- Option B (presented in Figure 2) assumes the City implements a suite of new and expanded funding tools to complement a smaller GO bond, including a vehicle registration fee, a targeted seasonal sales tax (e.g. fuel tax or prepared food and beverage tax), an increase to TSDCs, and/or greater reliance on Core Area urban renewal funding to pay for transportation. Like Option A, it assumes that a TUF is implemented to fund new and increased OM&P costs, though other new flexible sources may contribute to these as well.

Either Option A (the preferred approach) or Option B could fully fund the near-term project list and the expanded OM&P recommendations; however, Option B would require more separate actions and public votes to implement a larger number of new or expanded funding sources. In addition, and because funding from the TUF is insufficient to fully cover the near-term OM&P funding gap, both options assume a small amount of GO bond revenue flowing into the pool of funds for OM&P.[8]

In the diagrams below, the left column shows recommended funding tools. Existing funding sources are listed at the bottom of the diagrams in red, with new sources listed at the top in

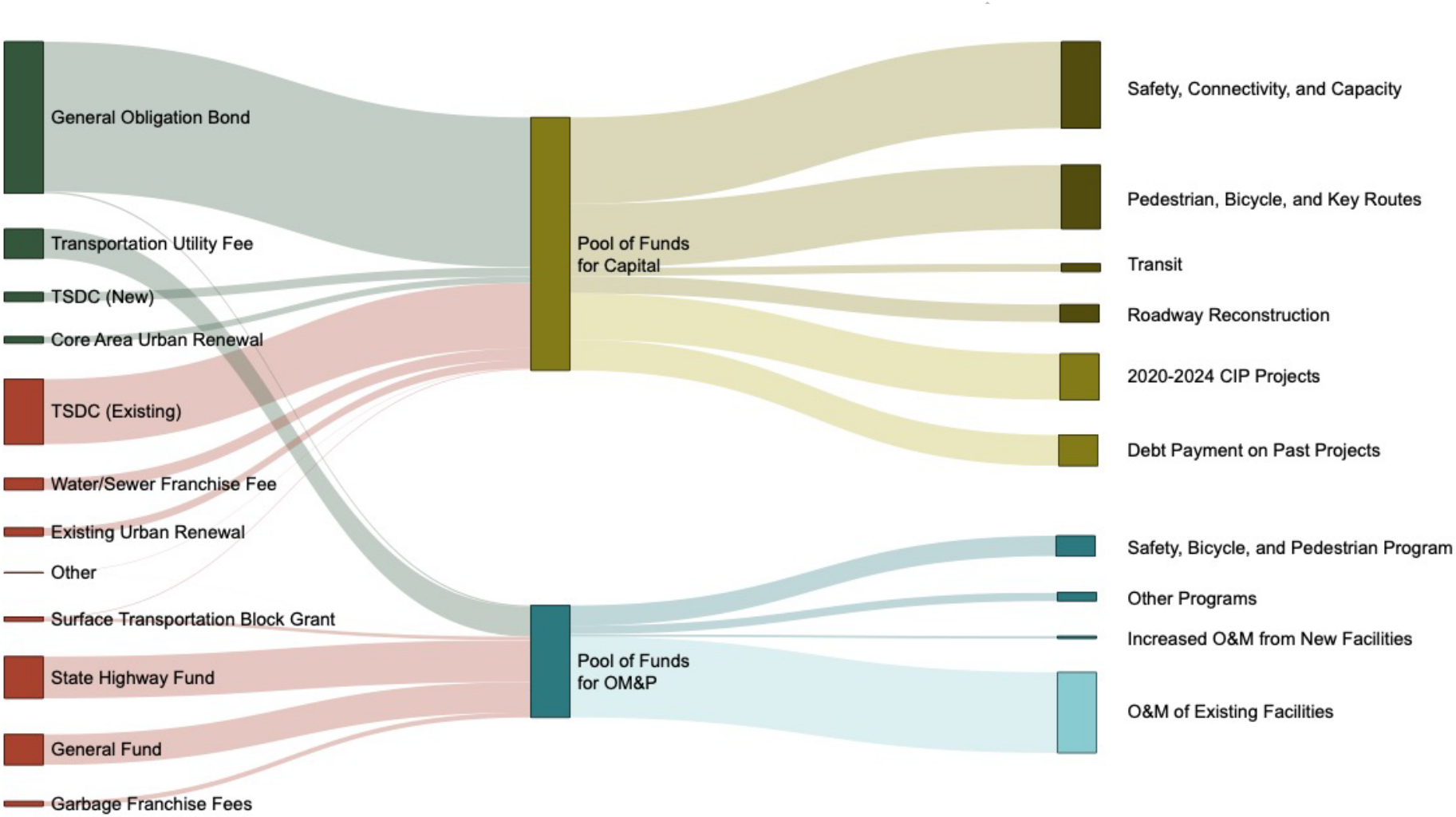
[7] These supplemental funding sources in Option A, including a TSDC rate increase, will not be sufficient to reduce the financial impact of a large general obligation bond.

[8] GO bond dollars would fund the capital components of programs (such as sidewalk infill, safety improvements, the purchase of parking meters, etc.).

green. Each funding source is allocated between the “Pool of funds for Capital Projects” and the “Pool of funds for OM&P” (middle column) consistent with the assumptions and requirements for that source. The “Pool of funds for Capital Projects” and the “Pool of funds for OM&P” are allocated to project and program categories based on the near-term project list and the recommended program allocations[9] from Chapter 4 (right column). The total funding potential (all bars in the left column) matches the total cost of priority projects / OM&P (all bars in the right column). Note that the figures show the portion of existing funding sources that is allocated towards existing debt obligations and the 2020-2024 CIP as well as the portions that are available to fund new projects.

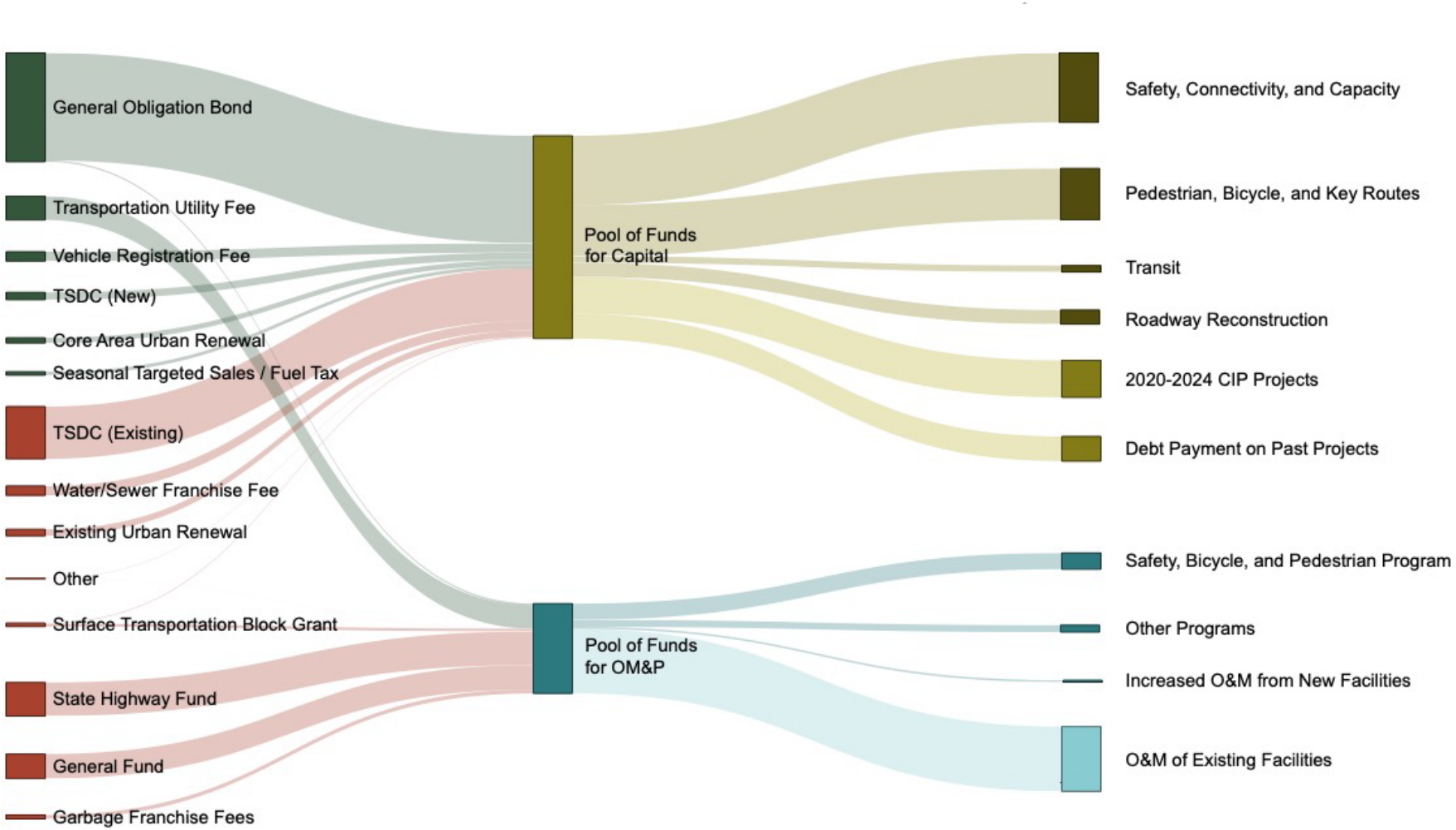
[9] The near-term action plan assumes the following for OM&P: 10 years of costs for “O&M of Existing Facilities,” five years of costs for “Increased O&M from New Facilities,” eight years of costs for “Safety, Bike, and Pedestrian Improvements,” and eight years of costs for “Other Programs.”

Figure 1. Diagram of Near-term Funding Plan (Option A - Preferred), FY Ending 2021–2030



Source: Calculations by ECONorthwest.

Figure 2. Diagram of Near-term Funding Plan (Option B), FY Ending 2021–2030



Source: Calculations by ECONorthwest.

Appendix B. Funding Strategy Analysis and Methods

This appendix presents additional details of the assumptions and methodology used to develop the funding strategy presented in Chapter 5 of Bend's Transportation Plan.

Summary of Analysis

The approach to developing the funding strategy included:

- Worked with consulting teams and staff from relevant State, regional, and local agencies to discuss financials, transportation services, and funding plans and policies.
- Reviewed existing data and previous studies, such as: City of Bend Adopted Biennial Budgets and financial summaries, the City of Bend's existing Transportation System Plan (TSP), and the City of Bend's existing Capital Improvement Plans (CIP).
- Developed an Initial Funding Assessment (IFA) with a preliminary analysis of funding needs and funding capacity from existing funding tools and potential new / expanded tools. The IFA presented the evaluation of potential new / expanded tools and preliminary funding packages to fund transportation needs.
- Using recommendations outlined in the IFA, refined a funding strategy to (1) consider the costs of needed projects and programs as identified by CTAC, and (2) identify suitable new / expanded funding tools to cover funding needs that exceed the City's current funding capacity.

Analysis of Existing Sources

ECONorthwest worked with City staff to project transportation revenues that could be available from existing funding sources over the 2020–2040 planning horizon. The two forecasts, on subsequent pages, display revenue projections of existing revenue sources. One way of thinking about these projections is that they estimate the amount of revenue available for implementation *if nothing changes in the future* (e.g. no new funding tools, rates of existing tools remain unchanged, etc.). Combined with the estimated capital and OM&P costs, the existing tools inform a funding gap to determine the amount of additional revenue that is needed to implement Bend's transportation system needs over the planning horizon.

Existing funding tools are forecast to generate approximately $544.1 million over the planning period, with approximately $293.7 million (or 54% of the total) available for capital costs and approximately $250.4 million (or 46% of the total) for OM&P costs.

Table 4 presents the revenue projections for capital expenditures and Table 5 presents the revenue projections for operations, maintenance, and programs (OM&P). In summary, ECONorthwest estimates that on average, existing revenue sources will generate approximately $14.7 million per year for capital needs and approximately $12.5 million per year for OM&P.

Table 4. Forecast of Existing Revenues (2018 dollars) for Capital Projects, FY Ending 2021–2040

FYE	Water / Sewer Franchise Fees [a]	TSDCs (Existing) [b]	Surface Transp. Block Grant [c]	Urban Renewal (Juniper Ridge) [d]	Urban Renewal (Murphy Crossing) [d]	Other [e]	Total
2021	$1,699,400	$9,138,450	-	$0	$0	$466,788	$11,304,638
2022	$1,737,889	$9,138,450	-	$0	$0	$20,000	$10,896,339
2023	$1,777,250	$9,138,450	-	$0	$1,238,679	$20,000	$12,174,379
2024	$1,817,502	$9,138,450	-	$0	$0	$20,000	$10,975,952
2025	$1,858,666	$9,138,450	$242,172	$6,222,457	$0	$20,000	$17,481,745
2026	$1,900,762	$11,685,485	$240,064	$0	$0	$20,000	$13,846,311
2027	$1,943,812	$11,685,485	$237,966	$0	$0	$20,000	$13,887,263
2028	$1,987,837	$11,685,485	$235,885	$0	$0	$20,000	$13,929,207
2029	$2,032,859	$11,685,485	$233,827	$3,482,156	$0	$20,000	$17,454,327
2030	$2,078,900	$11,685,485	$231,781	$0	$2,180,683	$20,000	$16,196,849
2031	$2,125,984	$12,323,436	$229,753	$0	$0	$20,000	$14,699,173
2032	$2,174,135	$12,323,436	$227,751	$0	$0	$20,000	$14,745,322
2033	$2,223,376	$12,323,436	$225,764	$0	$0	$20,000	$14,792,576
2034	$2,273,732	$12,323,436	$262,150	$0	$1,115,473	$20,000	$15,994,791
2035	$2,325,229	$12,323,436	$259,863	$0	-	$20,000	$14,928,528
2036	$2,377,892	$12,402,052	$257,599	-	-	$20,000	$15,057,543
2037	$2,431,748	$12,402,052	$255,349	-	-	$20,000	$15,109,149
2038	$2,486,824	$12,402,052	$253,121	-	-	$20,000	$15,161,997
2039	$2,543,147	$12,402,052	$250,908	-	-	$20,000	$15,216,107
2040	$2,600,746	$12,402,052	$248,716	-	-	$20,000	$15,271,514
20-year Total	**$42,397,690**	**$227,747,115**	**$3,892,669**	**$9,704,613**	**$4,534,835**	**$846,788**	**$289,123,710**
Near-term Total	**$18,834,877**	**$104,119,675**	**$1,421,695**	**$9,704,613**	**$3,419,362**	**$646,788**	**$138,147,010**
Mid-/long-term Total	**$23,562,813**	**$123,627,440**	**$2,470,974**	**$0**	**$1,115,473**	**$200,000**	**$150,976,700**
Average	**$2,119,885**	**$11,387,356**	**$243,292**	**N/A**	**N/A**	**$42,339**	**$14,456,186**

Source: ECONorthwest.

Note: Values are in 2018 dollars and rounded to the dollar. Dashes indicate there is no revenue from that source in that year. Averages only include the years in which the source is generating revenue.

[a] The projection is based on budgeted amounts for 2021 and assumes a 2.3% annual increase in subsequent years to account for population growth. Because water and sewer rates tend to increase over time with inflation, these projections are not discounted for inflation.

[b] Based on estimated new peak hour trip ends at $8,000 per Peak Hour Trip. Total new peak hour trip ends are based on the model results for the 2040 full TSP project list, which includes measures to reduce peak hour vehicle trips. Total growth in trip generation over the 2020-2040 period was allocated to 5-year periods using population projections from Portland State University and converted to an average annual number of new trip ends for each 5-year period. The projection is not discounted for inflation because the TSDC rate ($8,000 per Peak Hour Trip as of January 1, 2020) is annually adjusted based on an established cost index to account for inflation.

[c] The projection is based on ODOT's Long Range Revenue Tables. The City of Bend's share is based on 75% of the allocation to the Bend MPO. Revenues to the City are discounted by 6% to account for a federal funds conversion rate. The projection assumes the full allocation (100%) of Bend's STBG revenue is directed to operations, maintenance, and programs (OM&P) expenses until 2023. In 2024 and onwards, 25% of STBG dollars are allocated to capital expenditures and 75% to OM&P. Values are discounted for inflation.

[d] Revenue estimates for existing urban renewal areas are based on recent financial analysis that indicates the likely borrowing potential for each area and the amount expected to be available to fund new projects. The specific timing and amounts available may differ from these assumptions. Most projects likely to be funded in both urban renewal areas are transportation projects; however, the funding is not guaranteed to be allocated to transportation or to projects in the TSP project list.

[e] Other sources of revenue include rental income, charges for service, loan repayments, investment income, and miscellaneous revenues. The projection is based on the City of Bend's budget for 2021. In year 2022 and onward, $20,000 is assumed to account for some investment income.

Table 5. Forecast of Existing Revenues (2018 dollars) for Operations/Maintenance and Programs, FY Ending 2021–2040

FYE	State Highway Fund [f]	Surface Transportation Block Grant [g]	General Fund [h]	Garbage Franchise Fees [i]	Other [j]	Total
2021	$7,223,540	$745,866	$6,827,281	$814,325	$23,358	$15,634,370
2022	$6,926,661	$739,339	$4,811,358	$807,711	$10,000	$13,295,069
2023	$6,929,584	$732,904	$4,760,147	$801,189	$10,000	$13,233,824
2024	$6,849,913	$484,343	$4,721,647	$794,709	$10,000	$12,860,612
2025	$6,753,939	$480,129	$4,683,530	$788,294	$10,000	$12,715,892
2026	$6,529,922	$475,933	$4,645,546	$781,901	$10,000	$12,443,302
2027	$6,324,384	$471,770	$4,607,838	$775,554	$10,000	$12,189,546
2028	$6,349,822	$467,654	$4,570,531	$769,275	$10,000	$12,167,282
2029	$6,388,840	$463,561	$4,533,412	$763,027	$10,000	$12,158,840
2030	$6,427,217	$459,507	$4,496,612	$756,833	$10,000	$12,150,169
2031	$6,465,148	$455,502	$4,460,251	$750,713	$10,000	$12,141,614
2032	$6,502,388	$451,528	$4,424,140	$744,635	$10,000	$12,132,691
2033	$6,539,140	$524,301	$4,388,401	$738,620	$10,000	$12,200,462
2034	$6,575,188	$519,726	$4,352,875	$732,641	$10,000	$12,190,430
2035	$6,610,737	$515,198	$4,317,685	$726,718	$10,000	$12,180,338
2036	$6,645,595	$510,698	$4,282,692	$720,828	$10,000	$12,169,813
2037	$6,679,970	$506,242	$4,248,019	$714,992	$10,000	$12,159,223
2038	$6,713,693	$501,815	$4,213,545	$709,190	$10,000	$12,148,243
2039	$6,746,972	$497,432	$4,179,391	$703,441	$10,000	$12,137,236
2040	$6,779,655	$493,080	$4,145,452	$697,729	$10,000	$12,125,916
20-year Total	**$132,962,308**	**$10,496,528**	**$91,670,353**	**$15,092,325**	**$213,358**	**$250,434,872**
Near-term Total	**$66,703,822**	**$5,521,006**	**$48,657,902**	**$7,852,818**	**$113,358**	**$128,848,906**
Mid-/long-term Total	**$66,258,486**	**$4,975,522**	**$43,012,451**	**$7,239,507**	**$100,000**	**$121,585,966**
Average	**$6,648,115**	**$524,826**	**$4,583,518**	**$754,616**	**$10,668**	**$12,521,744**

Source: ECONorthwest.

Note: Values are in 2018 dollars and rounded to the dollar.

[f] The projection is based on ODOT's Long Range Revenue Tables, which allocates funds to ODOT, counties, and cities. Bend's share of the revenue allocated to cities is based on City of Bend population as a percent of the total population of all cities in the state as of 2018, based on population estimates from Portland State University (3.1%). Values are discounted for inflation.

[g] The projection is based on ODOT's Long Range Revenue Tables. The City of Bend's share is based on 75% of the allocation to the Bend MPO. Revenues to the City are discounted by 6% to account for a federal funds conversion rate. The projection assumes the full allocation (100%) of Bend's STBG revenue is directed to operations, maintenance, and programs (OM&P) expenses until 2023. In 2024 and onwards, 25% of future allocations goes to capital expenditures and 75% to OM&P. Values are discounted for inflation.

[h] The General Fund Subsidies for fiscal year 2021 include one-time funding to support City Council's 2019-2021 goals to improve neighborhood safety and make investments in street infrastructure. The estimates for 2022 and beyond are based on a previous fiscal policy to dedicate 75% of all franchise fee revenue to Street Maintenance, but actuals will be determined by City Council as part of future goal setting and biennial budgeting processes. Values are discounted for inflation.

[i] The projection is based on historical revenues received in Bend from this source, increasing by 2.3% to account for population growth each year prior to being discounted for inflation. (Garbage service rates historically have not increased with inflation.)

[j] Other sources of revenue include licenses and permits, charges for services, investment income, and other miscellaneous revenues. The projection is based on the City of Bend's budget for 2021. In year 2022 and onward, $10,000 is assumed to account for some investment income.

Analysis of New / Expanded Funding Tools

The analysis of new funding tools and potentially expandable existing funding tools provide the City with options to generate new revenue over the planning horizon. The preferred new / expanded tools do not include project-specific tools or potential grants; these types of tools are desirable when available and should be pursued, but they are too specific and uncertain to be factored into Bend's overall funding strategy.

The evaluation of new / expanded tools looked at the dimensions of equity, political acceptability, efficiency, legality, and magnitude of funding potential. It assessed funding potential using a range of levy rates, calibrated for reasonableness to address the BTP funding gap, after revenues of existing sources was factored into the equation.

Table 6. Forecast of New Revenues (2018 dollars) for Capital Projects, FY ending 2021–2040

FYE	Vehicle Registration Fee [k]	Seasonal Fuel Tax [l]	Seasonal Food and Beverage Tax [m]	City-wide Transp. SDC (Rate Increase) [n]	Urban Renewal (Core Area) [o]	General Obligation Bond (high-end est.) [p]
2021	-	-	-	-	-	$250,000,000
2022	-	-	-	-	-	-
2023	-	-	-	-	$1,300,000	-
2024	-	-	-	-	$1,300,000	-
2025	-	-	-	-	$1,300,000	-
2026	$3,818,929	$1,435,733	$4,271,230	$2,921,371	$1,300,000	-
2027	$3,773,187	$1,392,540	$4,367,968	$2,921,371	$1,300,000	-
2028	$3,728,071	$1,350,674	$4,466,896	$2,921,371	$1,300,000	-
2029	$3,683,401	$1,310,034	$4,568,065	$2,921,371	$1,300,000	-
2030	$3,639,282	$1,270,622	$4,671,526	$2,921,371	$1,300,000	-
2031	$3,595,803	$1,232,435	$4,777,329	$3,080,859	$1,100,000	-
2032	$3,552,809	$1,195,383	$4,885,529	$3,080,859	$1,100,000	-
2033	$3,510,393	$1,159,466	$4,996,180	$3,080,859	$1,100,000	-
2034	$3,468,422	$1,124,609	$5,109,337	$3,080,859	$1,100,000	-
2035	$3,426,992	$1,090,812	$5,225,056	$3,080,859	$1,100,000	-
2036	$3,385,987	$1,058,009	$5,343,397	$3,100,513	$1,100,000	-
2037	$3,345,502	$1,026,201	$5,464,417	$3,100,513	$1,100,000	$250,000,000
2038	$3,305,437	$995,330	$5,588,179	$3,100,513	$1,100,000	-
2039	$3,265,883	$965,397	$5,714,744	$3,100,513	$1,100,000	-
2040	$3,226,754	$936,351	$5,844,175	$3,100,513	$1,100,000	-
20-year Total	**$52,726,852**	**$17,543,596**	**$75,294,028**	**$45,513,715**	**$21,400,000**	**$500,000,000**
Near-term Total	**$18,642,870**	**$6,759,603**	**$22,345,685**	**$14,606,855**	**$10,400,000**	**$250,000,000**
Mid-/long-term Total	**$34,083,982**	**$10,783,993**	**$52,948,343**	**$30,906,860**	**$11,000,000**	**$250,000,000**
Average	**$3,515,123**	**$1,169,573**	**$5,019,602**	**$3,034,248**	**$1,188,889**	**N/A**

Source: ECONorthwest.

Note: Values are in 2018 dollars and rounded to the dollar. Dashes indicate there is no revenue from that source in that year. Averages only include the years in which the source is generating revenue.

[k] The vehicle registration fee (VRF) can only be levied at the county level; statute dictates that county VRF revenue must be shared with cities (cities receive 40% of total revenue and the county receives 60%). The projection is based on a flat rate of $56 per year —the maximum rate currently allowed under statute—per registered vehicle in Deschutes County (using registration data from the Oregon DMV). To estimate revenue allocated to the City of Bend (out of the total share of revenue allocated to cities), ECONorthwest used a factor of 74%, which is based on Bend's share of registered vehicles of total registered vehicles in Deschutes County cities (US Census Bureau, ACS). ECONorthwest assumed the number of registered vehicles county-wide would grow by 1.9% based on the rate of population growth in Deschutes County for 2015-2035 (source: Portland State University's Population Research Center). The value of the fee was discounted for inflation as the rate is not indexed to inflation and does not automatically adjust over time. The fee is assumed to start in year 6 to allow time to build support among the other jurisdictions, including allowing time to update their transportation system plans to identify needed projects.

[l] The projection is based on a seasonally-adjusted flat rate per gallon of fuel (gasoline and diesel) sold. ODOT provided the fuel volume data (gallons sold in Bend per month). The flat rates are 1 cent in November through January (off season); 3 cents in March, April, May, and October (shoulder season); and 5 cents in June through September (peak season). The volume of fuel sold per year and the rates were assumed to remain constant over time. Estimates were discounted for inflation to reflect the fact that the rate is not assumed to automatically adjust with inflation over time.

[m] The projection is based on a 5% rate per dollar spent on prepared food and beverage applied during June, July, August, and September. Estimates of spending on prepared food and beverage are based on City of Bend sales data by 2-digit NAICS code and statewide data on the share of spending in that NAICS code dedicated to prepared food and non-alcoholic beverages (to overcome data availability limitations) using data from the 2012 Economic Census (inflated to 2018 dollars and adjusted for estimated population growth from 2012-2018). Spending on prepared food and beverages subject to the tax was assumed to increase with population growth at a rate of 2.3%. In the absence of reliable data on food and beverage expenditures by month, the projection assumes that one-third (four months out of 12) of the projected annual food and beverage spending will be subject to the tax. The estimates were not discounted for inflation since the cost of prepared food and beverages that are the basis for the tax is assumed to rise with inflation.

[n] Based on total trip generation over the 2020-2040 period, allocated to 5-year periods based on projected population growth in each 5-year period, at $10,000 per Peak Hour Trip. Annual estimated revenue is total estimate revenue at $10,000 per Peak Hour Trip, with revenue generated off $8,000 per Peak Hour Trip (Bend's existing TSDC rate) subtracted. The projection is not discounted for inflation because the TSDC rate is annually adjusted based on an established cost index to account for inflation.

[o] Revenue estimates for a new urban renewal area in the Core are based on preliminary finance plan analysis that is likely to change prior to and/or following adoption of an urban renewal plan for the area. The annual estimate is based on the total funding estimated to be available for transportation projects from 2022 (when the urban renewal area would first begin collecting revenues) through 2030 and from 2031 through 2040, converted to an average annual amount over each period. Note that while the urban renewal area would begin collecting revenues in 2022, it would not generate funding for projects until 2023.

[p] The maximum reasonable revenue potential of a GO bond is based on input from the Funding Work Group. The assumed timing reflects a bond in the near-term and another in the long-term, but the specific timing is unknown.

Table 7. Forecast of New Revenues (2018 dollars) for Operations/Maintenance and Programs, FY Ending 2021–2040

FYE	Transportation Utility Fee [q]
2021	-
2022	$5,412,317
2023	$5,368,615
2024	$5,325,194
2025	$5,282,204
2026	$5,239,365
2027	$5,196,837
2028	$5,154,761
2029	$5,112,897
2030	$5,071,394
2031	$5,030,384
2032	$4,989,657
2033	$4,949,350
2034	$4,909,283
2035	$4,869,595
2036	$4,830,129
2037	$4,791,024
2038	$4,752,143
2039	$4,713,624
2040	$4,675,346
20-year Total	**$95,674,119**
Near-term Total	**$47,163,584**
Mid-/long-term Total	**$48,510,535**
Average	**$5,035,480**

Source: ECONorthwest.

Note: Values are in 2018 dollars and rounded to the dollar.

[q] The actual rate structure for the Transportation Utility Fee will be determined if/when City Council implements the new fee. The projection is based on a flat rate of $10 per household per month and $2 per employee per month. Households were estimated using U.S. Census American Community Survey data and employees were estimated using the US Bureau of Labor Statistic's Quarterly Census of Employment and Wages data. The analysis assumes a growth rate of 2.3% per year, which is based on Bend's forecasted population growth from 2020 to 2040 (source: Portland State University's Population Research Center). Estimates were discounted for inflation, since the rate is not assumed to adjust automatically with inflation over time.