TRANSPORTATION SYSTEM PLAN

CITY OF BEND

Acknowledgments

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In particular, the City wants to express its gratitude to volunteer committee members, decision-makers, and staff who contributed countless hours to the development of this plan:

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Cover Image: Bend's Colorado/Century roundabout, the first modern roundabout in Oregon

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Acronyms

ACS	American Community Survey
ADS	automated driving systems
APM	Analysis and Procedures Manual
AV	Automated vehicles
BAT	Bend Area Transit
BPRD	Bend Park and Recreation District
BRM	Bend Redmond Transportation Model
BTP	Bend Transportation Plan
CCAP	Bend Community Climate Action Plan
CET	Cascade East Transit
CIP	Capital Improvement Program
COIC	Central Oregon Intergovernmental Council
COVID-19	Novel Coronavirus
CTAC	Citywide Transportation Advisory Committee
CTC	Centralized Traffic Control
CUFC	Critical Urban Freight Corridors
DEQ	Department of Environmental Quality
DLCD	Department of Land Conservation and Development
ESF	Emergency Support Function
FAUG	Federal Aid Urban Boundary
FEIS	Final Environmental Impact Survey
FHWA	Federal Highway Administration
FTE	Full time equivalent
FWG	Funding Work Group
FY	Fiscal Year
GO Bonds	General Obligation Bond
GTNC	Gas Transmission Northwest Corporation
HB	House Bill
HOMS	highway performance monitoring system
IFA	Initial Funding Assessment
IGA	Intergovernmental Agreement
ILUTP	Integrated Land Use and Transportation Plan
ITS	Intelligent Transportation System
LID	Local Improvement District

LOTTR	level of travel time reliability
LSN	Low Stress Network
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NHFN	National Highway Freight Network
NHS	National Highway System
NSSP	Neighborhood Safety Program
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
OM&P	Operations, Maintenance & Programs
ORS	Oregon Revised Statutes
OSU	Oregon State University
PCI	Pavement Condition Index
PMT	Project Management Team
PTC	Positive Train Control
RMV	real market value
SC	Steering Committee
SHF	State Highway Fund
SOV	Single occupant vehicle
SRTS	Safe Routes to School
STBG	Surface Transportation Block Grant Program
TDM	Transportation Demand Management
TNC	Transportation network company
TPR	Transportation Planning Rule
TSAP	Transportation Safety Action Plan
TSDC	Transportation System Development Charge
TSM	Transportation System Management
TSP	Transportation System Plan
TUF	Transportation Utility Fee
UGB	Urban Growth Management
URA	Urban renewal area
USFS	United States Forest Service
v/c	Volume to capacity ratio
VMT	Vehicle miles traveled
VRF	Vehicle registration fee

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Introduction

The Bend TSP is the City's vision and guide for transportation improvements for the next 20 years.

Questions This Chapter Answers

- What is the Bend Transportation System Plan?
- How was the plan developed?
- How does it relate to other City of Bend planning documents?

1

Introduction

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

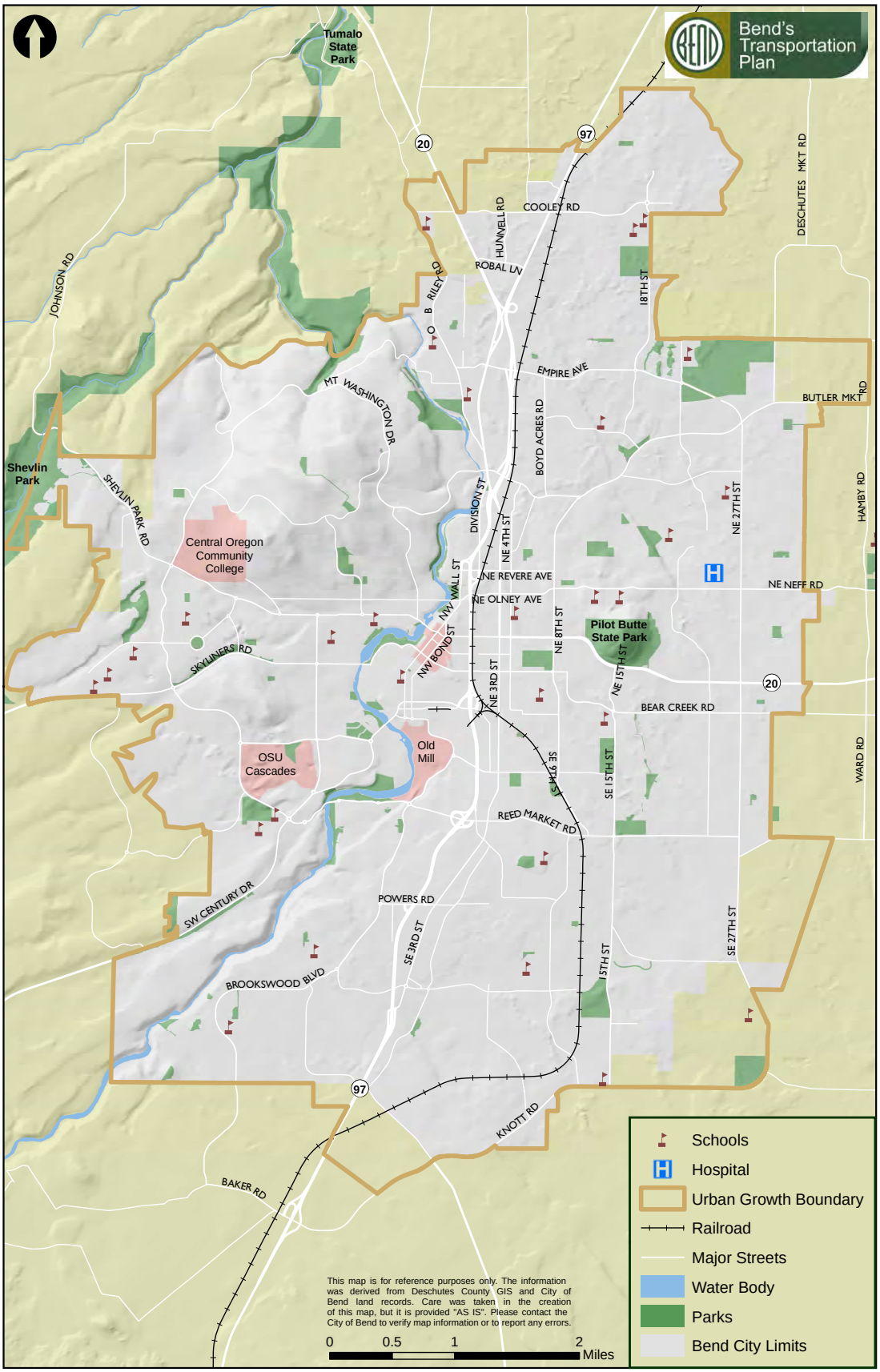
Between 2018 and 2020, the City of Bend developed this TSP through a robust process guided by:

- 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 in 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.

Figure 1-1. TSP Study Area



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:** Initial Funding Assessment
- **Appendix M:** Changes to Functional Roadway Classifications

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.

US 97 in Bend, Oregon

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.

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 Other Organizations & 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.

An outdoor event in downtown Bend

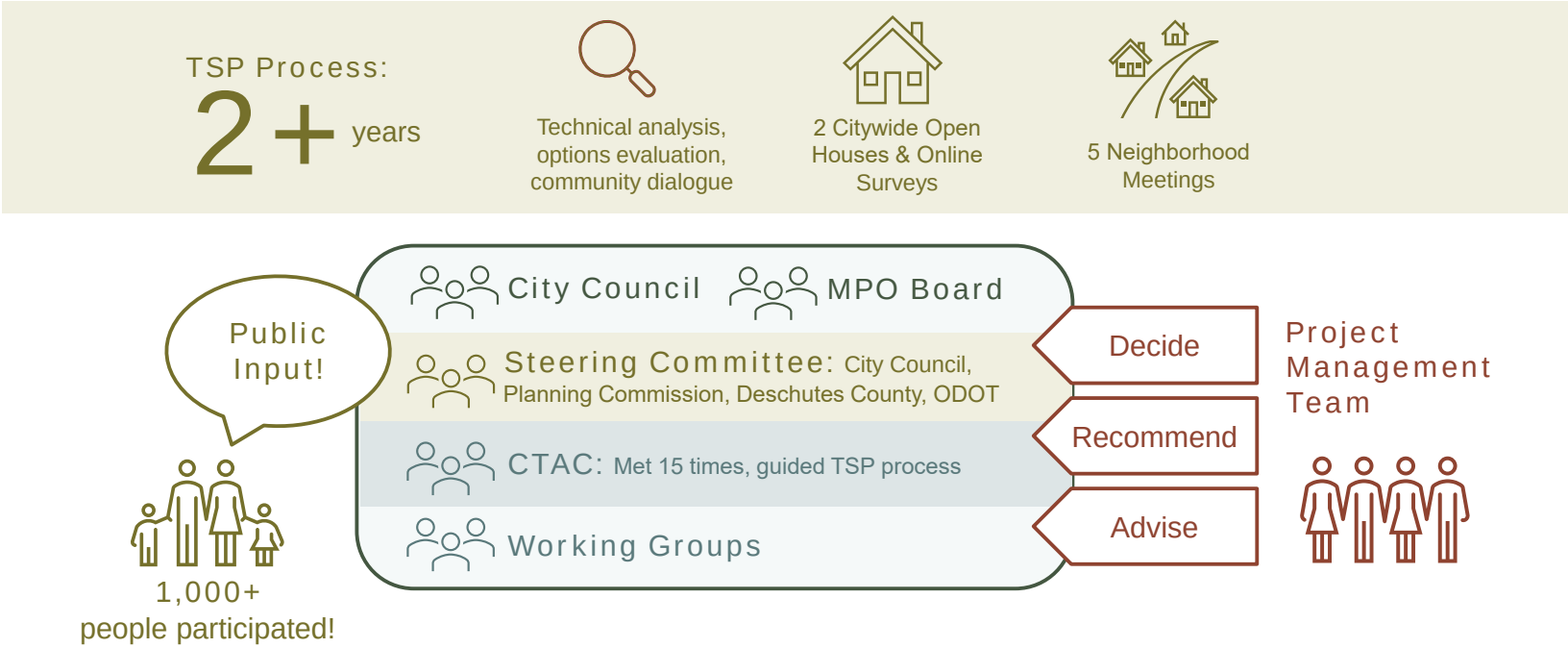
In addition to CTAC, a number of other key stakeholders and many members of the public shaped the decision-making and development for the TSP, as outlined below.

- **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 regular 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.

Figure 1-2. Who was involved?



Southern River Crossing

2

Goals, Policies & Actions

The goals shape the policies and actions in the TSP and guide its projects and programs.

Questions This Chapter Answers

- What goals guide the 20-year Transportation System Plan?
- What policies and actions will be set to carry out these goals?
- How will the goals affect future investment decisions?

2

Goals, Policies & Actions

Introduction

Bend's TSP Goals define the community's desired outcomes for the transportation system. The Goals shaped and guided development of the policies, actions, projects, and programs in the TSP and guide its projects and programs.

Goals

Preamble: The Goals articulated in this document were developed by the 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.

1 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

2 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

3 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

4 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

5 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

6 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

7 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

Deschutes River and Colorado Avenue

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 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.

The Mirror Pond footbridge in winter

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, 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 travel speeds based on the posted speed limit.

>>> Actions:

- The City will plan for, design, construct, and/or reconstruct streets to achieve consistency between travel 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.

>>> Action:

- The City will create a plan that identifies and reduces safety issues caused by residential cut-through traffic throughout the City..

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 transportation system's adequacy and ensure safe, efficient transportation for people using all modes. The City will assess the transportation system's motor vehicular adequacy 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 ODOT.

>>> Action:

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

Students crossing street

Downtown Bend

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 populations historically underserved by the transportation system 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 all community members, with respect to age, race, disability, gender, income, and location in the City, have 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 community members.
- Analyze crash and fatality data to determine where rates are higher in order to ensure that the annual CIP process includes projects that will improve safety outcomes and processes for all community members.
- 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 and will emphasize active engagement and support of those who have been historically underserved.

>>> 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 the needs of community members who face transportation challenges du to their age, status as a working parent, housing proximity to employment, and physical abilities.

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 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 integration, 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,

Community members on the bus

CET Bus and Passenger at Hawthorne Station

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 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 and community members, including those who have been historically underserved in transit, the City will work to improve the availability of all forms of transportation and transportation technologies by establishing mobility hubs and reducing reliance on Hawthorne Station.

>>> Actions:

- 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

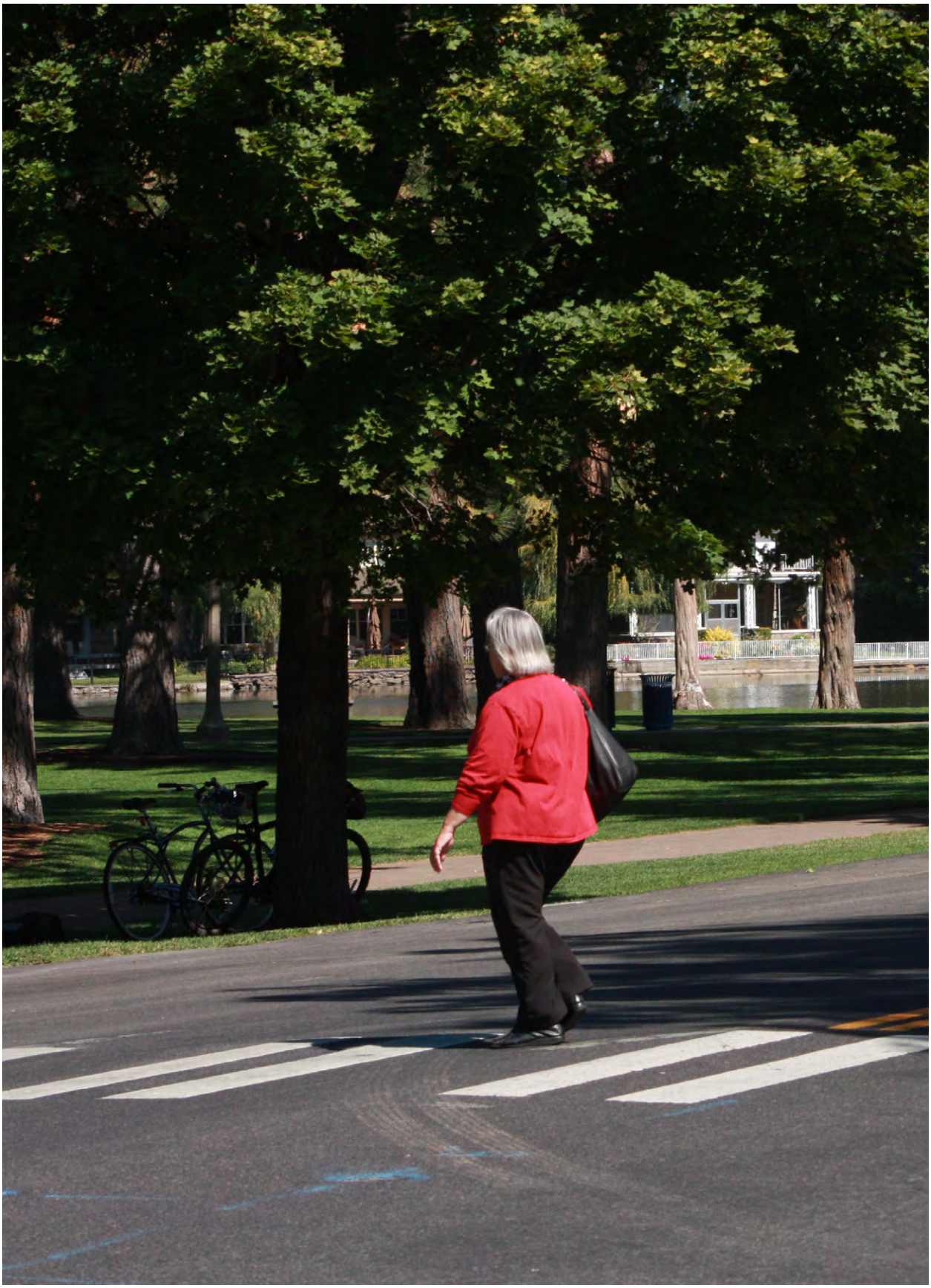
The City of Bend's transportation system will be an interconnected network of complete streets that provides safe, optimized travel for all modes. The system is intended to increase connectivity, safety, and travel time reliability while encouraging walking, biking, and opportunities for using transit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



Pedestrian crossing Riverside Boulevard

Bike Rider in Drake Park

>>> 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.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 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.

3

Transportation System Plan Evaluation Process & Needs

How will the City meet the community's transportation needs in the coming 20 years?

Questions This Chapter Answers

- How is Bend expected to grow over the next 20 years?
- How will the transportation system need to develop in order to support growth?

3

Transportation System Plan Evaluation Process & Needs

Introduction

Bend's 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 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 3-1.

The following figures show the location and

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

Table 3-1: 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	56,690[1]	84,934	28,244 (50%)

1Year 2019 employment data based on preliminary estimates subject to revision.

intensity of projected growth in the Bend area through 2040, including specific opportunity areas and expansion areas identified through the 2016 UGB update. Figure 3-1 illustrates the relative intensity of housing growth in different areas of the UGB, while Figure 3-2 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 3-1. Heat map of projected housing growth (2014-2040)

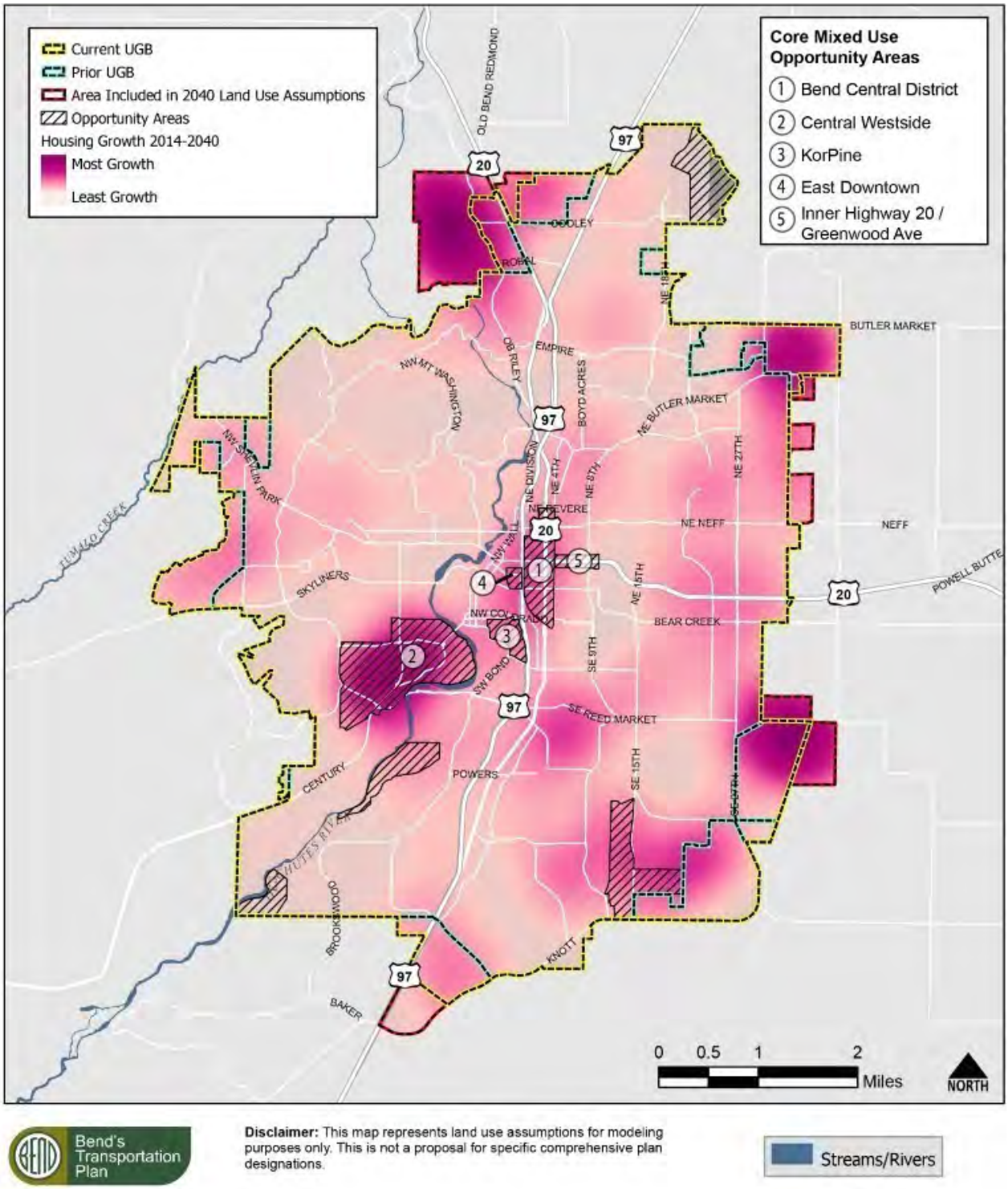
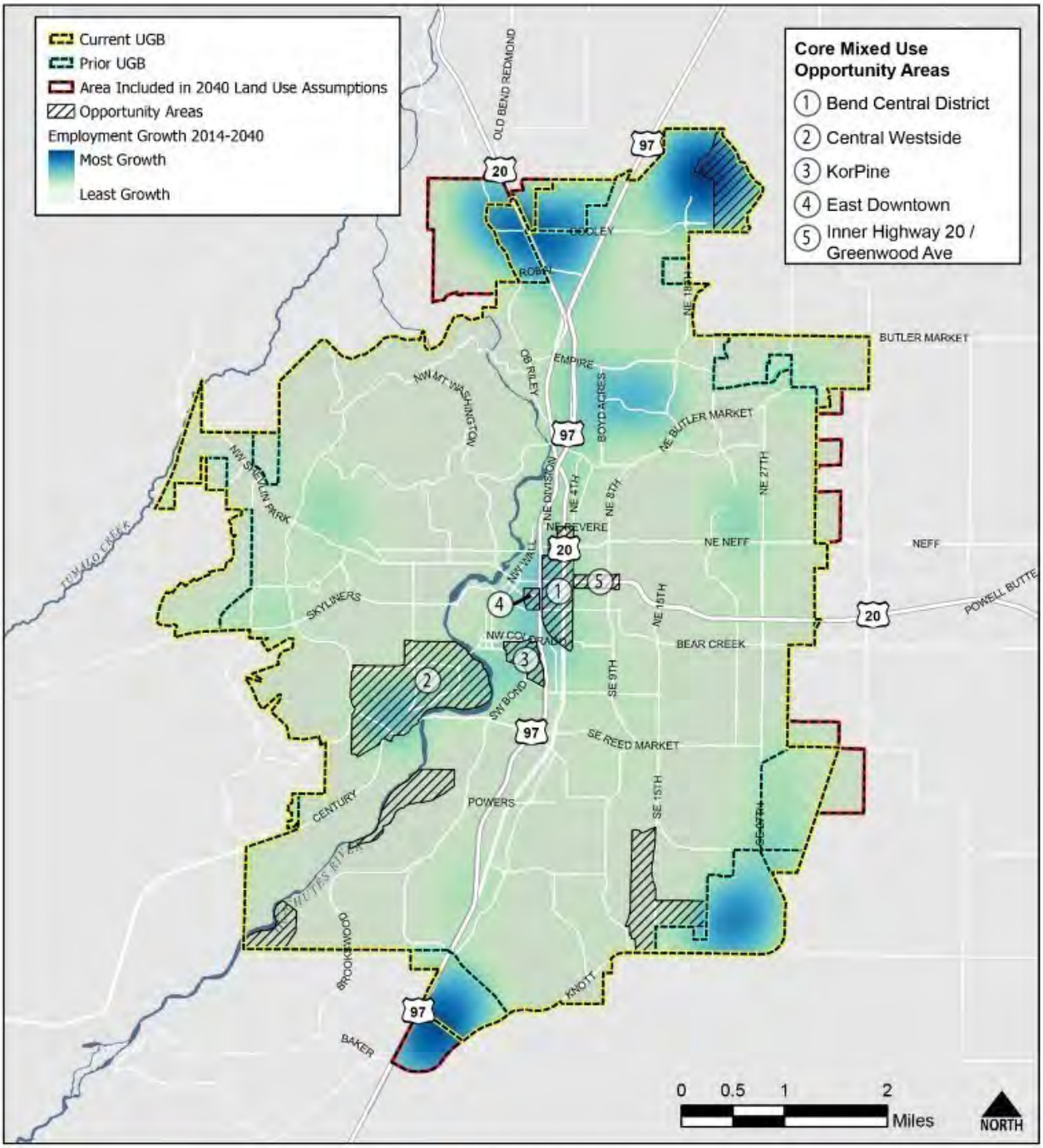


Figure 3-2. Heat map of projected employment growth (2014-2040)



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: 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 TSAP[1] 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.

1 Bend's TSAP is a comprehensive safety program that systematically identifies and prioritizes safety projects and establishes a proactive approach to reducing crash frequency and severity. The analysis work that developed the TSAP is useful to establish a baseline from which to measure progress towards these objectives.

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.

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.

Figure 3-3. Scenario-Based Evaluation

Bike Lanes on Riverside Boulevard

Franklin Avenue in Downtown Bend

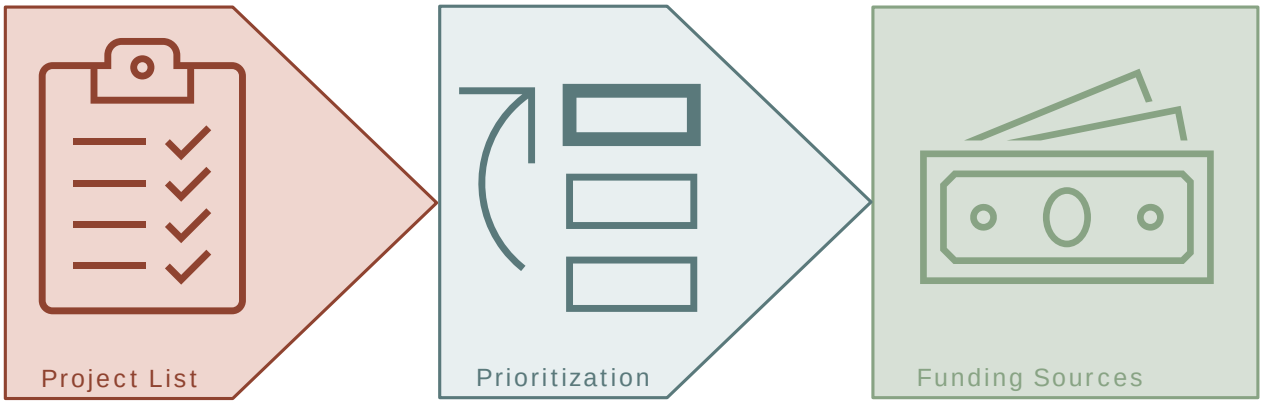
Prioritization & Investment Strategy Identification

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.

Figure 3-4. Project Prioritization



Aerial view of Bend

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 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.

Bus waiting for passengers

4

System Plan Elements

Your transportation needs depend on what mode you are using. The TSP covers all modes, from foot to rail.

Questions This Chapter Answers

- What are the expected needs in Bend for walking, bicycling, transit, vehicle, freight, air, rail and key pipeline facilities in the next 20 years?
- What are the City's plans to meet those needs?

4

Introduction

This TSP communicates a set of policies, programs, and projects to support multimodal transportation system needs within Bend's 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.

Walking and Bicycling Systems

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 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, in Chapter 2 and Chapter 5, respectively, are aimed at serving different types of walking trips for people of all ages and abilities and focus on providing:

- A complete sidewalk network connecting neighborhoods, schools, parks, transit stops and transit hubs;
- Pedestrian-related safety enhancements, particularly for arterial and collector street crossings; and
- Key Walking and Bicycling Routes[1] that link important destinations and provide critical east-west and north-south cross-town travel for people walking and bicycling (See Figure 5-4 in Chapter 5).

The Existing Walking Facilities Map is shown in Figure 4-1. Existing trails and paths are shown in Figure 4-2 (Existing Bicycling Facilities and Paths/Trails).

1 Key Walking and Bicycling Routes are connected segments of low stress bicycle facilities and shared pathways that allow travel across the City.

BPRD Trail System

Existing trails and paths are shown in Figure 4-2 (Existing Bicycling Facilities and Paths/Trails). For planned paths and trails, see the BPRD Trails Map (BPRD Comprehensive Plan adopted July 2018)[2]. The City of Bend TSP incorporates the BPRD Trails Map into its planning. BPRD and the City of Bend recognize that path and trail alignments are conceptual and subject to refinement.

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 (see Figure 4-2: Existing Bicycling Facilities and Paths/Trails).

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 detailed in Chapter 5, which addresses:

- A proposed Low Stress[4] bicycle network (See Figure 5-1 in Chapter 5);
- Key Walking and Bicycling Routes[5] that link key destinations and provide critical east-west and north-south cross-town travel for people walking and bicycling (See Figure 5-4 in Chapter 5);
- A wayfinding signage program;
- Safe Routes to Schools and Parks; and
- Walking and bicycling connections to transit stops and hubs.

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

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 Walking and Bicycling Routes are connected segments of low stress bicycle facilities and shared pathways that allow travel across the City.

Passenger loading bike onto bus

Figure 4-1. Existing Walking Facilities map

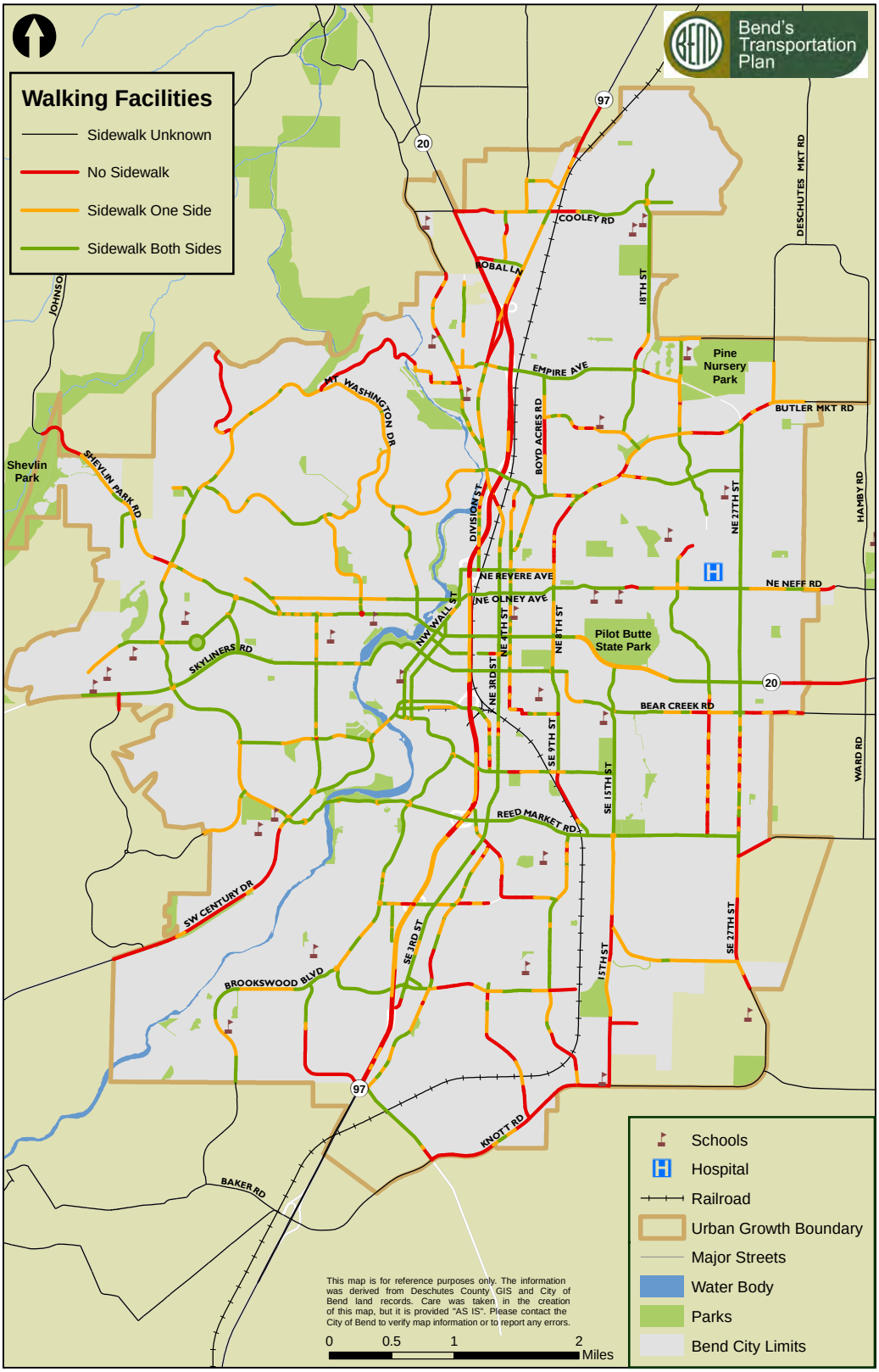
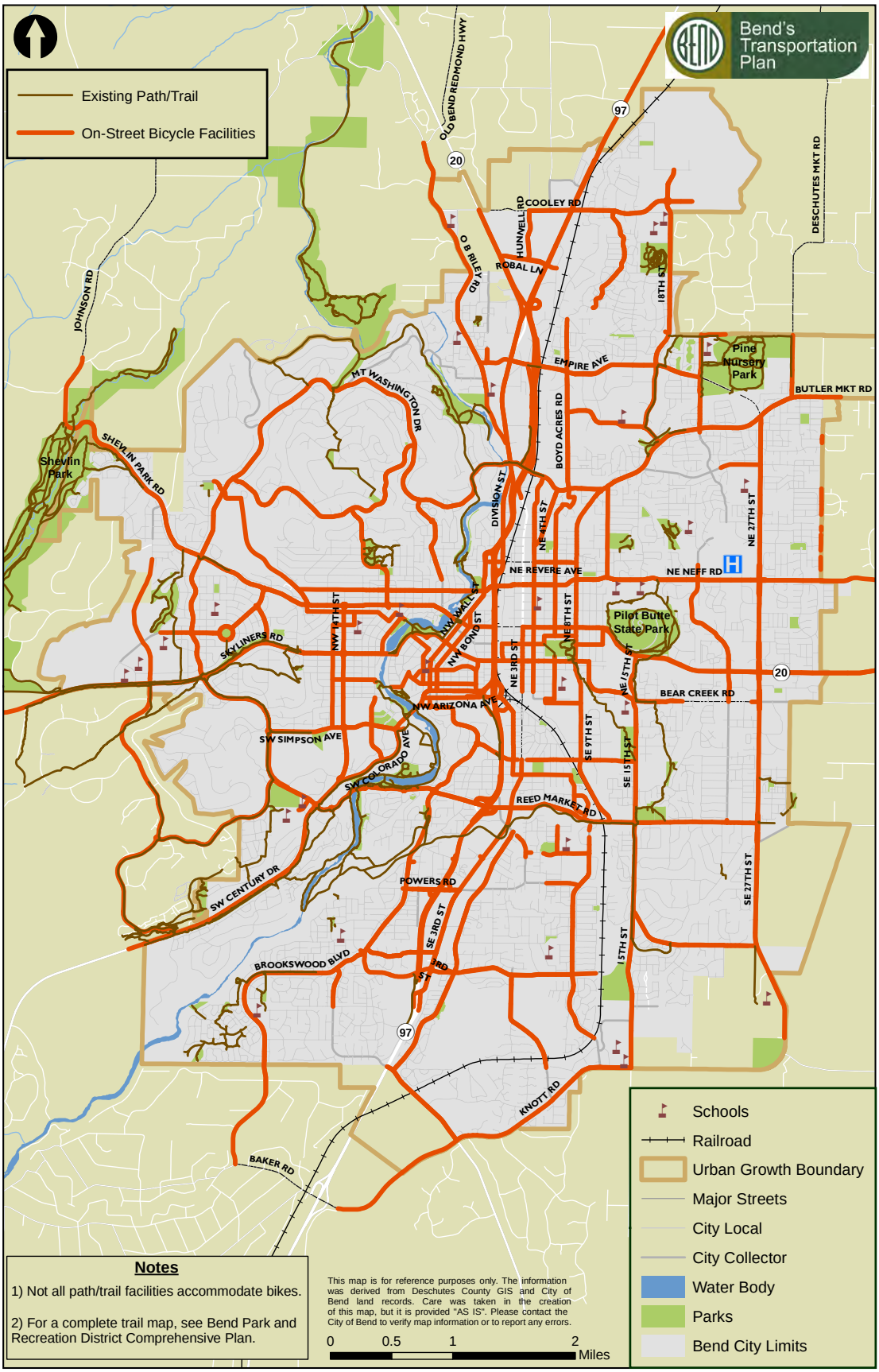


Figure 4-2. Existing Bicycling Facilities and Paths/Trails Map



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 in 2018 by the Second IGA Re: Transit System between the City and COIC. 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 is administered through the State Transportation Improvement Fund (STIF), 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 20 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 COIC Board of Directors, managers, and staff a framework for providing transit and transit-related 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.

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/

The CET Development Plan will synthesize and update the existing Central Oregon Regional Transit Master Plan (2013) and the Bend MPO's Public Transit Plan and Transit Corridor Land Use Assessment (2013). Chapter 5 describes the projects that were identified by both the CET and the City's planning efforts, including:

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

Primary transit corridors[9] and mobility hub locations, as identified within the ongoing CET Master Plan update, are shown in Chapter 5 (Figure 4-2).

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.

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.

9 Primary transit corridors identify the roadway segments that are most significant for transit. These corridors are a mechanism to coordinate transit and land use to achieve land use characteristics that can support a high level of transit service.

Passenger loading bike onto bus

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 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 4-3) shows the Functional Classifications of roadways within the City.

Typical spacing of collectors and arterial facilities within the City are shown in Table 4-1. The precise alignment for new streets will be defined as development occurs.

Functional Classification	Typical Spacing
Major Arterial	1-2 miles
Minor Arterial	0.5-1 mile
Collector	0.5 miles
Local Street	Established by block length and block perimeter standards based on zoning designation

Note: Spacing of State Highways and interchange facilities are governed by applicable ODOT standards.

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.[10]

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

Road with buffered bike lane

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[11] 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

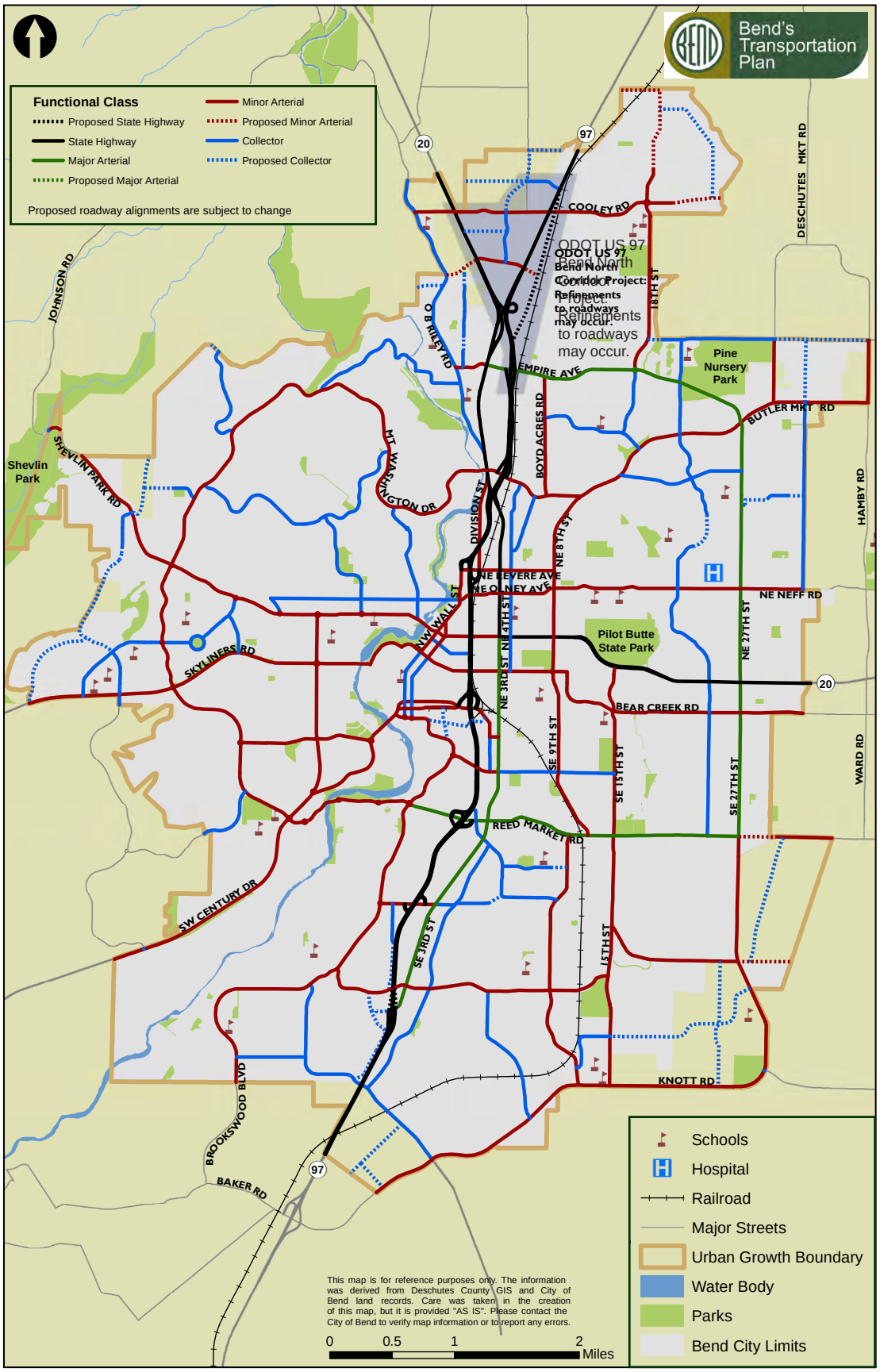
The City's boundaries include two highways[12] that are owned and operated by ODOT: US 20 and US 97 (also known as the Parkway for a portion of its length through the city). These two facilities serve a significant role in regional transportation and freight movement, as well as providing critical connections 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.

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

12 Highways were called "Principal Arterials" in the 2000 TSP.

Vehicles on Bond Street

Figure 4-3. 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.

Fire station with emergency services vehicles

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[13], and OSU-Cascades[14] 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.

The TDM projects and programs identified in Chapter 5 showed a significant contribution to helping projections of future VMT per capita stay below a 5% increase over 2010 levels, meeting State planning regulations.[15]

Transportation Systems Management

The Oregon 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 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.

13 https://www.cocc.edu/about/visitors/transportation.aspx

14 https://osucascades.edu/transportation/cascades-commuters

15 OAR 660-012-0035 (5)

Roundabout in the snow

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.
- *Public Transportation Management*[16]: 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 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.

16 This task will be managed by CET.

For example, early predictions claimed major increases in road system capacity with ADS and AV technology. However, a recent study[17] 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[18] 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 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.

17 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

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

Transportation technology is constantly evolving

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 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.

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

20 Best Practices TDM, Seattle Urban Mobility Plan, January 2008.

21 OAR 660-012-0045

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

Parking in Downtown Bend

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 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 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 and is in the process of drafting a new 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.

South Canyon pedestrian bridge

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.

5

Transportation Projects & Programs

How coordinated transportation investments address transportation needs in the next 20 years

Questions This Chapter Answers

- What specific projects are planned to meet estimated needs in the next 20 years?
- Which projects are top priority, and where are they in the city?
- What are the estimated costs of the planned projects?

5

Transportation Projects & Programs

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 UGB expansion areas); City Council priorities expressed through goals, budgets, and the 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 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.[7]

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 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.

7 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.

Greenwood Undercrossing looking west—a vision for Bend's Core Area.

A detailed funding action plan recommendation[8] was developed by the 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 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 5-1 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.

Operations & Maintenance of Existing Facilities

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.

8 See Appendix A of Chapter 6.

Table 5-1. 2020-2024 City of Bend Transportation Capital Improvement Program

Project	Cost Estimate
Neff & Purcell Intersection Design	$4,150,000
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
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**

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.[9] 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 5-3 through 5-6 present the projects identified in each of the priority categories.

Key Walking & Bicycling Route Priority Recommendations

The TSP update process identified Key Walking and Bicycling Routes that are essential to implementing portions of the planned bicycle Low Stress Network shown in Figure 5-1 as well as continuous walking routes throughout the City. Based on recommendations from the Citywide Transportation Advisory Committee, these Key Walking and Bicycling routes are all included as a near-term priority. The routes are shown in Figure 5-3b will be implemented through the capital projects identified in Table 5-3b.

Transit System

The City of Bend had regular and ongoing coordination with CET, the transit provider for Central Oregon and Bend, throughout development of the TSP 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 a minimum of 5 mobility hubs[10] (including Hawthorne Station);
- 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.

9 As documented in Volume 2.

10 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.

Primary transit corridors[11] and potential mobility hub locations, as identified within CET's Transit Master Plan, are shown in Figure 5-2. The location of Mobility Hubs and transit centers are preliminary and are intended to show the general location of such facilities in each quadrant of the City. Neither the City nor CET have identified specific locations for these facilities.

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.[12]

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 ITS Plan, and the BPRD Trails Map.

11 Primary transit corridors identify the roadway segments that are most significant for transit. These corridors are a mechanism to coordinate transit and land use to achieve land use characteristics that can support a high level of transit service.
12 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.

2nd Street Redevelopment—a vision for Bend's Core Area.

Figure 5-1. Low Stress Bicycle Network

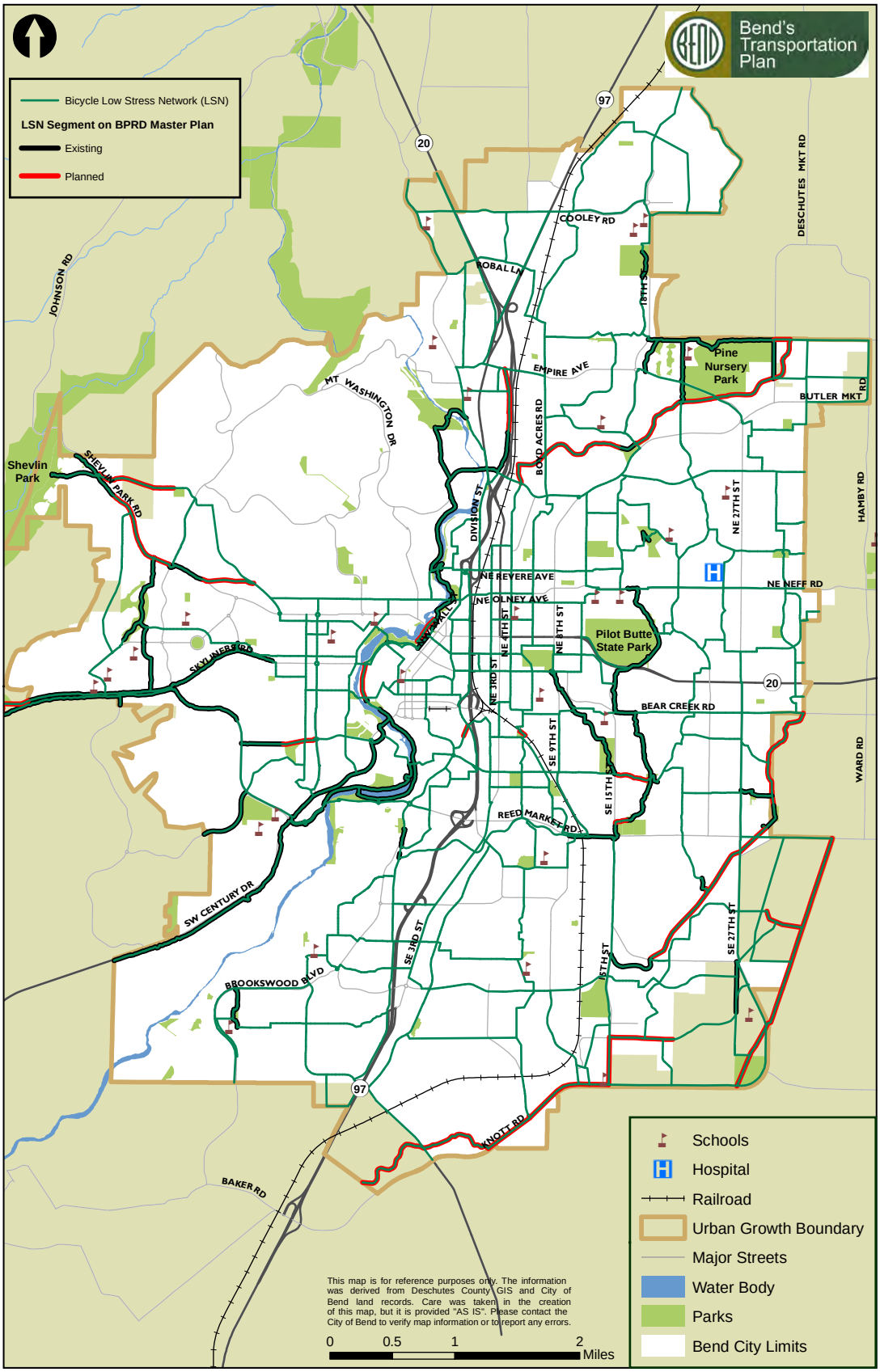
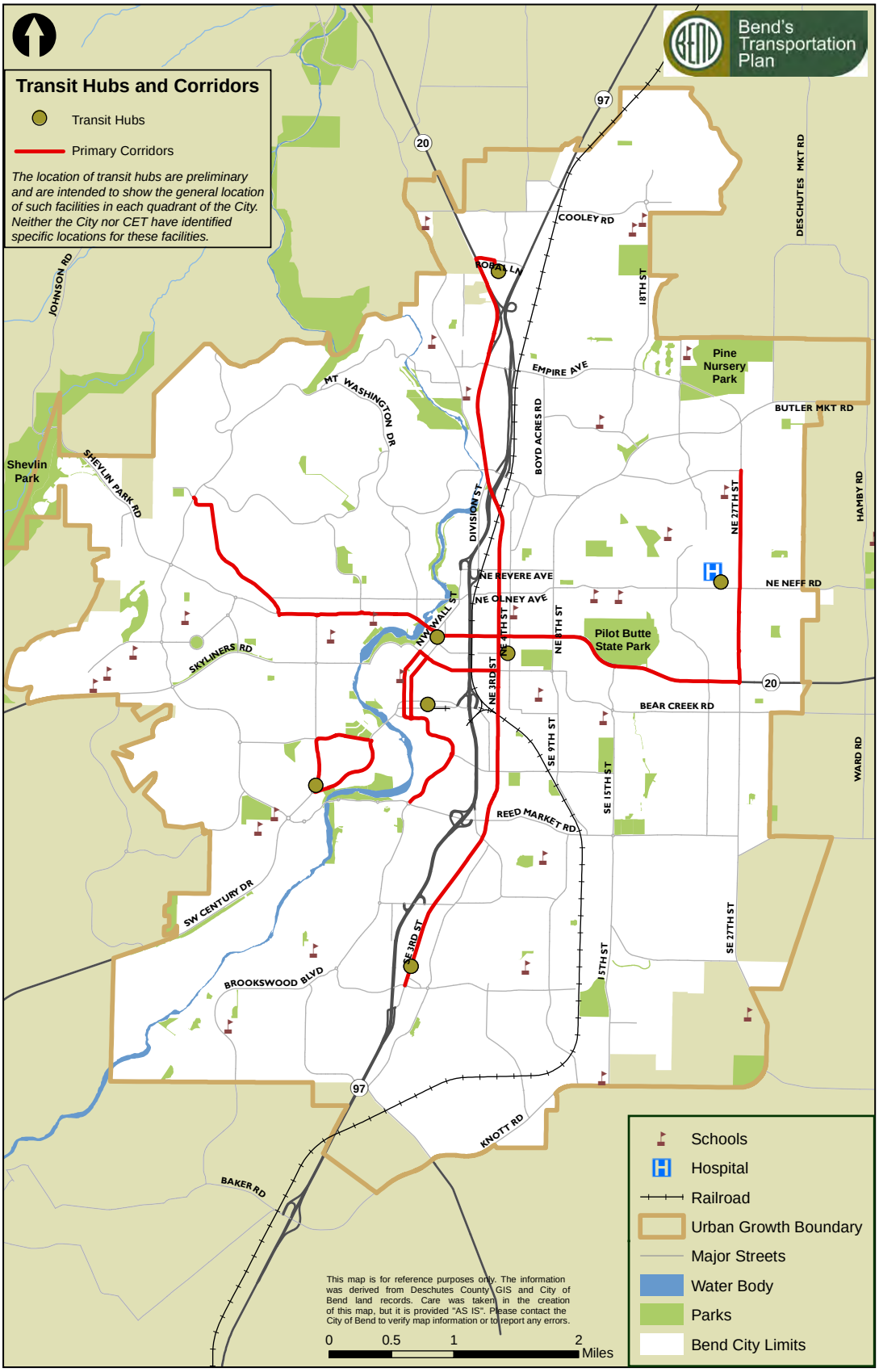


Figure 5-2. Primary Transit Corridors & Mobility Hub Locations



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 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 5-2.

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.

3rd Street looking south—a vision for Bend's Core Area.

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[7] 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).
- **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 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

7 Plan, zone and policy recommendations adopted in Bend's 2016 Comprehensive Plan update.

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:** Proposed projects to improve bicycling within the City include completing the Low Stress Network of bicycling facilities (Figure 5-1) and 12 Key Walking and Bicycling Routes (Figure 5-3b), as well as safety programs. Proposed projects to improve walking within the City include the completion of a Pedestrian Master Plan and the Key Walking and Bicycling Routes projects. Proposed safety programs will also increase walking and bicycling within the City. With the 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 a minimum of five future mobility hubs (Figure 5-2). 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 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 5-2. Recommended Near-term Program Funding Allocation

ID	Program	Description	Estimated Initernal Cost	Estimated Annual Cost [7]	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	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[8]	Program will be coordinated with other City of Bend parking efforts and may be consolidated within a citywide program, as appropriate.

7 Actual annual funding requirements will be based on further review by the City of Bend during the implementation phase of each program.
8 Program costs may be covered by parking revenue.

ID	Program	Description	Estimated Initernal Cost	Estimated Annual Cost [7]	Notes
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.

Bond and Wilson roundabout

Figure 5-3a. Near-Term Projects

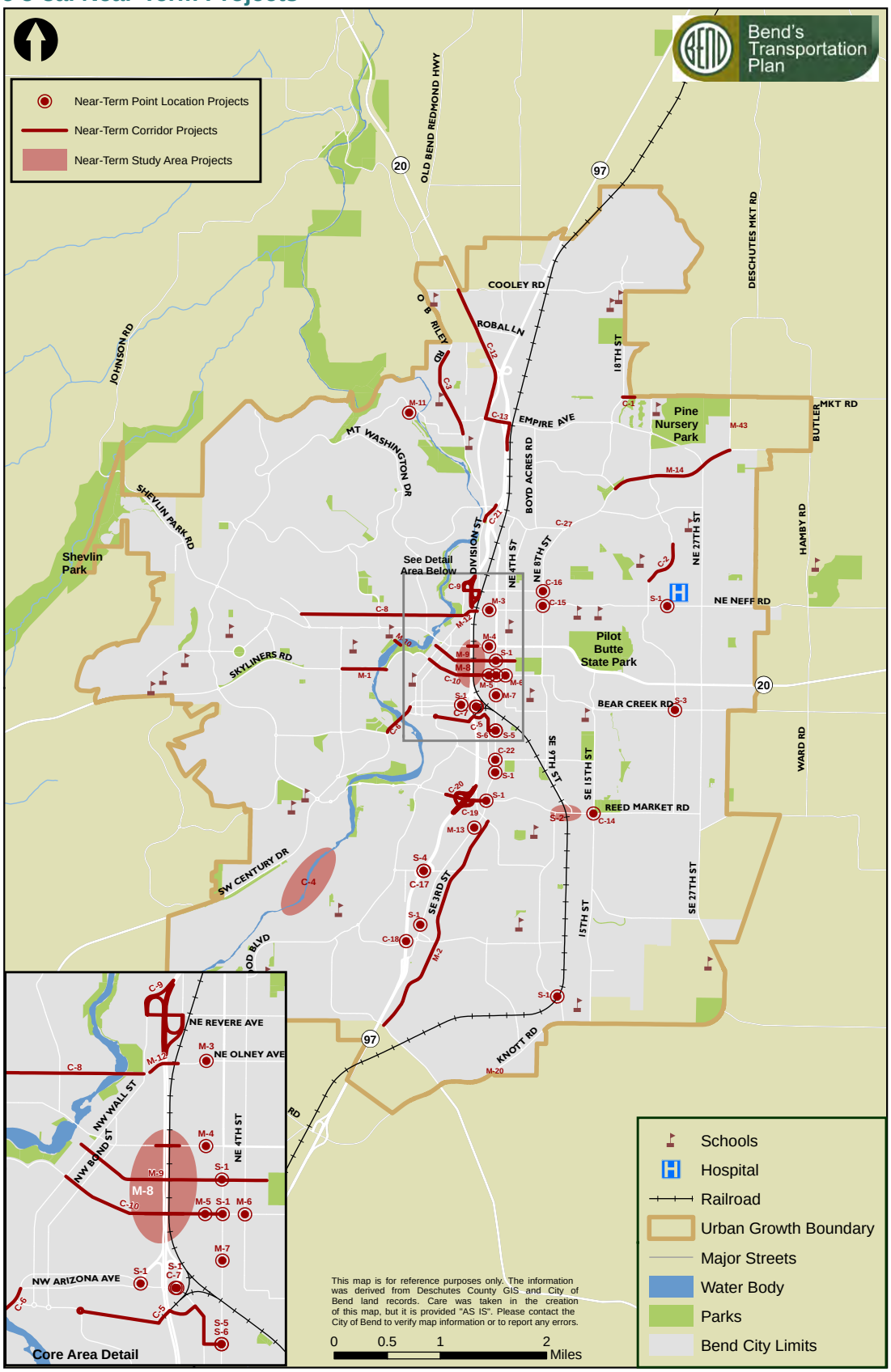


Table 5-3a: Near-term Investment Priorities

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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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
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)

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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.[7]	Safety	$100,000	$100,000
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

7 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.

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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
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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
		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 TSDC Project List 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.

Hawthorne Avenue looking east—a vision for the Bend Central District.

Figure 5-3b. Key Walking and Bicycling Routes

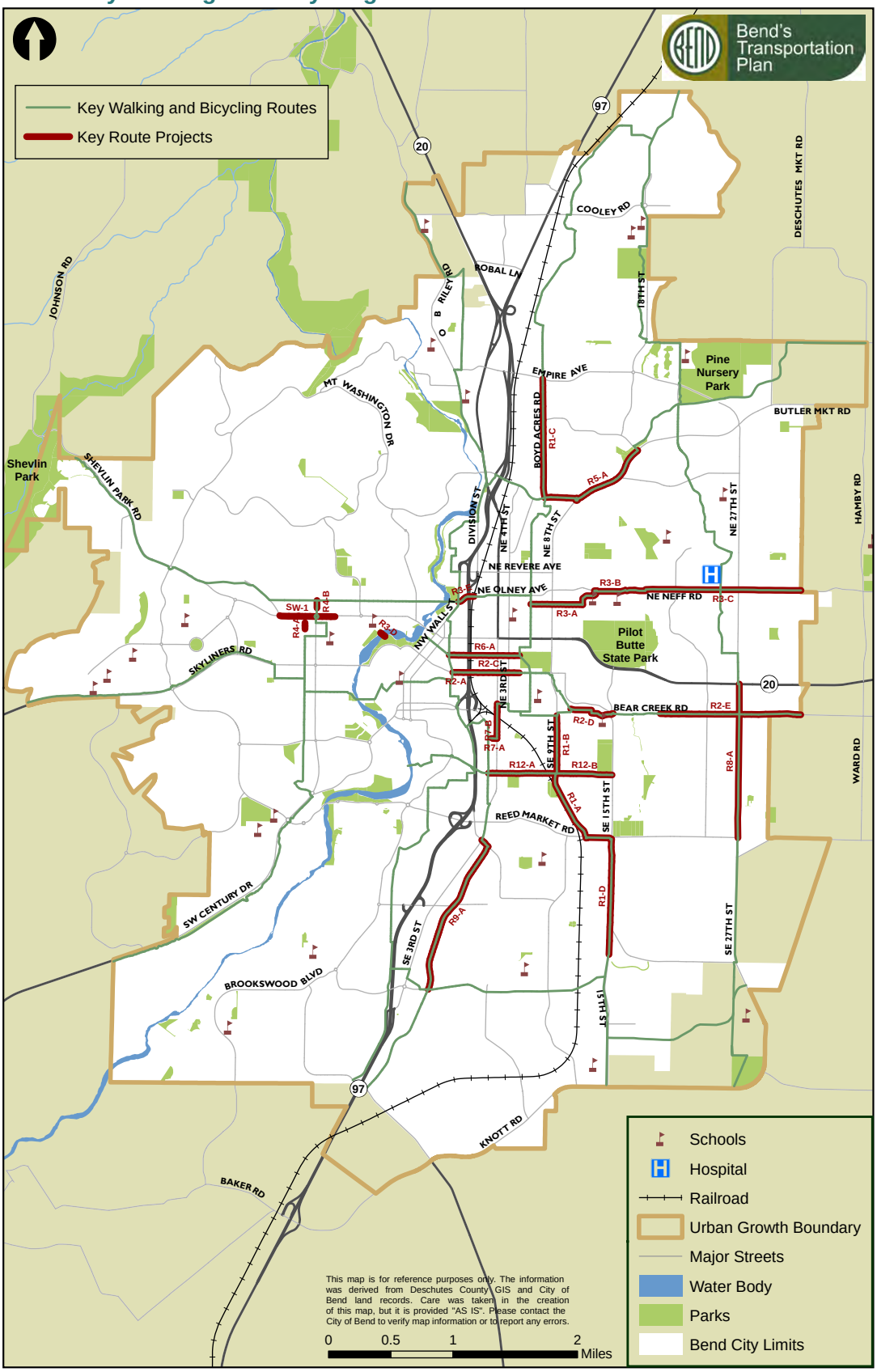


Table 5-3b: Key Walking & Biking Routes & Associated Capital Improvement Projects

ID	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

ID	Project Extents	Facility Type & Description	Cost Projection
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
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

ID	Project Extents	Facility Type & Description	Cost Projection
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 5-4. Mid-Term Projects

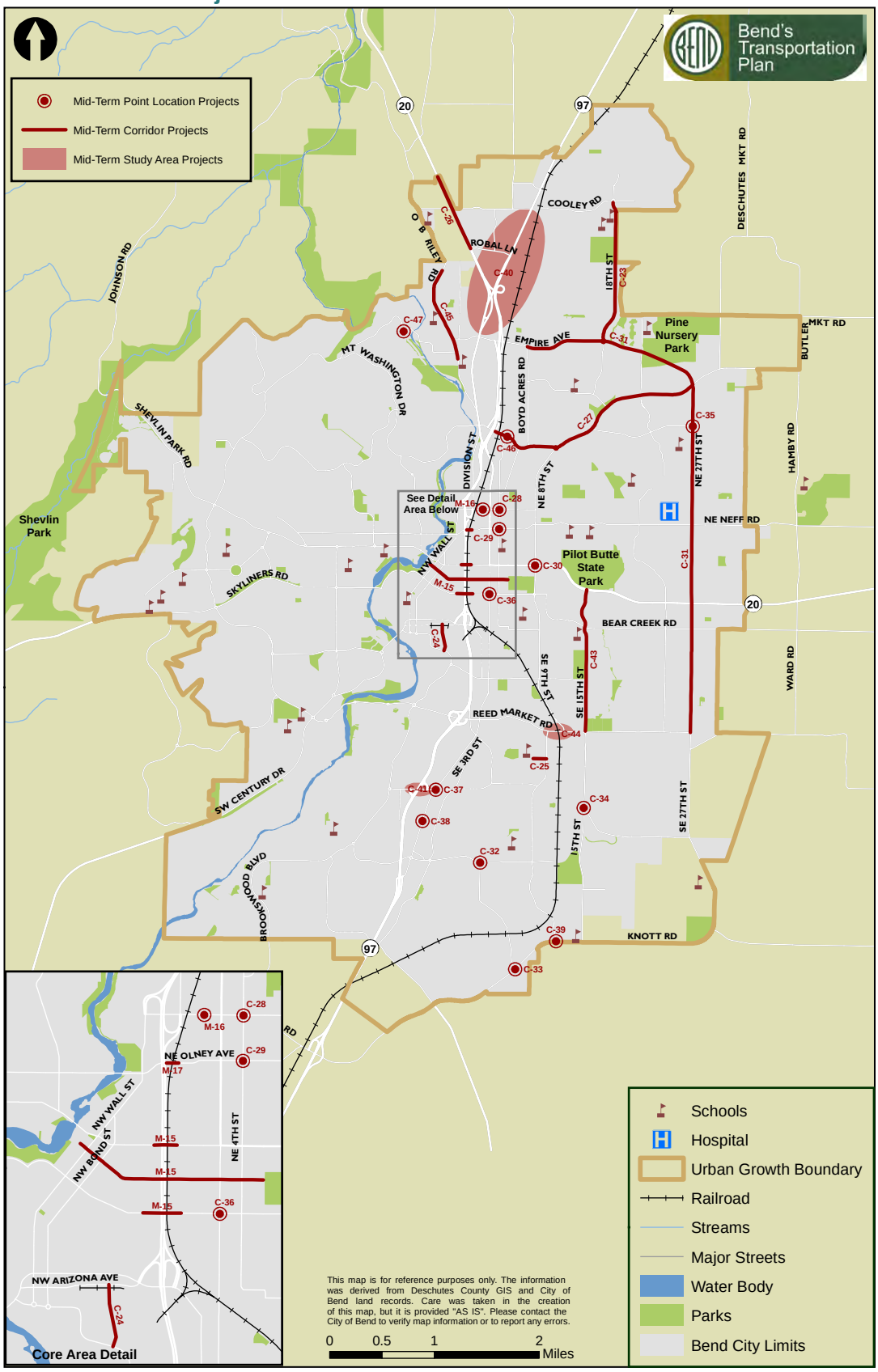


Table 5-4: Mid-term Investment Priorities

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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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
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 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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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
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 TSDC Project List 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 5-5. Long-Term Projects

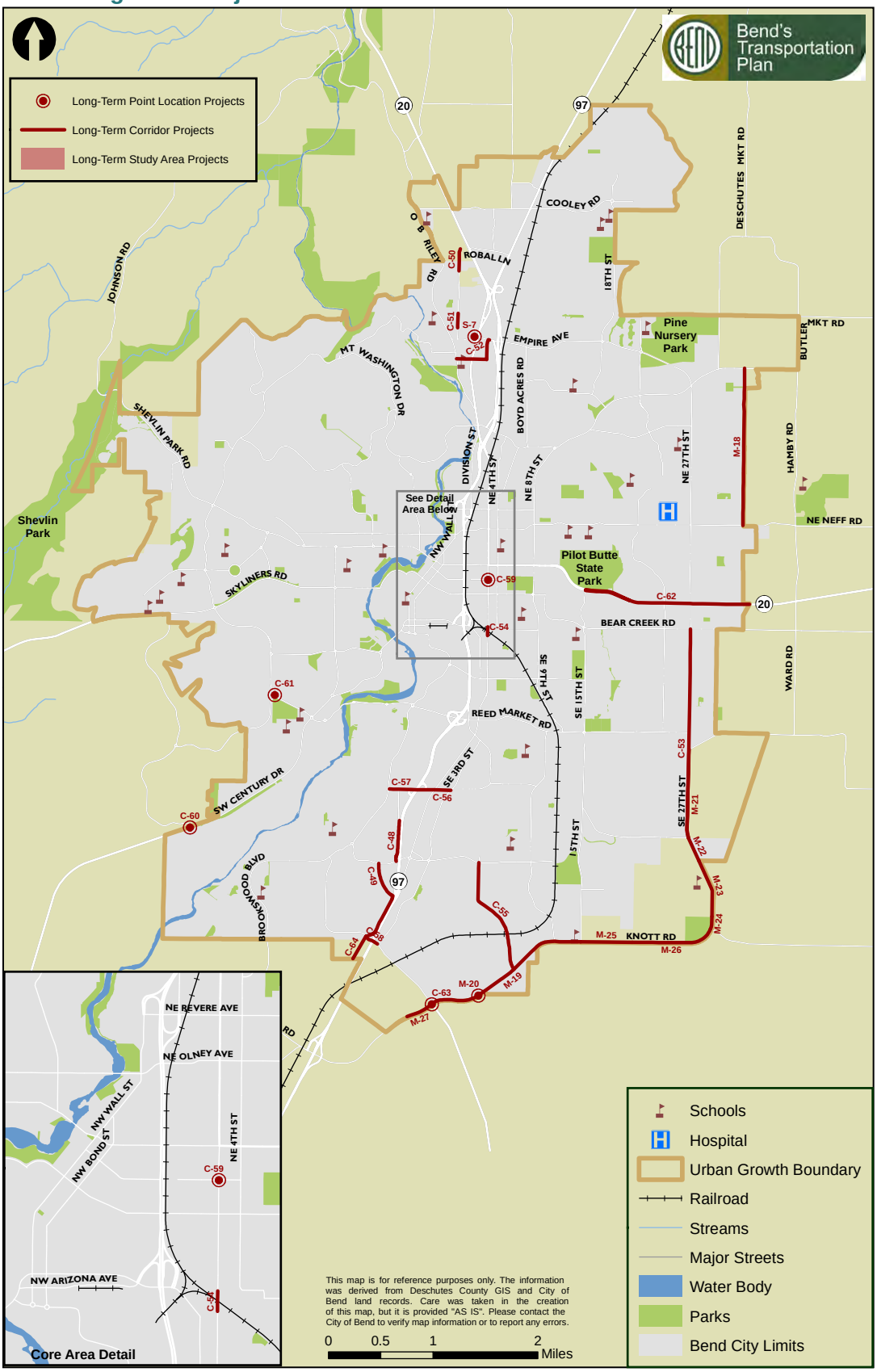


Table 5-5: Long-term Investment Priorities

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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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
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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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 TSDC Project List 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.

2nd Street at Greenwood—looking south, a vision for Bend's Core Area.

Figure 5-6. Expansion Area-Driven Projects

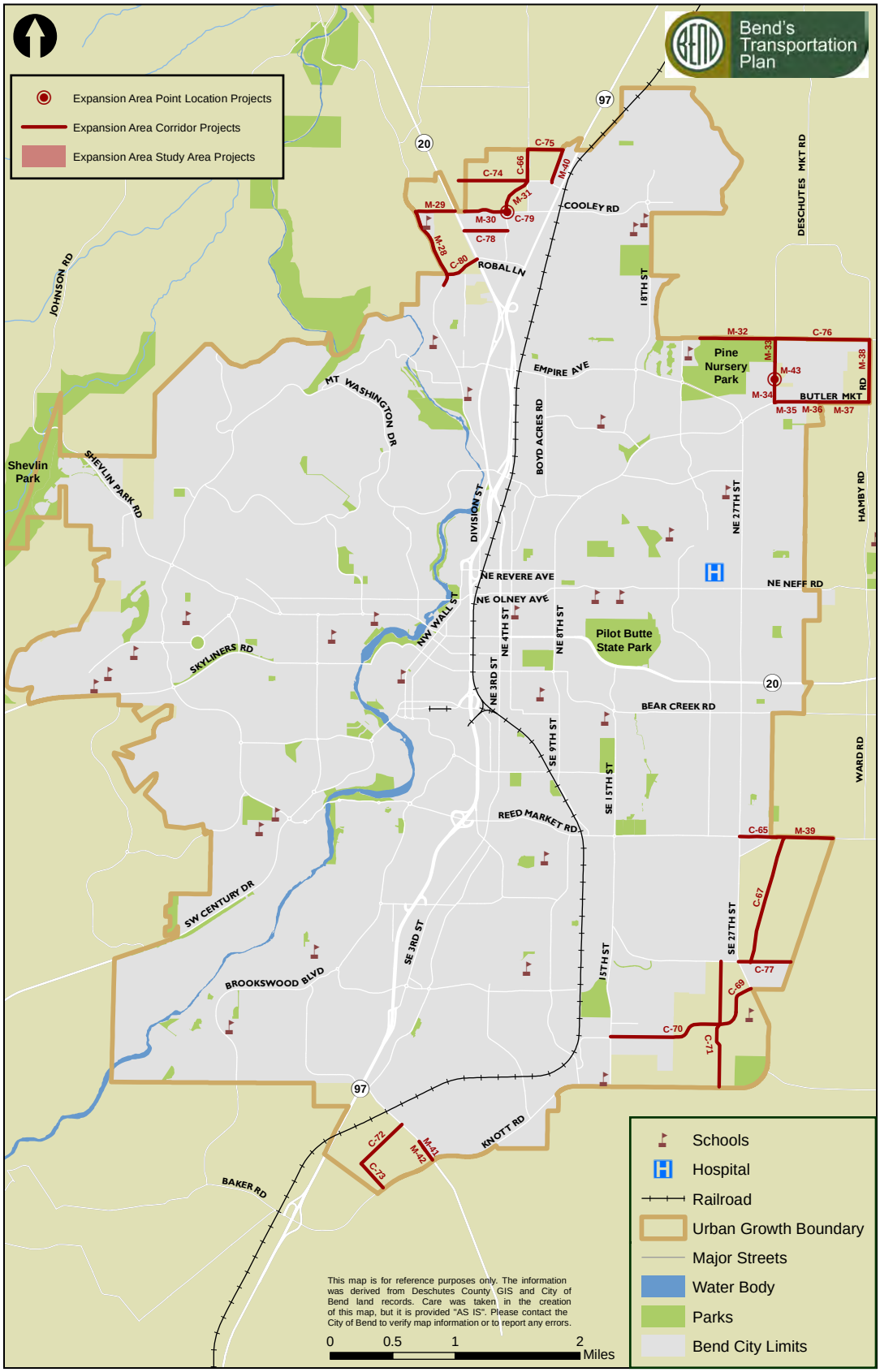


Table 5-6: Expansion Area Driven Projects

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
C-65	Stevens Road realignment	Includes connection to Reed Market Road, intersection improvement at Reed Market Road/Steven Road/27th Street, and bridge to cross canal	Connectivity/ Capacity	$48,600,000	$48,600,000
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-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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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	$3,800,000	$3,800,000
M-31 ●	Hunnell Road rural road upgrade and realignment from Cooley Road to existing Hunnell Road	Construct new collector along “S curve” alignment.	Pedestrian/ Bicycle	$2,600,000	$2,600,000
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

ID	Project	Description/Location	Project Type	Total Cost	City Proportionate Cost
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		**$101,300,000**	**$101,300,000**

● **TSDC –** Project is on current TSDC Project List 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.

6

Transportation Funding Strategy

How will we fund Bend's transportation system needs over the next 20 years?

Questions This Chapter Answers

- What sources are available to fund projects in the Bend TSP?
- What is the City's strategy for filling the anticipated funding gap?

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.
- **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 6-1 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).

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.

Recreational cyclists in Bend

Table 6-1. 2020-2024 City of Bend Transportation Capital Improvement Program

	Near-Term	Mid- and Long-Term
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.
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 6-2, 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 6-2. 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)	($101,300,000)
Estimated Funding Gap	($259,261,000)	($274,254,000)	($101,300,000)

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 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 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). 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.[2]
- **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 6-3 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 6-3. 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.

Funding Tool	Overall Revenue Assumptions	Projected Revenue Potential Years 1-10	Projected Revenue Potential Years 11-20	Applicability to 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.
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.

Funding Tool	Overall Revenue Assumptions	Projected Revenue Potential Years 1-10	Projected Revenue Potential Years 11-20	Applicability to Expansion Area Projects
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 6-3). 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 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.

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).

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.

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 5-2).

This Action Plan is intended as guidance for implementing the funding strategy described in Chapter 5. The Action Plan identifies approaches recommended by the 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 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 A-1 and Figure A-2 are presented as alternative ways to fund the vision of the BTP, between FY Ending 2021–2030.

- **Option A (presented in Figure A-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 A-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]

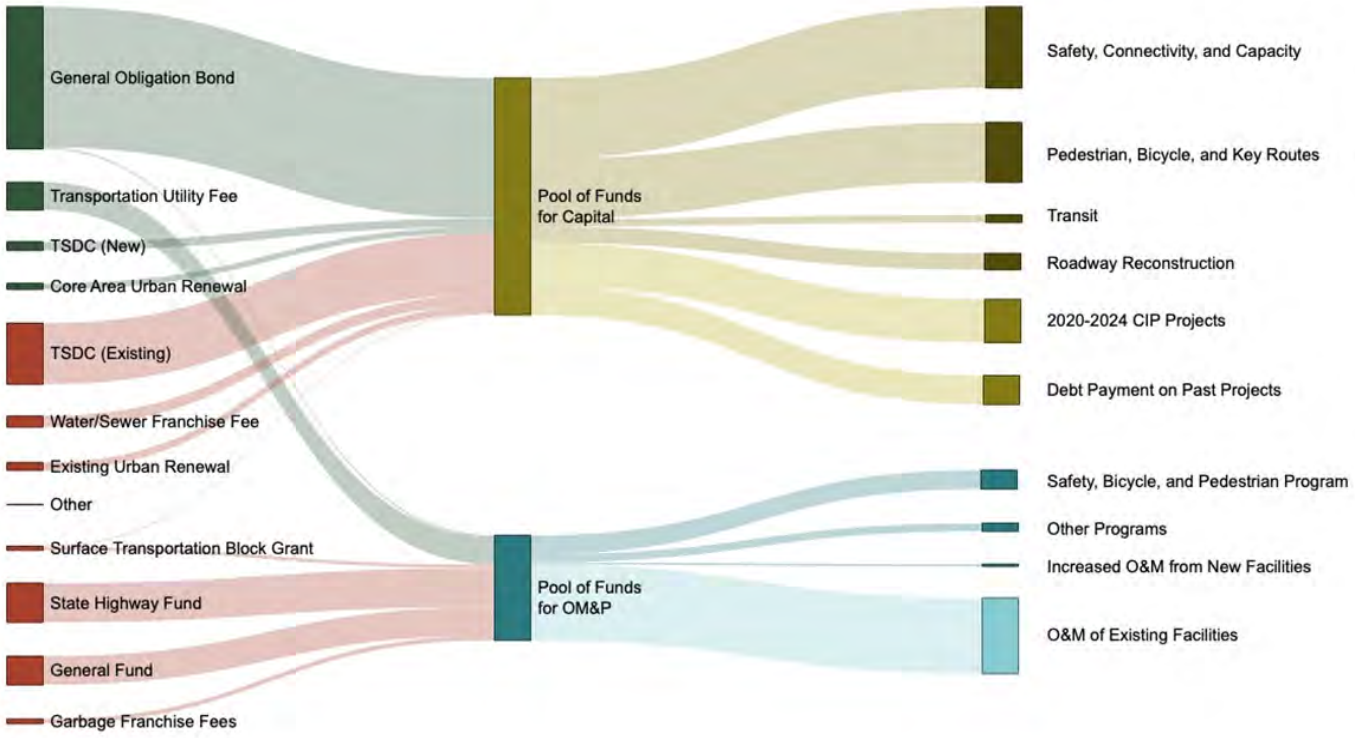
7 These supplemental funding sources in Option A, including a TSDC rate increase, will not be sufficient to reduce the financial impact of a large general obligation bond.

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

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 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.

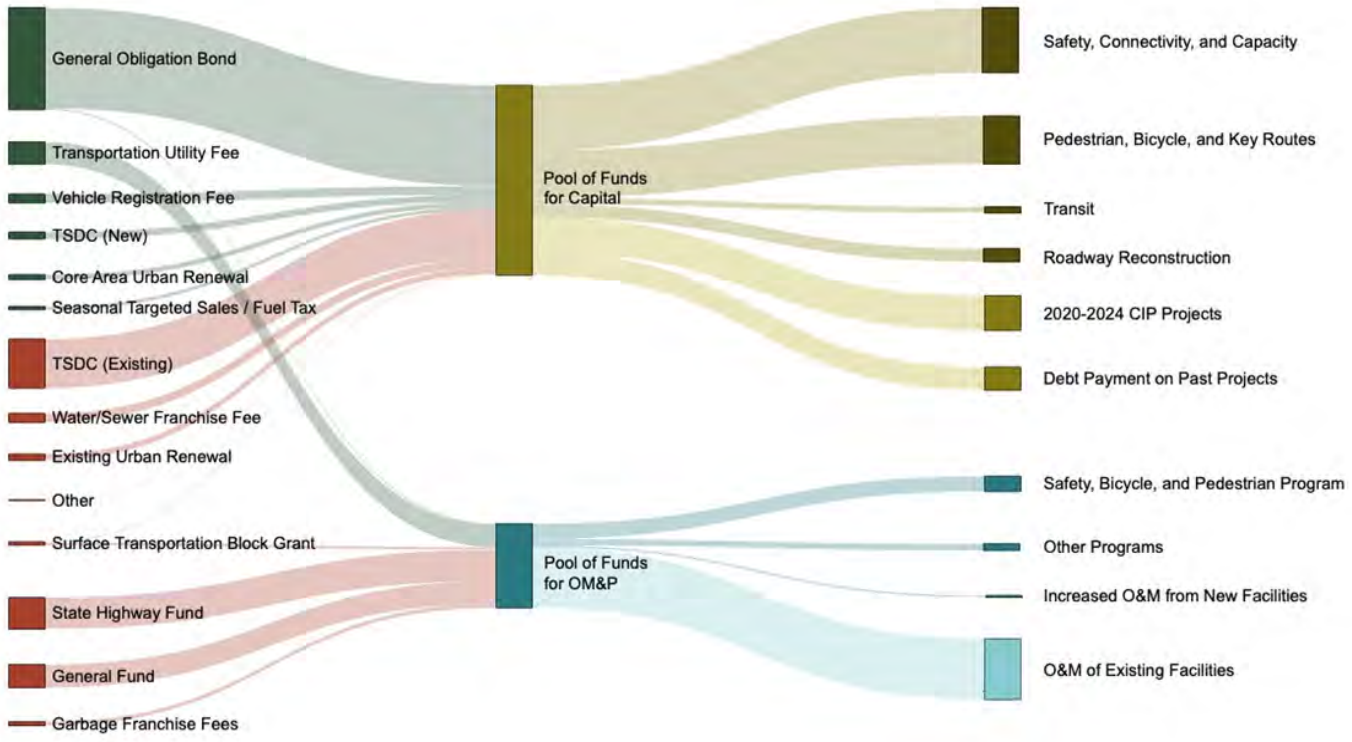
9 The near-term action plan assumes the following for OM&P: 10 years of costs for "O&M of Existing Facilities," five years of costs for "Increased O&M from New Facilities," eight years of costs for "Safety, Bike, and Pedestrian Improvements," and eight years of costs for "Other Programs."

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



Source: Calculations by ECONorthwest.

Figure A-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 TSP, and the City of Bend's existing 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 6-4 presents the revenue projections for capital expenditures and Table 6-5 presents the revenue projections for 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 B-1. 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.

Table B-2. 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. Dashes indicate there is no revenue from that source in that year. Averages only include the years in which the source is generating revenue.

Notes on Tables B-1 and B-2

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 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.

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 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 B-3. Forecast of New Revenues (2018 dollars) for Capital Projects, FY ending 2021–2040

FYE	Vehicle Registration Fee[k]	Seasonal Fuel Tax[l]	Seasonal Food & 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.

Table B-4. 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. Dashes indicate there is no revenue from that source in that year. Averages only include the years in which the source is generating revenue.

Notes on Tables B-1 and B-4

43 The 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.

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.

7

Implementation & Performance Monitoring

How projects will be built and how the City will keep the TSP on target as time passes

Questions This Chapter Answers

- What are the steps for carrying out the projects identified in the TSP?
- How will we know if the TSP is continuing to serve the needs of the community over time?

7

Implementation & Performance Monitoring

This Chapter provides an overview of:

1. How the transportation projects and programs identified in Chapter 5 are implemented
2. 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 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 life cycle 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 life cycle 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 measures 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 intent is that the targets and measures identified below, or their equivalents, will be monitored over time at regular intervals, and the results reported to the community.

Performance Measures & Targets

The performance measures in this Chapter provide quantifiable 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 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 in 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 7-1. Performance Monitoring Targets

Goal Area	Target	Measures and Data Sources
Safety	**Zero transportation-related fatalities.** **Reduction of transportation-related serious injuries by 50%.**	Measurements: 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
Safety	**Establish a speed enforcement, education, and monitoring program within five years of TSP adoption.**	Measurement: Yes/No This target is based on identified Actions in Chapter 2 to implement Policies 19 and 20. A speed monitoring program would evaluate select streets to establish and enforce appropriate motorist speeds based on street context. Data Source: City
Safety	**Establish a neighborhood traffic calming program that addresses cut through traffic and monitors local streets for appropriate levels of vehicular traffic, within five years of TSP adoption.**	Measurement: Yes/No This target is based on an identified Action in Chapter 2 to implement Policy 11. This program may be incorporated into and/or in coordination with the City's existing Neighborhood Street Safety Program (NSSP). Data Source: City

Goal Area	Target	Measures and Data Sources
Equity	**Develop a Transportation Equity Program within three years of TSP adoption.**	Measurement: Yes/No This target is intended to establish a baseline for future related measurements. It is based on identified Actions in Chapter 2 to implement Policies 4 and 5 and is identified as Program P-9 in Chapter 5, Table 2. 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	**Increase travel time reliability for motor vehicles on key arterials.**	Measurement: Reliable travel time is measured by ODOT using the Federal Highway Administration (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. ODOT and the BMPO set the reliable travel time targets as required by the 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. Data Sources: ODOT, MPO, FHWA's National Performance Management Research Data Set or equivalent. Reported every two years.
Mobility	**The City street network pavement with a Pavement Condition Index (PCI) average rating of 80 or higher.** **50% of pavements of Non-Interstate National HWY System (NHS) with a PCI rating of 70 or higher.**	Measurement: Pavement condition is measured using standardized 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 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.
Transportation Demand Management (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. It is based on Policy 30 in Chapter 2 and Program P-2 in Chapter 5, Table 2. Data Source: City

Goal Area	Target	Measures and Data Sources
Bicycle, Pedestrian, & Complete Streets	**Establish a Bicycle and Pedestrian Facility Maintenance Program within three years of TSP adoption.**	Measurement: Yes/No This target is based on identified Actions in Chapter 2 to implement Policies 41 and 48 and Program P-6 in Chapter 5, Table 2. This would include mapping of baseline conditions. It is intended to establish a baseline for future related measurements and targets. Data Source: City
Bicycle, Pedestrian, & Complete Streets	**Adopt the Bikeway Design Guide within five years of TSP adoption.**	Measurement: Yes/No This target is based on an identified Action in Chapter 2 to implement Policy 40. Data Source: City
Bicycle, Pedestrian, & Complete Streets	**All 12 Key Routes complete or in progress by 2030.**	Measurement: Percentage of each Key Route complete. Total number of Key Routes complete. See Chapter 5, Figure 4 and Table 3b 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
Bicycle, Pedestrian, & Complete Streets	**Completion of the bicycle Low Stress Network (LSN).**	Measurement: Yes/No. Percentage of LSN complete. This target is based on Policy 42 in Chapter 2 and Program P-4 in Chapter 5, Table 2. Data Source: City
Bicycle, Pedestrian, & Complete Streets	**Adopt a Pedestrian Master Plan within three 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 measures and targets. This target is based on identified Actions in Chapter 2 to implement Policies 40 and 41 and Program P-5 in Chapter 5, Table 2. Data Source: City
Bicycle, Pedestrian, & Complete Streets	**Implementation of the Pedestrian Master Plan.**	Measurement: Yes/No. Percentage of Pedestrian Master Plan implemented. This target is based on Policy 41 in Chapter 2 and Program P-5 in Chapter 5, Table 2. Data Source: City

Goal Area	Target	Measures and Data Sources
Bicycle, Pedestrian, & Complete Streets	**Update the Standards and Specifications and/or Bend Development Code to identify how complete street elements – including walking, biking and safe crossing infrastructure – will be incorporated during development and redevelopment, new construction, reconstruction and maintenance activities, within five years of TSP adoption.**	Measurement: Yes/No This target is identified as an Action in Chapter 2 to implement Policy 40. Data Source: City
Environment	**Double the percentage of commute trips made by bike, walking, and transit.**	Measurement: 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
Environment	**Zero increase in VMT per capita (from 2010 level).**	Measurement: VMT per capita . 2010 baseline: 9.47 VMT per capita per day VMT estimates are developed by ODOT as required by the FHWA for the Highway Performance Monitoring System (HPMS). ODOT creates estimates for each federal aid urban boundary (FAUB) by functional classification. Data Source: ODOT
Environment	**30% decrease in transportation-related GHG emissions by 2040.**	Measurement: Percentage of decrease in transportation-related GHG emissions. This target is based on the City's 2019 Climate Action Plan. Data Source: City

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