

TABLE OF CONTENTS FOR BEND TRANSPORTATION SYSTEMS PLAN & UPDATES

Title	Date of Adoption	Page
Chapters 1-8 plus glossary & acronyms	2000 (Ch. 1-7) and 2011 (Ch. 8)	2
Chapter 9	2017	230
Integrated Land Use and Transportation Plan	2017	246

Bend Urban Area Transportation System Plan



Copies of this document are available:

On-line at the City of Bend Website at <http://www.bendoregon.gov>

**At the Bend Public Library – in the Resource Section
601 NW Wall Street
Bend, Oregon**

**For additional information and/or arrangements for an interpreter or other
means of communication, please contact
City Administration – (541) 388-5505.**

ACKNOWLEDGEMENTS

CITY AND COUNTY PLANNING STAFFS

Larry Patterson, City Manager
Ron Garzini, Assistant City Manager, COO
Andy Parks, Assistant City Manager, CFO
Deborah McMahon, Development Services Director
John Hossick, Bend Planning Director (retired)
Mike Byers, Bend Principal Planner
Rick Root, Bend Transportation Planner

Mollie Hull, Senior Accountant
Carol Shisler, Office Assistant
Deb Walker, Development Services Tech. II
Cameron Allen, Management Intern
Deborah Hogan, Safe Communities Program
Jude Fulghum, Safe Communities Program

George Read, Deschutes County Community Development Director
Catherine Morrow, Deschutes County Principal Planner (former)
Steve Jorgensen, Deschutes County Transportation Planner
Becky McElrath, Deschutes County computer mapping
Tim Berg, Deschutes County computer mapping

BEND TRANSPORTATION ADVISORY COMMITTEE (2000)

Shane Avery	Michael Lovely	Don Sjolander
Allan Bruckner	Bob Lovlien	Sharon Smith
Louis Conter	Jeff Monson	Tom Szymoniak
Christopher Eck	Tracy Osborn	Ann Wheeler
Hal Efron	Liz Rewick	
John Hummel	Kirk Schueler	<i>Sam Imperati, facilitator</i>
Kevin Keillor	Michael Schwartz	<i>Hillary Berk, facilitator</i>

BEND URBAN AREA CITIZENS TRANSPORTATION COMMITTEE (1994-1997)

Michele McKay, Chair	Bob Kennedy, Vice Chair	Ken Chard
John Diehl	Chris Eck	Rick Slough
Karen Swirsky	Tom Wykes	

TRANSPORTATION TECHNICAL ADVISORY COMMITTEE (2000)

Mark DeVoney, ODOT Region 4 Planning	Deborah Hogan, Safe Communities Program
Peter Russell, ODOT Region 4 Planning	John Simpson, BMPRD
Dick Johnson, Deschutes County Road Dept.	Jeff Monson, Commute Options for C.O.
Gary Judd, Deschutes County Traffic Engineer	Sandra Strieby, COIC
Steve Jorgensen, Deschutes County Transportation Planner	Jim Roderick, Bend-LaPine School District

BEND URBAN AREA PLANNING COMMISSION (1998)

Russ Kiel, Chair	Jeri Alden	Sally Russenberger	Al Tozer
Mike O'Herron, Vice Chair	John Gilbert III	John Schubert	

BEND PLANNING COMMISSION (2000)

Sally Russenberger, Chair	Jeff Ellington	Angela Lee	Robert Naidis
John Gilbert III, Vice Chair	Michael Holtzclaw	Don Leonard	

BEND CITY COUNCIL (1998)

Bob Woodward, Mayor
Kathie Eckman
Bill Friedman
Benji Gilchrist
Suzanne Johannsen
Oran Teater
Jim Young

BEND CITY COUNCIL (2000)

Jim Young, Mayor
Kathie Eckman
Bill Friedman
Benji Gilchrist
John Schubert
Oran Teater
Wyvetta Wilson

DESCHUTES CO. COMMISSIONERS (1998)

Nancy Pope Schlangen, Chair
Robert Nipper
Linda Swearingen

DESCHUTES CO. COMMISSIONERS (2000)

Linda Swearingen, Chair
Tom DeWolf
Dennis Luke

Bend Urban Area Transportation System Plan

PREAMBLE

Bend residents cherish the clean air, pristine mountain views, small town charm and livability of their city. Our community seeks to retain those assets for generations to come. The Transportation Plan for the urban area plays a major role in determining how well we sustain those qualities. This Plan delineates a balanced and well-designed transportation system that is integrated with the diverse goals of the community and provides citizens a range of choices. It seeks to ensure that residents and visitors, with or without an automobile, can enjoy all of the city's amenities and services. The transportation system must be attractive, convenient and preserve the qualities that make Bend a special place to live.

Bend Urban Area Transportation System Plan

Table of Contents

	<u>page</u>
LIST OF FIGURES AND ILLUSTRATIONS	i
LIST OF TABLES	iii
LIST OF APPENDICES	iv
LIST OF RESOURCE DOCUMENTS	v
LIST OF MAP EXHIBITS	vii
LIST OF TSP AMMENDMENTS	vii
PREFACE	viii
SUMMARY	x
 1.0 INTRODUCTION	
1.1 Background.....	1
1.2 History.....	1
1.3 Travel Change.....	2
1.4 Planning for the Future.....	4
1.4.1 Land Supply	4
1.4.2 Future Transportation Network Alternatives	4
1.5 Transportation System Plan Requirements.....	5
1.5.1 Goal 12	5
1.5.2 Transportation Planning Rule (TPR)	5
1.5.3 Bend Urban Area - TPR Requirements	6
1.6 Public Involvement and Interagency Coordination.....	7
1.6.1 Advisory Committees	8
1.6.2 Interagency Coordination	9
1.6.3 Informational Materials and Public Meetings	10
 2.0 EXISTING TRANSPORTATION PLANS, POLICIES AND STANDARDS	
2.1 City of Bend.....	21
2.1.1 Bend Area General Plan	21
2.1.2 City of Bend Zoning Ordinance NS-1178	21
2.1.3 City of Bend Subdivision Ordinance NS-1349	21
2.1.4 City of Bend Street Policies	22
2.1.5 City of Bend Street Standards and Specifications	22
2.2 Deschutes County.....	22
2.2.1 Deschutes County Road Standards	22
2.3 State of Oregon.....	22
2.3.1 Oregon Transportation Plan	22
2.3.2 Oregon Highway Plan	23
2.3.3 Oregon Bicycle and Pedestrian Plan	23
2.3.4 Oregon Public Transportation Plan	23
2.3.5 Oregon Highway Corridor Strategy Plans	23
 3.0 CURRENT TRANSPORTATION CONDITIONS	
3.1 Street System.....	24
3.1.1 Street System Inventory	24
3.1.2 Street System Design	27
3.2 Pedestrian (Sidewalk) System.....	32
3.3 Bikeway System.....	32
3.3.1 On-Street Facilities	32
3.3.2 Off-Street Facilities	32

3.4	Public Transportation System.....	34
	3.4.1 Bend Dial-A-Ride Program	34
	3.4.2 Other Existing Public Transportation Facilities	34
	3.4.3 Other Public Transportation Services	34
3.5	Rail, Air and Road Freight Systems.....	35
	3.5.1 Rail Service	35
	3.5.2 Air Service	36
	3.5.3 Road Freight System	38
3.6	Pipeline System.....	39
3.7	System Safety	39
	3.7.1 Motorized Vehicles	39
	3.7.2 Pedestrians and Bicycles	39
3.8	Existing Population and Employment.....	40
 4.0	 TRANSPORTATION NEEDS ANALYSIS	
4.1	Computer Modeling of the Transportation System.....	42
	4.1.0.1 Population and Employment Forecasts	42
	4.1.0.2 Refinement of the Roadway Network	42
	4.1.0.3 Trip Generation	43
4.2	Transportation System Needs.....	46
	4.2.1 Roadway System	46
	4.2.1.1 Modernization and Capacity Improvements	47
	4.2.1.2 Safety Improvements	48
	4.2.1.3 Operation and Maintenance	50
	4.2.2 Sidewalk and Bikeway System	54
	4.2.2.1 Sidewalk Needs	54
	4.2.2.2 Bike System Needs (on street)	54
	4.2.2.3 Trail System Needs	55
	4.2.3 Public Transportation System	56
	4.2.3.1 Intra-city Public Transportation	56
	4.2.3.2 Inter-city Public Transportation	58
	4.2.4 Airport System	58
	4.2.5 Downtown Parking System	58
 5.0	 TRANSPORTATION ALTERNATIVES ANALYSIS	
	5.0.1 Transportation Goals	60
	5.0.1.1 Goal Statement	60
	5.0.1.2 Plan Goals	60
5.1	Development of Alternatives.....	61
5.2	Description of Alternatives.....	62
	5.2.1 No-Build Alternative	62
	5.2.2 Build Alternatives	63
5.3	Evaluation of the Alternatives.....	64
5.4	Performance of the Alternatives.....	65
	5.4.1 Quantitative Comparisons	65
	5.4.2 Qualitative Comparisons	67
5.5	Recommended Alternative.....	71
	5.5.1 Land Use	72

5.5.2	Public Transportation ⁹	76
5.5.2.0	Recommended Alternative Analysis	76
5.5.2.1	Transit Systems Evaluated	76
5.5.2.2	Transit Service Enhancements	76
5.5.2.3	Transit Service Funding	77
5.5.2.4	Transit Service Phasing Strategy	78
5.5.2.5	Inter-City Transit	79
5.5.3	Travel Demand Management	83
5.5.4	Bicycle and Pedestrian Facilities	84
5.5.5	Street System	86
6.0	TRANSPORTATION SYSTEM PLAN	
6.1	Transportation System Management.....	96
6.2	Transportation Demand Management.....	96
6.3	Pedestrian and Bicycle System.....	97
6.3.0.1	Trip Potential	97
6.3.1	The Pedestrian System	99
6.3.1.1	The Landscape Strip	99
6.3.1.2	Street Crossings	100
6.3.1.3	Multi-Use Trails	101
6.3.2	The Bicycle System	105
6.3.2.1	Bike Lanes	105
6.3.2.2	Bike Parking Facilities	106
6.4	Public Transportation System.....	107
6.4.1	Transit Feasibility	107
6.4.2	Multi-Modal Strategies	107
6.4.3	Community Mobility	107
6.4.4	Public Transportation Facility Design ⁹	108
6.4.4.1	Transit Centers	108
6.4.4.2	Major Transit Stops	108
6.4.4.3	Transit Friendly Design	109
6.4.4.4	Land Use Organization (transit oriented)	109
6.4.4.5	Park and Ride Lots	109
6.4.4.6	Transit Trunk Routes and Transitways	110
6.4.4.7	Transit System Implementation	110
6.5	Street System.....	111
6.5.1	Roadway Classifications	112
6.5.1.1	Expressways	112
6.5.1.2	Principal Arterials	123
6.5.1.3	Major Arterials	126
6.5.1.4	Minor Arterials	127
6.5.1.5	Arterial – Frontage Roads	137
6.5.1.6	Major Collectors	138
6.5.1.7	Residential Local Streets	139
6.5.1.8	Industrial Streets	140
6.5.1.9	Alleys	140
6.5.2	Other Roadway Elements	140
6.5.2.1	Intersections	140
6.5.2.2	Access Management (Median Control)	141
6.5.2.3	Community Appearance	142
6.5.2.4	Steep Slope Areas	142
6.5.2.5	Traffic Calming	142

6.5.2.6	Truck Routes	143
6.5.2.7	Eastside Bypass	143
6.5.2.8	Safety	144
6.5.2.9	Railroad Grade Crossings	144
6.5.2.10	Freight System	145
6.6	Airport Plan.....	145
6.6.1	Local Air Service	145
6.6.2	Regional Air Service	145
6.7	Rail Plan.....	145
6.7.1	Freight Rail Service	145
6.7.2	Passenger Rail Service	146
6.8	Transmission Pipeline Plan.....	146
6.9	Transportation System Plan Objectives, Policies, Benchmarks and Implementation.....	146
6.9.1	Transportation and Land Use	146
6.9.2	Transportation System Management	149
6.9.3	Transportation Demand Management	150
6.9.4	Pedestrian and Bicycle Systems	155
6.9.5	Public Transportation System	160
6.9.6	Street System	164
6.9.7	Rail System	171
6.9.8	TSP Map Updates	171
7.0	TRANSPORTATION SYSTEM IMPLEMENTATION ¹¹	
7.1	Transportation Improvement Planning and Development Providers within the TSP Plan Area¹¹.....	175
7.2	Transportation Funding Sources¹¹.....	177
7.2.1	Historic Transportation Funding Distribution ¹¹	177
7.2.2	Transportation Funding Sources ¹¹	178
7.2.3	Potential New Revenue Sources of Funds for Transportation ¹¹	183
7.3	Project Prioritization¹¹.....	184
7.4	Long Term Transportation Needs.....	185
7.4.0	Transportation Implementation Plan (TIP) ⁶	185
7.4.1	Multimodal System ¹¹	186
7.4.2	Non Roadway System ^{6, 11}	188
	Public Transportation System	188
	Neighborhood Accessway System	189
7.5	Transportation Funding and Prioritization Policies.....	190
8.0	IMPLEMENTATION OF THE TSP	
8.1	Existing Ordinances.....	191
8.2	Planned Implementation Ordinances	194
8.3	Comprehensive Plan Changes	197

GLOSSARY

LIST OF ACRONYMS

APPENDICES A-E : Index of Appendices, TSP Appendices A-E

APPENDIX F [TSP Technical Studies – in a separate bound document]

MAPS

LIST OF FIGURES AND ILLUSTRATIONS

Figure No.	Type	Topic	Page
Chapter 1			
1a	Picture	Early two-way traffic on downtown Wall Street	2
1b	Map	Bend, Oregon 1912	3
Chapter 2 (None)			
Chapter 3			
2	Map	Map of Bend Urban Area – Existing Major Street System	25
3	Map	Map of Existing Bend Area Bridges - Existing	31
4	Figure	Central Oregon Public Transportation Services - Existing	37
5	Map	Map of Transportation Analysis Zones (TAZs)	41
Chapter 4			
6	Figure	EMME/2 Traffic Model - Existing Road Network	44
7	Figure	EMME/2 Traffic Model Future Road Network	45
8	Map	Top Crash Incident Locations-Bend Urban Area (1996-1998)	49
9	Figure	Pedestrian/Automobile Crashes in Deschutes Co. (1996-1998)	51
10	Figure	Bicycle/Automobile Crashes in Deschutes Co. (1996-1998)	51
11	Figure	Street Fund – 5 Year Capital Schedule – Transportation System Repair and Maintenance	52
12	Map	City of Bend – Annexation Area (July 1, 1999)	53
Chapter 5			
13	Figure	5-Bus – Route Alternative	80
14	Figure	9-Bus – Route Alternative	81
15	Figure	Bend Area Transit (BAT) Route System ⁹	82
16 a	Figure	Primary Trail System Priorities	89
16 b	Figure	Sidewalk System Improvement Priorities	90
16 c	Figure	On-Street Bike Lane System Improvement Priorities	92
17	Figure	Recommended Alternative - Level-of-Service (2020)	93
19	Figure	Proposed Realignment of East-West Collect at Regency Street (COCC) and Mt. Washington Drive	95

LIST OF FIGURES AND ILLUSTRATIONS

Figure No.	Type	Topic	Page
Chapter 6			
20	Picture	Landscape buffered sidewalk on Colorado Avenue	99
21	Figure	Example of curb extension retrofit	100
22	Picture	Median allows pedestrian to cross one direction of traffic at a time	100
23	Figure	Pedestrian refuges at a signalized intersection	101
24	Picture	Deschutes River trail	101
24b	Figure	Springwater Trail, Portland, Oregon ⁶	103
25	Figure	Example of retrofitting street to accommodate bike lanes and on-street parking	106
26 a	Figure	South Bend Parkway Refinement Study 2022 Build Alternative “H-Modified”	116
26 b	Figure	Bend Parkway – South End - Proposed Frontage Road	118
27	Figure	A typical Modern Urban roundabout	141
28	Figure	Arterial Streetscape	173
29	Figure	Street Grid System (typical street spacing)	174
Chapter 7 (None)			
Chapter 8			
30	Picture	Example of a 20’ wide curb extension or “choker” on a 30’ wide street	196

LIST OF TABLES

Table No.	Topic	Page
Chapter 1		
1	Chronology of Community Involvement and Public Discussion	12
Chapter 2 (none)		
Chapter 3		
2	Bend Urban Area Existing Traffic Signals (and Roundabout)	28
3	Existing Bend Area Bridges	29
4	Bend Urban Area Trails Inventory (open to public use)	33
5	Truck Activity on US 97 and US 20	38
6	Top Intersection Crash Locations - Ranked by No. of Crashes (1996-1998)	40
Chapter 4 (none)		
Chapter 5		
7	2000-2020 Demographic Comparison for the Bend Urban Area	62
8	Comparison of Per Capita VMT and VHT	68
9	Comparison of Lane Miles of Congestion	68
10	Qualitative Comparison of the Alternatives	70
Chapter 6		
11	Minor Arterials within the Urban Area	137
12	Street Functional Classification (Typical Characteristics)	172
Chapter 7		
13	Historic Transportation Funding Sources ¹¹	177
14 & 14 a	Twenty-year Forecast Funding and Estimated Transportation Forecast Summary ¹¹	187
15	Forecast Potential Transportation Funding Sources – Next 20-years ¹¹	188
16	Miscellaneous Transit Costs ¹¹	189
Chapter 8		
17	Existing Measures that Implement the Bend TSP	191
18	Planned Changes to City Development Codes	194

LIST OF APPENDICES

APPENDICES A-E¹¹ TSP DATA TABLES

Appendix Index (2-pages)

Appendix A: Roadway System Inventory

- A.1.1 Existing Street System - Existing Conditions (3-pages)
- A.1.2 Existing Street System - Future Conditions (3-pages)
- A.1.3 Future Street System – Future Conditions (1-page)

Appendix B: Roadway System Cost Estimates

- B.1.1 Existing Street System - Modernization Costs (3-pages)
- B.1.2 Future Street System - Construction Costs (1-page)

Appendix C: Roadway System Priorities

- C.1.1 Existing Street System - Modernization Priorities (3-pages)
- C.1.2 New Street System - Construction Priorities (1-page)

Appendix D: Roadway System Intersections

- D.1.1 Existing Controlled Intersections: Type of Traffic Control (2-pages)
- D.1.2 Potential Traffic Control: Location, Type, Priority, Cost and Share (2-pages)

Appendix E: Transportation SDC Eligible Projects

- E.1.1 List of Eligible Transportation SDC Projects (3-pages)
- E.1.2 Map of Eligible Transportation SDC Projects (1-page)

APPENDIX F¹¹ TSP TECHNICAL STUDIES

[A separate bound document]

- F Transportation Model (EMME/2) Update, Kittelson and Associates, Inc., June 2000

LIST OF RESOURCE DOCUMENTS

[Note: Resource Document references are delineated in text by “superscript”]

RESOURCE DOCUMENT A Existing Policies, Ordinances and Standards

- A.1 City of Bend - Street Policies
- A.2 City of Bend - Standards and Specifications for Streets
- A.3 Bend Area General Plan (November, 1998)
- A.4 City of Bend - Street Width Exceptions for Awbrey Butte (1983, 1993)
[Resolutions #1679 and #2067]
- A.5 City of Bend Ordinance Amendments re: TPR expedited elements
[Ordinance No. NS-1592]
- A.6 City of Bend Resolution Establishing a Street SDC (1995)
[Resolution No. 2146]
- A.7 Plan Amendments for Trail and Collector Street Additions (1996)
[Resolution No. 2171, 2172, 2173] and Staff Report (June, 1996)
- A.8 City of Bend - Downtown Parking District Ordinance (1996)
[Ordinance No. NS-1655]
- A.9 City of Bend - Street Width Reduction in Residential Zones (1996)
[Ordinance No. NS 1661]
- A.10 City of Bend and Deschutes County Agreement - for the Joint Management of the Bend Urban Area, 1998
- A.11 City of Bend – BMPRD Resolution No. 228 / Intergovernmental Agreement (IGA), 2003 ⁶
- A.12 Bend City Council - Transportation Implementation Plan (TIP), 2001⁶
- A.13 City of Bend and COIC Agreement for Transfer of Bend Area Transit (BAT), 2010 ¹¹
- A.14 City of Bend and ODOT Agreement for Juniper Ridge Zone Change, 2011 ¹¹

RESOURCE DOCUMENT B City Transportation Studies and State Plans

- B.1 Bend Municipal Airport Master Plan, 1994
- B.2 Bend Urban Trails Plan, 1995
- B.2.1 Rails-With-Trails – Lessons Learned, U.S. Dept. of Transportation, 2002 ⁶
- B.2.2 BMPRD – Deschutes River Trail – Action Plan, 2002 ⁶
- B.2.3 City of Bend – Assessment of Bicycle and Pedestrian System Needs, August 2006 ⁶
- B.3 Bend Urban Area Transit Feasibility Study, 1994
- B.4 Bend Urban Area Transit Feasibility Study, 1996
- B.5 Dial-A-Ride Study for the City of Bend, 2000
- B.5.1 City of Bend – Final Service Plan, 2006 ⁹
- B.6 Newport/Greenwood Transportation Corridor Report, 1994
- B.7 Bend – Redmond Shuttle Service Feasibility Study, 1997
- B.8 Bend Downtown Parking Plan, 1996
- B.9 Bend Area-Wide Travel Forecasting Model, 1991
- B.10 Bend Area Travel Demand Forecasting Model Update, 1996
- B.11 U.S. Highway 97 Corridor Strategy, ODOT, 1995 and City of Bend
[Resolution of Support - No. 2156]
- B.12 U.S. Highway 20 (East) Corridor Strategy, ODOT, 1996
- B.13 U.S. Highway 20 (Salem to Bend) Interim Corridor Strategy, ODOT, 1998 [Resolution of Support - No. 2254]
- B.14 Oregon – Transportation Plan, 1992
- B.15 Oregon – Bicycle and Pedestrian Plan, 1995
- B.16 Oregon – Public Transportation Plan, 1997
- B.17 Oregon – Highway Plan, 1999

RESOURCE DOCUMENT C Public Involvement Summaries

- C.1 Transportation Plan Update Public Involvement Report, 1994
- C.2 Bend Urban Area Transportation Issues Phone Survey, 1994
- C.3 Transportation Plan Update Slide Presentation, 1994
- C.4 What's Around the Next Bend - Open House, March 1995
- C.5 Deschutes County, Bend and Redmond Land Use Alternative Project, 1995
- C.6 Land Use Alternatives TGM Project - Public Involvement, 1995
- C.7 Deschutes County - Neighborhood Quality Survey: NE Study Area, 1996
- C.8 What's Around the Next Bend - Open Houses, July 1997
- C.9 Bend Community Survey 1999 (March 2000 Summary)
- C.10 Bend Transportation Advisory Committee – Recommendations, May 2000

RESOURCE DOCUMENT D Old Mill Site – Traffic Studies

- D.1 Old Mill Site – Transportation Master Plan, October 1995
- D.2 Old Mill Site – Transportation Impact Analysis, January 1997
- D.3 South Bend Deschutes River Crossing Analysis, December 1997
- D.4 South Bend Deschutes River Crossing Analysis - Addendum, February 1998
- D.5 Old Mill District River Crossing Analysis, April 1998
- D.6 Old Mill District River Traffic Impact Analysis, October 1999

RESOURCE DOCUMENT E Transportation Funding Documents

- E.1 City of Bend - Capital Improvement Program FY99/03
- E.2 ODOT - Statewide Transportation Improvement Program (DRAFT)
 FY 2000-2003
- E.3 City of Bend – Transportation System Development Charges Report, May 2000
- E.4 City of Bend - Capital Improvement Program FY 2011-2013 ¹¹
- E.5 Bend Metropolitan Transportation Improvement Program (MTIP), Nov. 2011 ¹¹
- E.6 ODOT - Statewide Transportation Improvement Program (STIP) 2012-2015 ¹¹
- E.7 City of Bend – Transportation Systems Development Charge Methodology, Sept. 2011¹¹

LIST OF MAP EXHIBITS

- A. Bend Urban Area Bicycle and Primary Trail System Plan Map
- B. Bend Urban Area Roadway System Plan Map
- C. Bend Urban Area Trail Surface Type Map
- D. Bend Urban Area Sidewalk Inventory Map

List of TSP AMMENDMENTS

	[Brief Description]
1. ORDINANCE NO. NS-1852 12/18/2002	[Industrial Way, Bond and Wall streets]*
2. ORDINANCE NO. NS-1912 03/03/2004	[Arterial: Right-Turn Lanes]
3. ORDINANCE NO. NS-1915 03/03/2004	[Cooley Road/Hwy 97 Grade Separation]
4. ORDINANCE NO. NS-1953 12/15/2004	[Street Policy 21] *
5. ORDINANCE NO. NS-2013 06/21/2006	[Street Policy 21] *
6. ORDINANCE NO. NS-2026 10/18/2006	[Bicycle & Pedestrian Plan] AND [TIP]*
7. ORDINANCE NO. NS-2032 11/15/2006	[Murphy Crossing Plan]
8. ORDINANCE NO. NS-2038 01/17/2007	[Misc. Street System Chapter 5 & 6]*
9. ORDINANCE NO. NS-2043 03/21/2007	[Transit: Chap. 3, 5 & 6 & Misc. Street System: Chap. 6]*
10. ORDINANCE NO. NS-2047 05/16/2007	[Chapter 6 Policy]*
11. ORDINANCE NO. NS-2200 05/01/2013	[Replacement: Chap. 7 & TSP Appendices: A-E]*
12. ORDINANCE NO. NS-2213 02/19/2014	[UGB Expansion & TSP Map for Middle School]
13. ORDINANCE NO. NS-2215 03/05/2014	[Ch 7, Appendix C, TSP Maps US 97 North Corridor]
14. ORDINANCE NO. NS-2216 03/05/2014	[Ch 7, Appendix C, TSP Maps City updates]

**** Indicates amendment (all or in part) made to address the State of Oregon DLCD Remand of TSP***

PREFACE

Bend has had a transportation component of the City General Plan since the mid-1970s and the City has conducted many other transportation planning efforts outside the land use process, too. As time has gone on, many refinements have been made to these planning documents. The latest refinement of one of these plans by the City is the development of the Transportation System Plan (TSP). The TSP has been specifically designed to meet requirements of the State Transportation Planning Rule (TPR), which is an administrative rule enacted by the Land Conservation and Development Commission, to better fulfill the state of Oregon's Land Use Goal on Transportation (State Land Use Goal #12).

The purpose of the Bend Urban Area* TSP is to help guide the development of a transportation system that will meet the forecast needs of the Bend community to the year 2020. This plan provides a policy and plan framework that will continue to enable Bend to design a balanced transportation system for the near-term and the next twenty years. Strategies for planning and implementing a wide range of transportation components are addressed in the TSP including automobile, public transportation, bicycle and pedestrian travel. (*The TSP includes transportation planning for the urban reserve area.)

The TSP provides city of Bend compliance with the requirements set out in Oregon Administrative Rule: 660-12. This is otherwise known as the Transportation Planning Rule (TPR). The TPR requires that the City develop a multi-modal transportation planning strategy that will reduce principal reliance on the automobile. In 1998, the City updated its comprehensive planning document: *The Bend Urban Area General Plan* as a part of the City's obligation to meet these requirements. *The Bend Urban Area Transportation System Plan* includes other recommended changes to the General Plan and local land use Ordinances that will further provide transportation planning policy and codes that will help to fulfill the direction of the TPR.

The completion of both the General Plan and this Transportation System Plan culminated a long planning process that began in 1994. The City used a variety of techniques and forums to gather ideas from the citizens of the community, to explain planning concepts in the Plans and to evaluate public comments.

A permanent and on-going forum for citizen involvement is the Bend Planning Commission. The Planning Commission is the official Citizens' Involvement Committee for the urban area, and advises the elected bodies on land use planning programs and policy and fulfills the Statewide Planning Goal #1 for local citizen involvement. Also, the City utilized a number of specially formed committees focused on developing these plans. One of these committees was a 20-member, broad based citizen committee

- viii -

organized to provide specific input on the development of the General Plan update. Another, more specialized, seven-member committee, focused on transportation components of the plans. In 2000, the City engaged the services of yet another citizen's advisory group, comprised of 17 people, called the Bend TSP Citizens Advisory Committee (BTAC) to review the December Preliminary Draft of the TSP.

At the end of Chapters 6 and 7 are policies (reflecting General Plan Policy modifications recommended by BTAC) that address issues discussed in the TSP. These policies are statements of public policy and are used to evaluate any proposed changes to the General Plan or the TSP. Often these statements are expressed in mandatory fashion using the word "shall". These statements of policy shall be interpreted to recognize that the actual implementation of the policies will be accomplished by land use regulations such as the City's Zoning Ordinance, Subdivision Ordinance and the like. The realization of these policies is subject to the practical constraints of the City such as availability of funds and compliance of all applicable federal and state laws, rules and regulations, and constitutional limitations.

SUMMARY

INTRODUCTION

Bend is located at the base of the Cascade Mountains at an elevation of about 3,600 feet. Its proximity to the Deschutes National Forest, the high mountain lakes, and to the Great Basin plateau makes it a hub for a number of recreational, sporting, business and tourist activities.

In July of 1999, the City annexed the unincorporated area out to its urban growth boundary increasing the city population by more than 13,000 people. Currently Bend, with a July 1999 population of 50,649, is the largest city in Oregon east of the Cascade Mountains.

Bend is the regional trade and service center for Central Oregon. More than two-thirds of all the jobs in the County are in Bend, and the wide range of retail businesses, professional and trade services, and specialty trades draws in customers from a very large geographical area reaching out as far as five counties.

TRAVEL CHANGES: Since 1990, Deschutes County has been one of the fastest growing counties in the state. Much of this growth has been concentrated within the Bend urban area. Also, the number of motor vehicle trips in the County has increased at a rate that is faster than the population growth. One indicator of the rise in automobile usage is evidenced by the fact that there are now more registered passenger vehicle ownerships than people that live in Deschutes County.

PLANNING FOR THE FUTURE: Like many cities experiencing rapid growth, Bend is having difficulty keeping up with the surge in community wide traffic. The Bend Parkway is one major project that will address the heaviest traveled corridor by providing an improved north-south travel route within the urban area. However, the Parkway will not provide for all of the community's transportation needs. Transportation deficiencies continue to include a lack of public transportation, an incomplete system of sidewalks and bike facilities, a limited number of river and railroad crossings, and poor levels of service at some major intersections.

FUTURE TRANSPORTATION NETWORK ALTERNATIVES: To prepare the TSP, additional studies were undertaken on several major components of the transportation system. The trail system was updated. An evaluation of transit feasibility was done. And, computer-modeling analysis of different road, bike, pedestrian, transit and land use alternatives was completed for the Bend urban area.

- x -

Development of the TSP used 20-year projections of population and employment based on the distribution of land uses shown on the land use plan as the basis of determining the needs of the transportation system. Future transportation system scenarios were analyzed that included a No-Build, a Non-Road improvement strategy, implementation of the existing General Plan and a “Combined” Alternative.

The improvement elements of the *transportation system plan* include the transportation components discussed in the *combined alternative*. These transportation improvements include the construction of new arterial and collector streets, the widening of existing roadways to the plan standard, the completion of the trail and pedestrian systems, and implementation of a public transportation system. The TSP also includes a variety of strategies to improve roadway system efficiency and to reduce system loading during the peak travel periods of the day such as transportation system management and transportation demand management.

CURRENT TRANSPORTATION CONDITIONS (as of June, 2000)

STREET SYSTEM: The existing Bend street system includes approximately 80 miles of arterials and 35 miles of collector roadways. There are currently 31 traffic signals, one roundabout and 46 bridges in the Bend urban area. There are six existing roadway crossings of the Deschutes River, plus the “new” Old Mill bridge. A large portion of Bend’s *major street system* is laid out in a grid-like pattern. The grid street system is interrupted by prominent topographic features of the city such as; the Deschutes River, Awbrey, Overturf and Pilot buttes, the railroad, and the canal system.

PEDESTRIAN AND BIKEWAY SYSTEM: Currently, there are about 60 miles of sidewalks along arterial and collector streets, or about one fourth of the major street system frontage. There are many gaps in the sidewalk system. Today, about 70 miles or about two-thirds of the *major streets* are striped with bike lanes, or wider “fog-lined” shoulders. There are approximately 28 miles of trails open to the public in the Bend urban area. Approximately half of these trails are located on private property where public access is allowed. The majority of the existing trails are located along the river and on the west side of Bend. There are also six existing exclusive *footbridges*.

PUBLIC TRANSPORTATION SYSTEM: Bend has a Dial-A-Ride system that is available for use by seniors (60 and older) and eligible disabled persons. The Dial-A-Ride service provides personalized door to door service and requires reservations up to seven days in advance of a planned trip. The service is provided to participants within the urban area only. There are several private transportation vendors that provide regular daily bus service to and from the City from outside the Bend area these including *Greyhound Bus, Valley Retriever Bus Lines, Porter Stage Line, The People Mover, CAC Transportation* and the *Mt. Bachelor Super Shuttle*.

OTHER TRANSPORTATION SERVICES: *Freight Rail Service:* The Burlington Northern-Santa Fe Railroad provides freight rail service to Bend. *Passenger Rail Service:* There is currently no passenger rail service in Bend. The nearest connection to passenger rail service in Central Oregon is in the town of Chemult, which is located about 70 miles south of Bend. *Regional Air Service:* Daily air passenger service is provided to the Central Oregon area at the Redmond Municipal Airport, which is located approximately sixteen miles north of Bend. The Redmond airport is currently occupied by two commercial carriers, Horizon Air and United Express. Currently, there are direct flights to Portland, Seattle and San Francisco.

TRANSPORTATION SYSTEM SAFETY: Traffic collisions (motor vehicle crashes) at intersections represent the greatest identifiable source of transportation related safety issues in the Bend urban area. Not surprisingly, the highest collision locations correspond to the busiest traveled intersections in town. Many of the signalized intersections along Highway 97 appear at the top of the crash total list.

TRANSPORTATION NEEDS ANALYSIS

The city of Bend engaged the services of several consultants to assist in the assessment of transportation needs during the preparation of the Transportation System Plan. Analysis was conducted to assess needs of the Airport (1994), Urban Trails (1995), Transit Feasibility (1996), Downtown Parking (1996) and an update of the Transportation Model (1996 and 2000).

ROADWAY SYSTEM: Several roadways throughout the urban area will approach, or exceed, their capacities under the “no-build” conditions during the peak hour. Many of the collector and arterial streets in the Bend urban area will be modernized or widened during the twenty-year planning period. For the sake of making a determination of roadway improvement costs, all roadways in the urban area have been estimated as being completed to the *Plan Standard* during the twenty-year planning period. The estimated cost (in 2000 \$s) of improving all of these roadways is approximately \$185 million (not including Parkway construction costs).

SIDEWALK AND BIKEWAY SYSTEM: The *sidewalk system* is generally well defined and improved in many of the older parts of the downtown area and in newer subdivisions. The primary need in many of the older parts of town, in addition to adding various missing linkages, is the retrofitting of intersection corners with standard wheelchair ramps and removing other possible obstructions necessary to comply with the federal Americans with Disabilities Act requirements. *Bike System Needs (on-street):* There are a number of bike system deficiencies that need to be addressed to better facilitate bicycle travel on the street network. Some collector or arterial streets have limited width to accommodate bike lane striping and street widening may be necessary.

(Off street bike) *Trail System Needs*: Approximately 32 more miles of trail improvements will be necessary to complete the *primary* trail system. The City is working with the Bend Metro Park and Recreation District to partner many of the construction, maintenance and grant projects on the trail system.

PUBLIC TRANSPORTATION SYSTEM: The feasibility of providing a local, *intra-city* type of transit service within the Bend urban area has been the subject of two separate studies. The 1994, study^{B.3} indicated that there are several factors such as dispersed employment centers, short travel times and low population density present in the Bend urban area that would make the generation of good transit rider numbers difficult. The 1996 study^{B.4} provided a good preliminary evaluation of what kind of transit system that the city might need in the future. After City Council received the second report, they “declared” that transit would be feasible “at build-out”. Another study, in 2000, advocated expansion of the Dial-A-Ride system to make it available to the general public. BTAC recommended that the City pursue expansion of the Dial-A-Ride system to provide service to the general public. It was recommended that this service expansion be included in a funding measure to go to the voters in November 2000. BTAC recommended also that the City should work toward expanding this service into a fixed-route system.

Inter-city needs include developing a more affordable, regular service between, at least, Bend and Redmond (and possibly other parts of the Tri-County area) to improve mobility for many *transportation needy* citizens of the city and the adjacent counties

TRANSPORTATION SYSTEM ALTERNATIVES

The City utilized the EMME/2 transportation computer model to compare and evaluate different future transportation system alternatives. Five alternatives were evaluated in the development of the TSP:

- A **No-Build Alternative** with no new roads beyond those currently funded,
- A **Comprehensive Plan Alternative** with construction of the road system and existing mode splits,
- A **TDM Alternative** with an emphasis on non-vehicle modes and a limited number of new roads,
- A **Combined Alternative** with a mix of strategies from the TDM and Comprehensive Plan alternatives, and
- A **Recommended Alternative** that slightly modified the Combined Alternative by widening parts of Reed Market Road and 27th Street to five lanes to reduce congestion.

- xiii -

The Recommended Alternative, that draws together the best components of each of the other alternatives, outperformed all of the other alternatives on just about every level of comparison. It is also the best alternative at meeting the transportation goals of the General Plan. The Recommended Alternative includes the implementation of a fixed- route transit system and increased reliance on walking, bicycling, carpooling and ridesharing to reduce reliance on single occupant vehicle travel. These alternative mode improvement strategies, in combination with some changes in the land use plan, and the construction of new roadways (to improve transportation system connectivity and to mitigate capacity deficiencies) are the general components of the Recommended Alternative.

TRANSPORTATION SYSTEM PLAN

The transportation system plan therefore contains many strategies aimed at providing multi-modal transportation system improvements and reducing reliance on a single mode of travel. These include the full range of strategies defined by the Recommended Alternative. These goals, strategies, objectives and policies are articulated in the existing Transportation Chapter of the General Plan (with some modifications reflected in the TSP).

LONG TERM TRANSPORTATION NEEDS

The TSP build-out of the City's collector and arterial transportation system is estimated to cost \$185 million (in year 2000 estimates exclusive of the Parkway). A schedule of the projects and the cost associated with each project is included in [the Appendices](#).

The City's funding strategy for these needs includes an estimated \$119 million from Transportation System Development Charges (TSDCs), \$7 million from a local funding measure and the balance from county, state, and federal funding. As indicated previously, it is expected that these sources will be adequate to build the transportation system. The timing of the construction of these improvements will be planned to occur with the demand created by new development. The timing of the dollars collected from TSDCs will be consistent with the timing of the new demand generated by development and will be managed through requirements for improvements by developers or construction by the City.

The City's projection of construction activity and TSDC collections for the next five years is included in Table 13. Projections for revenue collections for the next twenty years are included in Table 14. Specific scheduling of projects for construction, beyond the five-year period, has not been made due to the significant uncertainties associated with making such forecasts. Based upon currently available information, the projected revenue from the sources noted in the TSP are anticipated to be adequate to build the transportation improvements included in the TSP - as the demand for these improvements occurs, whether it occurs over twenty years or within some other timeframe.

Additionally as indicated earlier, the City will evaluate and update its CIP and TSDCs and consider the need for other funding sources and make adjustments as necessary to adequately address the issues included in the TSP.

In 2000, the Bend TSP Citizens Advisory Committee (BTAC) fulfilled a number of City Council assigned tasks including a review of the Draft TSP. BTAC made several proposed revisions to the Draft TSP that are summarized in the Resource Documents^{C.10}. Changes that were recommended by BTAC were included in the Final Draft of the TSP. BTAC had a number of changes to the *Objectives* and *Policies* of the TSP (sections 6.9 and 7.5). The Committee also enhanced these sections to include other recommendations on *implementation, benchmarks and funding* for each respective transportation system element.

BTAC also had two additional tasks including offering a prioritization of the five-year Capital Improvement Program (Appendix A.6) and exploring funding options to help implement the TSP. As it related to the later task, BTAC reviewed funding options/choices available for transportation improvements and forwarded a recommendation to City Council that includes a transportation funding measure to support funding for improvements to a number of the existing transportation deficiencies. The BTAC funding transportation system recommendations are detailed in Appendix A.7.

BTAC RECOMMENDATION

In brief, the BTAC funding recommendation included the following items:

- 1) ***Pursue a citywide transportation funding measure:*** The City should pursue a five-year, (\$7 million) transportation funding measure allocating:
 - a) \$1 million to maintenance,
 - b) \$2 million to sidewalk construction (principally for sidewalk in-fill along arterials and collector streets),
 - c) \$1.5 million for trail development, and
 - d) \$2.5 million for expansion of the Dial-A-Ride system (for general public use).
- 2) ***Maintenance:*** It was recommended that the County should enact a street SDC to fund County road improvements. It was anticipated that the establishment of a County wide SDC would allow the County to shift some of its Gas Tax revenue to the City for maintenance (in particular, to assist in the roadway maintenance needs of the newly annexed areas). Additionally, the City should also consider franchise fees, the transient room tax and/or a street utility to help fund roadway maintenance needs.
- 3) ***Downtown Parking:*** The City should develop a system of revenue collections from downtown area business tenants and owners to fund future needed parking improvements.

- 4) **Local sidewalks and street improvements:** The City should encourage the formation of LIDs, established by the local residents, for sidewalk and street improvements on local streets.
- 5) **TDM:** The City should fund TDM activities from the General Fund (and explore allocations through various sources, such as franchise fees) and also explore obtaining funds from other sources (i.e., grants).
- 6) **Bicycle Lane Improvements:** Bicycle lane improvements (lane striping and roadway shoulder improvements) should be funded from the maintenance budget.
- 7) **Trails:** Explore the use of SDCs for trails, possibly as a part of the Park District SDCs.
- 8) **SDCs:** The City should update the current SDC to include the full cost of improvements (excluding right-of-way, except for a provision for acquiring right-of-way for in-fill projects) and charge SDCs at 100-percent of the legal limit.

BTAC also recommended that the City reconvene the citizen committee periodically to assist in continued discussions on transportation including reevaluating system priorities or other funding strategies.

IMPLEMENTATION OF THE TSP

In 2000, the Bend Transportation System Plan was adopted. Some measures were adopted previously to comply with requirements in the Transportation Planning Rule to provide for safe and convenient travel by non-vehicle modes. Other measures, adopted before the Transportation Planning Rule went into effect, provide for mixed residential and commercial use. Additional changes to the Bend Zoning Code, Zoning Map, and Subdivision Codes are planned as part of the City's Periodic Review work program beginning in the year 2000. These changes will implement several amendments made to the Bend Area General Plan in 1998 and other changes made by adoption of the TSP. In general, the planned changes to the codes during Periodic Review will support more efficient travel patterns and non-motor vehicle travel.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

1. INTRODUCTION

The purpose of the Bend Urban Area Transportation System Plan (TSP) is to help guide the development of a transportation system that will meet the forecast needs of the Bend community. This plan provides policy and a plan framework that will enable Bend to design a balanced transportation system for the near-term and the next twenty years. Strategies for planning and implementing a wide range of transportation components are addressed in the TSP including automobile, public transportation, bicycle and pedestrian travel.

1.1 BACKGROUND

Bend is located at the base of the Cascade Mountains at an elevation of about 3,600 feet. Its proximity to the Deschutes National Forest, the high mountain lakes, and to the Great Basin plateau makes it a hub for a number of recreational, sporting, and tourist activities.

In July of 1999, the City annexed the unincorporated area out to its urban growth boundary increasing the city population by more than 13,000 people. Currently Bend, with a July 1999 population of 50,649, is the largest city in Oregon east of the Cascade Mountains. By the year 2020, the urban area population is expected to reach 68,700 persons, with about another 16,000 persons calculated to be within about five miles of the urban area.

Bend is the regional trade and service center for Central Oregon. More than two-thirds of all the jobs in the County are in Bend, and the wide range of retail businesses, professional and trade services, and specialty trades draws in customers from a very large geographical area reaching out as far as five counties.

With the rapid population and economic growth of Bend during the 1990s, the community is significantly different from the quiet lumber and agricultural town of the 1950s and 1960s. Similarly, the future look and feel of the community ten or twenty years into the next century will be different from the 1990s. As Bend continues to become more urban in its character, the impact and influence of change will be with us constantly.

1.2 HISTORY

The earliest roads of Bend formed along the main trails blazed by early settlers. These roads typically traced the shortest and easiest path between important destinations. The road alignments tended to follow the lay of the land and often were based on making easy river crossings or ways around large or rough land forms.

As the town became established and the community grew, the rural areas were defined by a system of farm-to-market roads that crisscrossed the countryside - most with Bend as a common destination point. Much of Bend's current road system is the outgrowth of the platting that first occurred from 1905 to 1920. These plats were organized and based largely on the system of township and range section lines.

Today's transportation system is a blend of turn of the century roadways, the uniform grids of the early 1900's (Figure 1b), and the more recent curvilinear streets with cul-de-sacs.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The roadways important to early Bend were those routes between the neighboring communities and to other parts of the state. Today these roadways are recognized as highways of *primary* statewide significance and are designated as U.S. Highways Route 97 and Route 20. Highway 97 is the main north-south highway east of the Cascades and Highway 20 is one of the main east-west routes through the state. These roadways continue to carry the highest traffic volumes through Bend.



1 a. Early two-way traffic on downtown Wall Street

Photo source: Unknown

1.3 TRAVEL CHANGES

Traffic volumes on most roadways in the community have risen over the years as land use patterns, employment and household sizes have changed. The community has responded with new roadways to meet these changing needs. The opening of Wilson Avenue from 15th Street to Division Street, in the 1970's, lowered volumes on Franklin Avenue. The development of Colorado Avenue, in the 1980s, relieved Franklin/Riverside/14th volumes and created some alternatives for Mt. Bachelor traffic. Completion of Brookwood Boulevard and the Baker Road interchange, in the early 1990s, provided an alternative north-south corridor to Highway 97. The Butler Market extension and the extension of Mt. Washington Drive around the north side of Awbrey Butte to Highway 97, later in the 1990s, have provided a new east-west route. It is projected that traffic volumes on many arterials will continue to increase and new facilities and services will be needed as time goes on.

Since 1990, Deschutes County has been one of the fastest growing counties in the state. Much of this growth has been concentrated within the Bend urban area. Also, motor vehicle travel in the County has increased at a rate that is faster than the population growth. This is a phenomenon that is occurring across the country. One indicator of the rise in automobile usage is evidenced by the fact that there is now more passenger vehicle ownership than people that reside in Deschutes County, which is typical for most counties (and cities) in Oregon.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

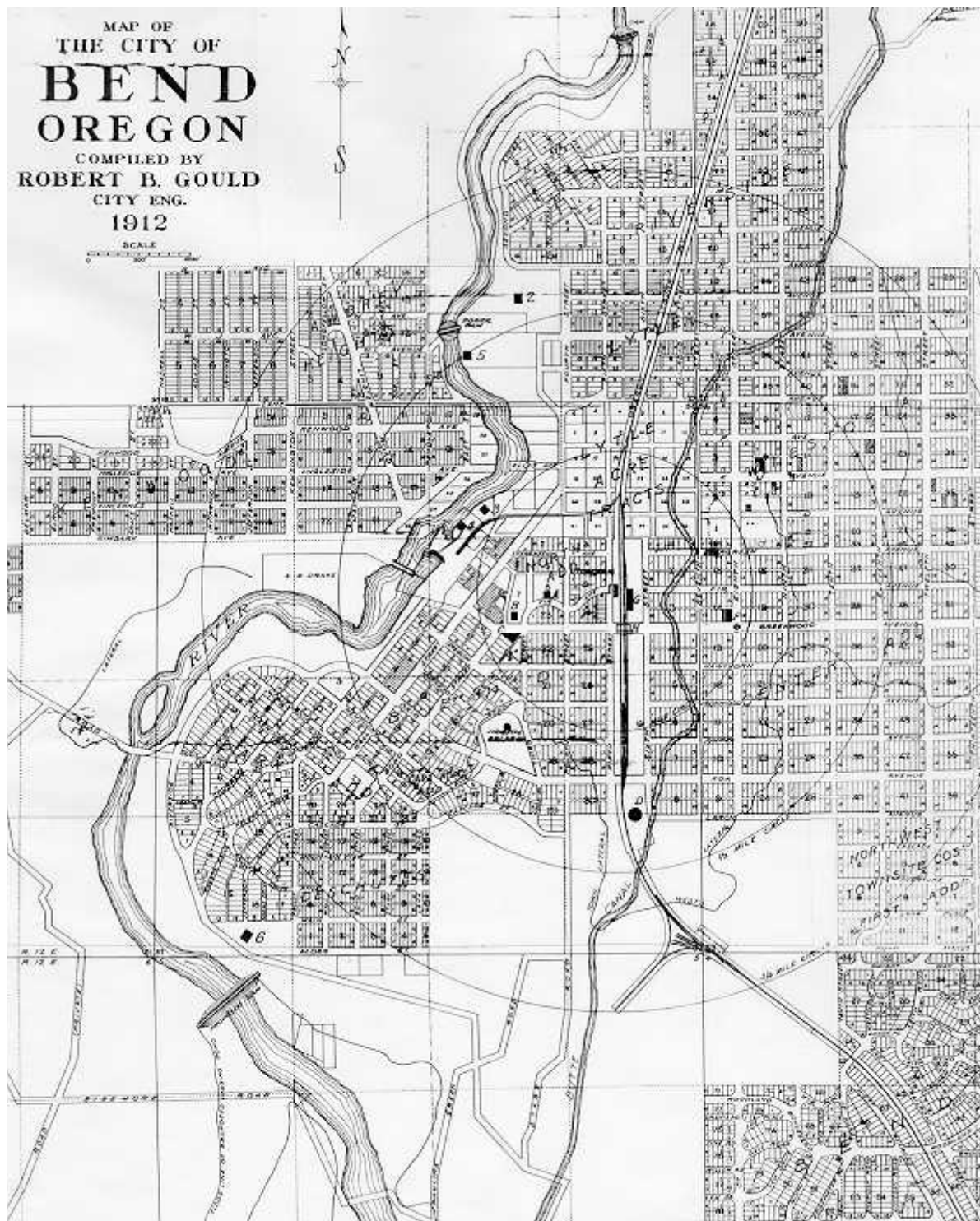


Figure 1 b. Bend, Oregon 1912

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

1.4 PLANNING FOR THE FUTURE

Like many cities experiencing rapid growth, Bend is having difficulty keeping up with the surge in community wide traffic. The Bend Parkway (now under construction) is one major project that will address the heaviest traveled corridor by providing an improved north-south travel route within the urban area. However, the Parkway will not provide for all of the community's transportation needs. Transportation areas needing improvement are the public transportation system, the sidewalk and bike system, and possibly increasing the number of river and railroad crossings. Some street intersections also have poor levels of service.

1.4.1 Land Supply

Under State law, the City and County agreed on a coordinated population forecast for the area within the Urban Growth Boundary (UGB). The city must maintain a 20-year supply of developable residential lands to meet this population forecast. To determine the City's needs, land supply was analyzed including a survey of vacant lands. This analysis indicated that the majority of new growth would be accommodated on these vacant lands. This will create, within the UGB an overall density forecast increase from 1229 persons/square mile, in 1995, to 2112 persons/square mile, in 2020.

1.4.2 Future Transportation Network Alternatives

To prepare the TSP, additional studies were undertaken on several major components of the transportation system. The trail system was updated in 1995^{Resource Document:B.2}. An evaluation of transit feasibility was done in 1994^{B.3} and 1996^{B.4}. And, computer modeling analysis of different road, bike, pedestrian, transit and land use alternatives was completed for the Bend urban area in 1996^{B.10} and in 2000 ^{Appendix: F}.

Development of the TSP used 20-year projections of population and employment based on the distribution of land uses shown on the land use plan as the basis of determining needs of the transportation system. The City updated its traffic model (EMME/2 Update 1996 and 2000) based on this planning horizon projection. Future transportation system scenarios were analyzed that included:

- a **no-build system** (a forecast of twenty years of growth with no transportation improvements beyond those projects already committed – committed project example: the Bend Parkway),
- a **non road improvement strategy** (i.e., called the **TDM alternative** because it was a non road improvement scenario that focused improvements on the pedestrian, bike, and transit systems only, plus implementation of demand management techniques and some alternative land use strategies),
- an alternative that consists of implementing the existing **Comprehensive (General) Plan** road system and land use patterns,
- a **combined alternative** that joined most of the TDM strategies and the transportation system and land use patterns of the existing General Plan, and

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- a **recommended alternative** that slightly modifies the combined alternative by widening parts of Reed Market Road and 27th Street to five lanes.

The improvement elements of the *transportation system plan* (TSP) include the transportation components discussed in the *recommended alternative*. These transportation improvements include the construction of new arterial and collector streets, the widening of existing roadways to the standards of the plan, the completion of the trail and pedestrian systems, and implementation of a public transportation system. The TSP also includes a variety of strategies to improve roadway system efficiency and to reduce system loading during the peak travel periods of the day such as transportation system management (TSM) and transportation demand management (TDM).

1.5 TRANSPORTATION SYSTEM PLAN REQUIREMENTS

1.5.1 Goal 12

Goal 12 is one of nineteen separate statewide planning goals adopted by the state of Oregon in the mid-1970s. These goals were designed to be implemented through inclusion in regional and local comprehensive plans. Under Goal 12, local governments must adopt transportation plans which “*provide and encourage a safe, convenient and economic transportation system.*” Specifically, each transportation plan: “*...shall (1) consider all modes of transportation including mass transit, air, water, pipeline, rail, highway, bicycle and pedestrian; (2) be based upon an inventory of local, regional and state transportation needs; (3) consider the differences in social consequences that would result from utilizing differing combinations of transportation modes; (4) avoid principal reliance upon any one mode of transportation; (5) minimize adverse social, economic and environmental impacts and costs; (6) conserve energy; (7) meet the needs of the transportation disadvantaged by improving transportation services; (8) facilitate the flow of goods and services so as to strengthen the local and regional economy; and (9) conform with local and regional comprehensive land use plans.*”

The Bend Area General Plan, which includes a transportation element, fulfilled the Goal 12 requirements of Oregon’s land use law. The Plan was adopted by the City and County in 1976, acknowledged by the Land Conservation and Development Commission in 1981, and given periodic review approval in 1989. The Plan was further evaluated and reviewed during a five-year period (1994 to 1998) and the updated plan was adopted in November 1998. The updated Plan has provided a policy framework for the TSP update process.

1.5.2 Transportation Planning Rule (TPR)

In April 1991, the Land Conservation and Development Commission (LCDC) adopted the Transportation Planning Rule (TPR), OAR 660 Division 12, and an administrative rule governing transportation planning. Under the TPR, Deschutes County and the City of Bend need to identify a system of transportation facilities and services adequate to meet the urban area needs for the next twenty years.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

1.5.3 Bend Urban Area - TPR Requirements

The Transportation Planning Rule (TPR) stipulates that the purpose of a transportation system plan (TSP) shall be to establish a coordinated network of transportation facilities adequate to serve state, regional and local transportation needs. It also is aimed at fulfilling the state Transportation Planning Goal #12 objective of reducing the principal reliance on the automobile.

Requirements of the TPR for communities vary dependent on the size of each respective urban area. Bend fits within a category defined by the TPR as a community with an urban area population that is greater than 25,000 people, and is not contained within a metropolitan planning organization (MPO).

The rule requires the Bend urban area TSP include the following:

1. A **coordinated network of transportation facilities** adequate to serve State, regional and local transportation needs. This shall be based on a **determination of needs** relevant to the planning area and the scale of the transportation network being planned.
2. A **systems plan** that includes the following elements:
 - a) A **twenty year forecast** of *population* and *employment* shall be used to determine:
 - i.) state, regional and local transportation needs,
 - ii.) needs of the transportation disadvantaged,
 - iii.) needs for the movement of goods and services to support industrial and commercial development.
 - b) A **road plan** for a system of arterials and collectors and standards for the layout of local streets and other important non-collector street connections. The standards for the layout of local streets shall address:
 - i.) extensions of existing streets,
 - ii.) connections to existing or planned streets,
 - iii.) connections to neighboring destinations.
 - c) A **public transportation plan** that:
 - i.) describes public transportation services for the transportation disadvantaged and identifies service inadequacies,
 - ii.) describes inter-city bus and passenger rail service and identifies the location of terminals,
 - iii.) evaluates the feasibility of developing a public transportation system at build-out.
 - d) A **bicycle and pedestrian plan** for a network of routes throughout the planning area.
 - e) An **air, rail, water and pipeline transportation plan** (as appropriate) which identifies where public use airports, mainline and branch line railroads and facilities, and major pipelines and terminals are located or planned within the planning area.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- f) **Transportation system management and demand management plans.**
- g) **Policies and land use regulations** for implementing the TSP.
- h) **A transportation financing program.** It shall include:
 - i.) a **list** of planned transportation facilities and major improvements
 - ii.) a general estimate of the **timing** for planned facilities and improvements
 - iii.) a determination of rough **cost estimates** for planned facilities and improvements
 - iv.) a **discussion** of transportation facility providers' existing funding mechanisms, their adequacy and assessment of possible funding alternatives
- 3. **Inventories and a general assessment** of existing and committed transportation facilities and services by function, type, capacity and condition:
 - a) Capacity analysis shall include:
 - i.) the capacities of existing and committed facilities,
 - ii.) the degree to which those capacities have been reached or surpassed on existing facilities,
 - iii.) the assumptions which these capacities are based upon.
 - b) The capacity analysis for state and regional facilities shall be consistent with standards of facility performance considered acceptable by the affected transportation agencies.
 - c) A condition analysis of each of the transportation facilities.
- 4. **A system of planned transportation facilities**, services and major improvements. The Plan shall include the functional classification, planned capacities and level of service.
- 5. **A description of the location of planned facilities** and where they may be sited. The TSP shall address facility parameters such as right-of-way and number and size of lanes. The plan shall include **a map** of the general location of these facilities.
- 6. The TSP shall **indicate the provider** of each of the transportation facilities or services.
- 7. **Evaluation** of Transportation Alternatives.

1.6 PUBLIC INVOLVEMENT AND INTERAGENCY COORDINATION

Citizen involvement and interagency coordination is an important component of the TSP. A vital step in developing a transportation system plan is to identify a public and interagency involvement process that brings citizens, special transportation interest groups, transportation providers, community economic interests, state and local agencies, and other jurisdictions into the planning process. Early involvement in the TSP process is important in identifying issues, establishing community understanding and confidence in

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

the process, setting community goals and objectives and developing an appropriate work program.

1.6.1 Advisory Committees

The Bend Urban Area Planning Commission (BUAPC) [now: Bend Planning Commission] was established, in 1980, by the City and the County to carry out a comprehensive planning program for the lands within the Urban Growth Boundary and the Urban Reserve Area. The Bend Urban Area Planning Commission is the official citizens' involvement committee for the urban area, and advises the elected bodies on land use planning programs and policy and fulfills the Statewide Planning Goal #1 for local citizen involvement.

Work sessions and public hearings were held with the Planning Commission to address the expedited requirements of the TPR (i.e. the subdivision and zoning Ordinance changes for bike, pedestrian and transit friendly design) in 1993. Also, work sessions were held with the Commission on related plan topics such as the trail plan, the transportation model update, transit feasibility and the proposed southern bridge crossing of the Deschutes River. In the review of the update of the Bend Area General Plan, the BUAPC held a series of public hearings (3) and conducted over twenty work sessions before forwarding the General Plan update on for City Council action. City Council also held a series of work sessions after receiving the recommended General Plan update then held a public hearing on the Plan and more work sessions before approving and forwarded the plan to the Deschutes County Commission for their approval.

In January 2000, the City formed another citizen involvement group charged specifically with the task of reviewing the Preliminary Draft TSP, December 1999. This committee was comprised of 17 citizens and called the Bend TSP Advisory Committee (BTAC). The committee had two additional tasks including offering a prioritization of the five-year Transportation Capital Improvement Program and exploring funding options to implement the TSP. BTAC began an aggressive schedule in February holding a total of ten full committee meetings, fifty-five (55) subcommittee meetings and holding five public open houses, and ended their work in May 2000.

In addition to the Planning Commission and BTAC activities, two other citizen advisory committees were utilized in the plan update process. A seven member committee, called the Transportation Citizen Advisory Committee (T-CAC), met monthly during 1993-97, to discuss transportation issues and to assist in the update of the General Plan - Transportation Chapter. Also, a 20 member Citizens Advisory Committee, met monthly during a four year period (1994-97), providing a comprehensive citizen review forum for the entire General Plan update process.

In addition to this citizen involvement effort, there were a number of other standing committees that provided input into the planning process:

- *The Deschutes County Bicycle and Pedestrian Advisory Committee,*

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- *Commute Options Working Group,*
- *The Clean Air Committee, and*
- *The Bend Traffic Safety Advisory Committee*

1.6.2 Interagency Coordination

Interagency coordination between the affected public agencies was provided at regular technical advisory committee meetings.

Technical Transportation Committees

The ***Transportation Technical Advisory Committee (T-TAC)*** for the Bend urban area provided the most focused interagency coordination on the Bend General Plan update and TSP development. It included representation from the state of Oregon - Department of Transportation, Region 4, Deschutes County Public Works and Planning Departments, Bend Metro Parks and Recreation District, Bend La Pine School District, and the city of Bend Engineering, Planning and Fire Departments. Commute Options for Central Oregon, the Deschutes County Safe Communities Program and the Central Oregon Intergovernmental Council (C.O.I.C.) were added to T-TAC in year 2000.

In addition, a countywide committee, the ***Deschutes County Technical Advisory Committee (C-TAC)***, with additional representation from the cities of Redmond and Sisters, provided overview on the Bend Plan from a regional perspective.

The ***Bend Urban Trails Plan TAC*** was a more focused and specialized committee organized with the specific task of overseeing the development of the trails planning effort. This technical committee includes representation from a broad variety of community interest groups. These included: representatives from the city of Bend, Deschutes County, Bend Metro Parks and Recreation District, Oregon State Parks and Recreation, U.S. Forest Service, the local water irrigation districts, Bend La Pine School District, the Deschutes County Bicycle and Pedestrian Advisory Committee, the Bend Traffic Safety Committee (*now: the Bend Traffic Safety Advisory Committee*), Transportation Options (*now: Commute Options for Central Oregon*), Central Oregon Trails Alliance, and other interested members of the community.

Bend has been an active participant in a regional, tri-county effort to better coordinate public transportation services. Beginning in November of 1998, the Central Oregon Intergovernmental Council (COIC) has organized a series of committees aimed at better coordinating the delivery of public transportation services in the Deschutes, Crook and Jefferson county areas. ***The Central Oregon Public Transportation Coordination Project*** is aimed at providing a focus for varied transportation interests, services and resources to improve mobility and coordination of services for the greater central Oregon area.

A “stakeholders” meeting was held, in January of 1999, to kick-off the project. Four citizen/business ***advisory committees*** were organized to help meet project objectives - an advocacy group, a business and industry group, a government representative group and a transportation providers group. These advisory groups and an oversight technical advisory

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

group have been meeting regularly to provide project communication and coordination. The **TAC** is made up of representation from Deschutes County planning and administration offices, Bend planning, the Bend La-Pine School District, Commute Options for Central Oregon, the state of Oregon regional planning and central office (transit planning) and COIC.

COIC has also organized a group of elected officials from the tri-county area called the **Central Oregon Area Commission on Transportation (COACT)** that is focused on discussing regional transportation funding issues. ODOT encouraged the central Oregon area to organize this committee to help provide the region (ODOT Region 4) with a forum for discussing regional and statewide transportation issues. A Bend City Councilor and the assistant city manager provide local participation in COACT discussions and activities.

1.6.3 Informational Materials and Public Meetings

In addition to the ongoing series of committee meetings and discussions, the city and county also conducted the following community activities during the General Plan update process:

- Production and distribution of the *Transportation Updates* newsletter, during the summer of 1994, to over 800 interested parties and stakeholders. The primary purpose of this newsletter was to explain the transportation planning process for updating the transportation plan.
- A *phone survey* of over 200 urban area residents was completed, in 1994, to solicit input on Bend area transportation issues and problems.
- A series of transportation *workshops* were held, in September 1994, to further gather public input and identify transportation *problems and issues*.
- A series of community wide *workshops* were held, in the Spring of 1995, that were coordinated with the local school district and Park District, to discuss broader planning ideas and to gather comments on planning concepts, transportation issues and land use alternatives.
- A series of *community meetings* were held, in 1995, to provide input into the development of the *Bend Urban Trails Plan*.
- A joint City Council and Planning Commission *work session* was held in July 1996, to review the *Bend Urban Area Travel Demand Forecasting Model Update* and to explain the update of the transportation model and the alternatives evaluation process.
- A series of neighborhood planning *charrettes* were hosted in the Fall of 1996, by Deschutes County, to help develop *refinement plans* for two areas where urban redevelopment is imminent. Follow up charrettes, in the spring of 1998, further refined one of these areas (referred to as the Lava Ridge Refinement Area). A set

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

of special development standards, and an overall land use and street plan were developed for this area.

- A special *community meeting* was held, in June 1996, to review the *Draft Transit Feasibility Study*.
- A series of four community *Open Houses* were held in the summer of 1997, in coordination with the school and park district, to provide information on proposed changes to the General Plan and Transportation System.
- A number of *informational flyers*, a community attitude *survey* of over 160 Bend residents, plus several *newspaper articles* and other *media events* occurred in the summer of 1997 to provide information on updating of the General Plan and Transportation System. A special cable television segment was produced and aired a summary of the proposed Plan changes.
- Numerous *presentations* were made to service groups, organizations, and neighborhoods on both the transportation plan and the update of the General Plan through out the Plan update process.
- *Public hearings* and (post-hearing) *work sessions* were held before both the Planning Commission (1997) and the Bend City Council (1998) during the update of the *Bend Area General Plan*. The Transportation Chapter was included in the General Plan update process. The plan was adopted in November of 1998.
- During the fall of 1999, the city hired Portland State University's Center for Urban Studies to conduct a Bend Community Survey^{C.8}. The *survey* was designed to get Bend area resident opinions on a variety of community issue topics that included several transportation-related questions. (Response from the mail-out survey was very good with 988 surveys returned from a mailing of 3,146 to registered voters.)
- Held ten (10) full BTAC meetings, fifty-five (55) subcommittee meetings and five (5) Open Houses, during year 2000, to review and consider changes to the December 1999 - Preliminary Draft TSP.
- In year 2000, the City added a new topic section called "Transportation Issues" to the City's "web site" home page. This included BTAC schedules, meeting minutes and notices, and a copy of the Draft TSP. It also included an Internet "comment card" for public input into the BTAC review process.

Table 1. Provides a more detailed chronology of community involvement and public discussion of transportation plans, policies and issues. In addition, detailed summaries of the more complex community involvement activities are provided in Resource Document C.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

TABLE 1.
Chronology of Community Involvement and Public Discussion

Audience	Activity	Date(s)*
Bend Planning Commission* [* In February 1998, the Planning Commission Ordinance was amended changing the Bend Urban Area Planning Commission (BUAPC) to the Bend Planning Commission.]	1. Presentation: Transportation Planning Rule	1. September 28, 1992 October 26, 1992
	2. Expedited TPR elements – work session Adoption of expedited TPR elements	2. March 8, 1993 April 26, 1993
	3. Empire Ave. Plan Amendment – Public Hearing & Approval (part 1) & Approval (part 2)	3. November 22, 1993 December 13, 1993
	4. Presentation: TSP & Transportation Plan Update	4. December 7, 1993 June 27, 1994 October 24, 1994 February 8, 1996 April 14, 1997
	5. Plan Amend. P.H. & Approval – Amer. Lane	5. June 27, 1994
	6. Presentation: Transit Feasibility Study (1994)	6. June 27, 1994
	7. Presentation: General Plan Update	7. April 19, 1995
	8. Trails Study – work session	8. June 21, 1995
	9. Transportation Priorities/Funding - work sessions	9. September 25, 1995 December 11, 1995 February 7, 1996 March 20, 1996
	10. South River Crossing – Work session BUAPC communication to City Council Re: Bridge alternative	10. December 20, 1995 February 9, 1998
	11. Street width reduction (residential) –work session Approval street width reduction (to 30')	11. April 22, 1996 May 13, 1996
	12. Trail & Collector St. Plan Amendments	12. May 13, 1996
	13. Trans. Model Alternatives – work session	13. July 17, 1996
	14. Presentation: General Plan & TSP <i>update</i>	14. October 28, 1996 February 24, 1997
	15. General Plan Update - Trans. Chapter overview	15. May 12, 1997 June 9, 1997 June 23, 1997
	16. Presentation: Gen. Plan – Open House summary	16. August 4, 1997
	17. General Plan: BUAPC Public Hearings: Chapters 1-5, Chapters 6, 8-10 Chapter 7 (Transportation)	17. Sept. 8, 15, 1997 October 13, 1997
	18. Wilson Avenue Road Alignment Plan Amendment approval	18. February 23, 1998
	19. BUAPC Gen. Plan work sessions (23 total) Chap. 7 (6 total), Approved amended Gen. Plan to be forwarded to City Council Gen. Plan Update “come back list” work session	19. Oct. '97 – Apr. '98 April 20, 1998 June 22, 1998
	20. Lava Ridge Refinement Plan – worksessions	20. July 27, 1998 January 11, 1999 January 25, 1999 February 22, 1999 March 8, 22, 1999 April 26, 1999 May 10, 24, 1999 June 28, 1999 June 14, 1999 June 28, 1999
	Refinement Plan Public Hearing Hearing follow-up & plan Adoption (to be forwarded to City Council)	

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Bend Planning Commission (continued)	21. Periodic Review: Work session w/BUAPC Public Hearing w/BUAPC Work task discussion 22. Transportation Systems Plan: Work sessions BTAC/TSP Jt. mtg. w/City Council Presentation Committee Recommendation Public hearing –Chap. 4, 5 & 7 Public hearing (Jt. hear. w/City Council) 23. Subdivision Ordinance (revisions): work session - Public Hearing (1st) follow-up work sessions trails, parks Public Hearing (2nd) follow-up work sessions 24. Procedures Ordinance – Public Hearing Worksession 25. Newport Ave. Charrette Presentation	21. January 25, 1999 February 8, 1999 April 10, 2000 22. Oct .25, 1999 December 15, 1999 April 24, 2000 January 19, 2000 May 17, 2000 May 8, 2000 June 28, 2000 23. June 28, 1999 July 12, 1999 Aug. 9,16, 23, 1999 Sept. 20, 1999 Sept. 27, 1999 Oct. 11, 1999 Nov. 1, 22, 1999 Dec. 6, 13, 1999 Jan. 10, 24, 2000 Feb. 28, 2000 Mar 27, 2000 Apr 10, 24, 2000 24. Feb 28, 2000 March 27, 2000 25. April 10, 2000
Bend City Council* [* In November 1995, the Bend City Charter was amended changing the name of the Bend City “Commission” to the Bend City “Council”.]	1. Expedited TPR elements – work session Adoption of expedited TPR elements 2. Presentation: TSP & Transportation Plan Update 3. Plan Amend. P.H. & Approval – Amer. Lane 4. Empire Ave. Plan Amendment Public Hearing & Approval 5. Airport Master Plan – work session Approval Follow-up work session 6. Downtown Holiday Transit Shuttle Report 7. Transit System – general discussion 8. Pilot Transit Project - Grant Proposal 9. General Plan <i>update</i> — joint work session with Gen. Plan CAC & BUAPC 10. Street SDC work sessions & (to establish a street SDC) Ordinance Adoption “Transportation” SDC - “Revision” work session	1. May 19, 1993 June 2, 1993 2. December 7, 1993 July 6, 1994 November 2, 1994 November 1, 1995 January 29, 1997 October 15, 1997 3. October 5, 1994 4. February 16, 1994 5. January 18, 1995 March 15, 1995 November 19, 1997 6. February 15, 1995 7. March 1, 1995 April 19, 1995 8. September 20, 1995 9. April 19, 1995 10. May 15, 1995 June 1, 1995 June 7, 1995 March 29, 2000

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Bend City Council (continued)	Public Discussion Public Hearing 11. TGM Trails Study - work session 12. Presentation: East Awbrey Butte street system 13. Highway 97 – ODOT Hwy Corridor Study Approve Resolution of Support for Study 14. Transportation Priorities/Funding work sessions 15. TSP & Trans. Plan update Jt. UGB Mtg.: 16. Park Plan & Trails work session 17. Downtown Parking Plan report & approval Amend D/T Parking boundary 18. Transit Feasibility - work sessions Nelson/Nygaard Study Bend Transit System “<i>direction</i>” from CC General discussion on transit General discussion on transit – work session Council declaration of Transit Feasibility - “at build-out” 19. Traffic Calming Policy (TED) Adoption TED Repeal/Replacement Policy Adoption 20. Traffic Impact Study Policy Adoption 21. Trail & Collector St. Plan Amendments 22. Trans. Model Alternatives work session 23. Street width reduction in Residential Zones Approved 24. Local Gas Tax discussion – work session 25. City Council Retreat –Goal setting TSP & Plan update 26. Work session on <i>Roundabouts</i> 27. Work session on Gen. Plan Citizen Involvement 28. Joint School District/City Transit Study Approval of grant scope of work change Joint study Rejected by Council Work sessions to discuss subject of transit 29. Council work session – state trans. funding proposal (HB 3163) 30. Arterial construction work session 31. 27th Street: Neff Rd. intersection work session 27th Ave. design work sessions 27th Ave. Summary Report to Council 32. Parkway: Wilson/Parkway Overpass: Work session Agreement w/City, ODOT and developer	April 5, 2000 June 21, 2000 11. June 21, 1995 12. July 5, 1995 13. September 20, 1995 14. September 25, 1995 February 7, 1996 March 20, 1996 15. January 8, 1996 16. January 17, 1996 17. August 16, 1995 February 21, 1996 March 20, 1996 July 21, 1999 18. November 1, 1995 June 5, 1996 June 19, 1996 July 3, 1996 August 21, 1996 February 12, 1997 February 19, 1997 19. February 21, 1996 July 7, 1999 20. June 5, 1996 21. June 19, 1996 22. July 17, 1996 23. July 17, 1996 August 7, 1996 24. September 4, 1996 25. January 3, 1997 26. March 19, 1997 27. April 16, 1997 28. April 2, 1997 January 7, 1998 March 18, 1998 April 1, 1998 April 15, 1998 29. May 7, 1997 30. July 2, 1997 31. July 16, 1997 February 5, 1997 March 19, 1997 July 16, 1997 November 5, 1997 April 7, 1999 32. July 16, 1997 September 3, 1997
--	---	---

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Bend City Council (continued)	- regarding funding Agreement approved Roadway alignment Plan Amendment	November 19, 1997 December 17, 1997 March 4, 1998
	Work sessions – update & north end median	April 15, 1998 August 4, 1999
	Reed Market overpass IGA for grade separated crossing Discussion	September 1, 1999 February 16, 2000
	33. South River Crossing – issues; location, number of bridges, design, traffic impact	33. December 20, 1995 June 20, 1996 April 2, 1997 April 16, 1997 June 4, 1997 June 18, 1997 July 16, 1997 August 20, 1997
	Public Hearing on EIS Scope of Work Work session Report to City Council on past studies & Council intention to conduct a 2 bridge study Work session RFP for a bridge study	September 3, 1997 September 17, 1997 October 15, 1997 January 7, 1998
	Work session: Kittelson Presentation Traffic analysis report to Council work session River crossing street design work session Council direction (2 bridges:1 arterial w/2 lanes, 1 local) River Crossing ROW Agreement – Consider action to purchase ROW Public Hearing Council Action – to authorize ROW Acquisition	February 18, 1998 April 7, 1999 April 21, 1999 June 2, 1999 June 9, 1999
	34. Joint City Council/Park District work session Regarding coordination on S. River Crossing Regarding the Log deck property exchange	34. April 15, 1998 April 21, 1999
	35. Lava Ridge Refinement Plan Jt. Work session w/Council & County Board Work session w/City Council Work session w/City Council Discussion w/City Council	35. May 14, 1998 July 21, 1999 January 5, 2000 May 3, 2000
	36. Improvement strategy for south access to downtown: CC: Presentation by consultant-work session BDB: Presentation by consultant-work session	36. May 20, 1998 March 17, 1999
	37. General Plan Update – <i>BUAPC Recommended Draft</i> – work sessions	37. June 17, 1998 July 1, 1998 July 15, 1998 August 5, 1998 August 19, 1998 September 2, 1998 September 16, 1998
	38. General Plan Update – Joint city/county Public Hearing Work session (post hearing) Revised General Plan Adoption (by City) City Zoning Ord. Amendments – approved	38. October 14, 1998 November 10, 1998 November 18, 1998 December 2, 1998
	39. Council/Park District – Public Hearing Re: Larkspur Trail Project	39. November 18, 1998
	40. Highway 20 Corridor Study – work session	40. December 16, 1998

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Bend City Council (continued)	Approve Resolution of Support for Study 41. Presentation on Olney Street design 42. General Plan – Periodic Review: Presentation Evaluation of Tasks Approved Work Program Approved 43. CIP Public Hearing 1999 CIP Public Hearing 2000 44. Private Streets: work session discussing accepting private streets as public 45. TSP work sessions Jt. Mtg. w/Planning Commission Misc. TSP/BTAC updates–by City Manager (at each Council meeting) BTAC Recommendation Presentation Public hearing TSP Adoption 1st Reading of Ordinance 2nd Reading of Ordinance 46. Subdivision Ordinance work sessions 47. Jt. work session w/Co. Board re: Trans. Fund. 48. West side traffic issues – work sessions West Bend Transportation Consortium Proposal Presentation City wide trans. issues report to Council 49. Community Survey (PSU) Summary presentation work sessions 50. Downtown Development Report – work session 51. Bend Dial-A-Ride work session: consultant report 52. City Wide Transportation Issues Presentation 53. Expressway Designations on State highways through Bend: Hwy 20 & 97 (OTC Action) 54. Newport Charrette – Report by Sponsors 55. Roundabouts on Mt. Washington Dr (2 loc.) Public Hearings	March 3, 1999 41. March 3, 1999 42. February 3, 1999 March 17, 1999 July 7, 1999 43. May 19, 1999 June 28, 2000 44. July 7, 1999 45. Nov 3, 1999 Dec. 15, 1999 January 19, 2000 Jan – May 2000 May 17, 2000 June 28, 2000 August 2, 2000 October 11, 2000 46. June 17, 1999 47. June 17, 1999 48. Aug 18, 1999 Sept. 1, 1999 Oct. 6, 20, 1999 Nov. 17, 1999 Jan. 19, 2000 May 3, 17, 2000 December 1, 1999 49. January 18, 2000 March 15, 2000 50. Oct. 20, 1999 51. Nov 17, 1999 52. Dec. 1, 1999 53. April 5, 2000 54. April 5, 2000 55. April 19, 2000
Deschutes County Board of Commissioners	1. TSP & Transportation Plan Update 2. Street SDC work session 3. TGM: Trails Study work session 4. Trans. Priorities/Funding work sessions 5. TSP & Transportation Plan Update 6. Trans. Model Alternatives work session 7. Lava Ridge Refinement Plan Jt. Work session w/Council & County Board 8. General Plan Update – Joint City/County Public Hearing	1. October 31, 1994 2. May 15, 1995 3. June 21, 1995 4. September 25, 1995 February 7, 1996 March 20, 1996 5. January 8, 1996 6. July 17, 1996 7. May 14, 1998 8. October 14, 1998

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

	9. Empire Ave. alignment – map amendment 10. Jt. Work session – Gen. Plan update 11. Revised General Plan Adoption (by County) 12. Jt. work session w/City Council re: Trans. Fund	9. October 14, 1998 10. November 10, 1998 11. November 25, 1998 12. June 17, 1999
Bend Metro Parks & Recreation - BMPRD	1. “What’s around the Next Bend” - Open Houses 2. TGM Trails Study work session 3. Park Plan & Trails work session 4. Joint City Council/Park District work session Regarding coordination on S. River Crossing “Log-deck” property exchange Land trade & ROW purchase agreement 5. Council/Park District – Public Hearing Re: Larkspur Trail Project	1. March 2, 1995 July 20, 1995 July 1, 8, 15, 22, ‘97 2. June 21, 1995 3. January 17, 1996 4. April 15, 1998 April 21, 1999 June 2, 1999 5. November 18, 1998
Bend La Pine School District	1. “What’s around the Next Bend” - Open Houses 2. School Siting TGM Study (final draft)	1. March 2, 1995 July 20, 1995 July 1, 8, 15, 22, ‘97 2. June 26, 1997
Bend City Council, BMPRD Board, Bend LaPine School District Board	“Collaborative Planning” Meetings: Transportation/General Plan Presentation	April 13, 2000
Bend Urban Area Transportation Technical Advisory Comm. (T-TAC)	Ongoing Coordination (monthly meetings)	January 1994 thru October 1997; Spring 2000
Deschutes County Transportation Technical Advisory Comm. (C-TAC)	Ongoing Coordination (monthly meetings)	December 1994 thru October 1997
Comprehensive (General) Plan CAC	<i>Discussions specific to TSP & Trans. Plan:</i> 1. General Plan Update/Trans. Issues 2. TSP & Transportation Plan 3. TSP & Transportation Plan 4. Transportation Plan update 5. Transportation Plan update	1. April 19, 1995 2. June 8, 1995 3. February 8, 1996 4. April 22, 1997 5. May 8, 1997
Bend Urban Trails TAC	Coordination Meetings (series of 3 meetings)	February 23, 1995 March 29, 1995 April 25, 1995
Bend Urban Area Transportation Citizens Advisory Committee (T-CAC)	Ongoing Coordination (monthly meetings) <i>Summary of key issues/discussions:</i> 1. Airport Master Plan discussion & approval 2. Transportation Benchmarks 3. Parking Study 4. Transportation Priorities/Funding work sessions	January 1994 through October 1997 1. May 19, 1994 September 15, 1994 2. November 17, 1994 December 15, 1994 January 19, 1995 May 18, 1995 June 15, 1995 August 17, 1995 January 18, 1996 3. September 21, 1995 4. September 25, 1995 February 7, 1996 March 20, 1996

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

(T-CAC continued)	5. Transit Feasibility 6. Sidewalk Priorities 7. Street Width Reductions (residential) & Approval 8. Trail & Collector Street Plan amendments 9. Transportation Model Alternatives discussions/ work session 10. Street Functional Classification 11. Highway 97 Corridor Study presentation Recommendation of support 12. General Plan <i>update</i>: ● Goals & Objectives ● G & O, Text, Policies & Maps ● Approve Transportation Chap. Forward to PC ● Alternative Evaluation Criteria 13. <i>Roundabouts</i> – special mtg. presentation 14. South River Crossing – EIS Scoping Study Recommendation to City Council 15. Joint meeting w/Comp. Plan CAC	5. March 17, 1994 June 16, 1994 March 21, 1996 June 6, 1996 6. January 18, 1996 March 21, 1996 7. March 21, 1996 July 17, 1996 8. April 18, 1996 9. October 10, 1994 November 17, 1994 December 15, 1994 April 20, 1995 May 18, 1995 July 17, 1996 10. January 19, 1995 March 16, 1995 June 15, 1995 October 19, 1995 11. April 20, 1995 July 20, 1995 August 17, 1995 12. 1996-1997: July 18, 1996 August '96-April '97 May 15, 1997 July 17, 1997 13. January 30, 1997 14. April 11, 1997 15. April 22, 1997
Bend TSP Advisory Committee (BTAC)	1. Full Committee Meetings (10 meetings) 2. Subcommittee Meetings (55 meetings) 3. Open Houses 4. Jt. City Council/Plan. Comm. recomm. present.	1. Feb-May 2000 2. Feb-May 2000 3. Feb. 15, 2000 Apr. 25, 27, 2000 May 5, 6, 2000 4. May 17, 2000
Alternative Funding Advisory Committee on Transportation	Committee meetings discussing transportation Funding alternatives and system priorities	April 4, 11, 1995 July 10, 1995 August 1, 7, 22, '95 September 11, 1995 October 30, 1995 Nov. 13, 17, 1995 December 4, 11, '95 Jan. 3, 8, 17, 24 '96 February 7, 1996 March 20, 1996
Downtown Parking Study Committee	Committee meetings discussing parking supply and demand in downtown. Developed parking management recommendations in coordination with consultant.	March 28, 1995 April 25, 1995 May 26, 1995 September 21, 1995 October 10, 1995

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

		December 19, 1995 January 26, 1996 March 8, 1996
Safe Communities Coalition	Deschutes County Safe Communities Program <i>General Meetings</i>	December 10, 1996 June 24, 1997
Bend Chamber of Commerce: <i>Leadership Bend Class</i>	1. Presentation: Introduction to TSP 2. Presentation: TSP & Transportation Planning 3. Presentation: TSP & Trans. Planning Issues/Problems	1. November 9, 1993 2. December 13, 1994 3. December 10, 1996
Oregon Head Injury Foundation	Workshop: Panel regarding Development of Area Public Transportation System	June 25, 1994
Bend Chamber of Commerce - Transportation Subcommittee	Presentations: TSP & Transportation Plan Update	September 26, 1994 February 22, 1995 November 9, 1995
Bend Chamber of Comm. – BRED Council	Periodic Review & TSP Presentation TSP Presentation	June 9, 1999 December 10, 1999
League of Women Voters	Presentation: TSP & Transportation Plan Update	November 7, 1996
St. Charles Medical Center. Board	Presentation: TSP, Plan, Trans. System Priorities, Roadway Projects; 27th Sr., Roundabouts	January 22, 1997
Central Oregon Board of Realtors	Presentation: Transportation & General Plan overview	April 24, 1997
Interested Parties (Other Bend Area sponsored activities)	Village Development Sponsored <u>Guest Speaker</u> : Andres Duany – <i>Rethinking Urban Sprawl</i> Newport Avenue <i>Design Charrettes</i> sponsored by Friends of Bend & Brooks Resources NorthWest Crossing Develop. <i>Open Houses</i> (West Bend Properties) West Bend Transportation Consortium <i>Workshops</i> Friends of Bend sponsored <u>Guest Speaker</u> : Ebon Fodor – <i>Who Pays for Growth?</i>	November 19, 1994 Feb. 23-25, 2000 Fall 2000 Winter 2000 Apr 12, 18, 2000 May 5, 2000
Interested Parties (Deschutes County activities)	Deschutes Co. – refinement area <i>charrettes</i> : 1. Southwest Study Area 2. Northeast (Lava Ridge) Study Area	1. November 12-14, '96 2. December 3-5, 1996 April 21-23, 1998
Interested Parties - City of Bend activities	1. <i>Transportation Updates</i> Newsletter 2. <i>Our City</i> Newsletter 3. <i>Our City</i> Newsletter 4. <i>Safety by Design</i> Newsletter 5. <i>Safety by Design</i> Newsletter 6. <i>What's around the Next Bend</i> – Transportation Newsletter 7. <i>What's around the Next Bend</i> – General Plan Update Info. Flyers 8. <i>Our City</i> Newsletter 9. <i>Safety by Design</i> Newsletter 10. <i>Safety by Design</i> Newsletter	1. Summer 1994 2. Spring 1995 3. Summer 1995 4. Fall 1996 5. Winter 1997 6. June 1997 7. July 1997 8. Summer 1997 9. Fall 1997 10. Summer 1998

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

	11. <i>Our City</i> Newsletter 12. <i>Our City</i> Newsletter 13. Bend Community Survey 1999 14. <i>Our City</i> Newsletter 15. <i>Our City</i> Newsletter	11. Summer 1998 12. Spring 1999 13. Fall 1999 14. Spring 2000 15. Summer 2000
Community Meetings Community Meetings (continued)	1. Awbrey Rd. Neighborhood Meeting 2. TSP Community Workshops 3. “Old Town” Neigh. Assoc. Meeting 4. “What’s around the Next Bend” - Open Houses 5. Draft Trails Plan public meeting 6. Olney Ave. Neighborhood Meetings 7. Special Meeting – Topic: <i>Roundabouts</i> 8. Wilson Neighborhood – Parkway overpass project 9. Wall/Bond/Colorado/Arizona Neighborhood Meetings to discuss downtown access project 10. Wall Street – Newport to Portland – meeting with affected businesses 11. BTAC Open Houses (5) General Audience General Audience Development Community Senior Center General Audience	1. July 21, 1994 2. Sept. 22 & 29, 1994 3. February 21, 1995 4. March 2, 1995 July 20, 1995 July 1, 8, 15, 22, ‘97 5. May 31, 1995 6. March 9, 1996 February 2, 1998 March 10, 1998 December 8, 1998 January 19, 1999 February 6, 1999 March 9, 1999 April 6, 1999 7. January 30, 1997 8. September 30, 1998 9. October 22, 1998 December 7, 1998 June 24, 1999 Aug 5, 30, 1999 10. December 15, 1998 11. February 15, 2000 April 25, 2000 April 27, 2000 May 5, 2000 May 6, 2000
Central Oregon Intergovernmental Council COIC	Central Oregon Public Transportation Coordination Project – TAC meetings (monthly) Project Stakeholders Meeting Project Newsletters	Nov. 1998 – Present Jan. 26, 1999 Summer 1999 Fall 1999
T.V. & Radio	1. Z21 TV Interview regarding TSP 2. KBND Interview regarding TSP 3. Cable T.V. Production & Airing - Summary of General Plan Update 4. Cable T.V. Production & Airing – City Edition: Video News Magazine	1. September 23, 1994 2. December 6, 1994 3. July 1997 4. July 2000

* **bold print** = approval date

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

2.0 EXISTING TRANSPORTATION PLANS, POLICIES and STANDARDS

2.1 CITY OF BEND

2.1.1 Bend Area General Plan

The Bend Area General Plan (BAGP) is the comprehensive planning document guiding land use and transportation planning for the greater Bend urban area. The BAGP was adopted by the city of Bend and Deschutes County, in June 1976, and later acknowledged by the Oregon Land Conservation and Development Commission, in June 1981, and given periodic review approval in 1989.

The BAGP establishes the overall goals, objectives and policies of the City relative to land use and transportation planning. The Plan provides a framework for decisions that are consistent with the physical characteristics, goals and resources of the community. The basic aim of the General Plan is to organize and coordinate complex interrelationships between people, land, resources, and facilities in such a way as to meet the future needs of the citizens and to protect the livability of the community.

The first major update of the General Plan was conducted over the course of a five-year period. Beginning in 1994, this effort included a major update of the Transportation element of the Plan that addresses many of the requirements stipulated in the TPR. The *Bend Area General Plan (BAGP) - Transportation Chapter 7*, is included in Resource Document A.3

The city is currently working on another Periodic Review effort regarding the General Plan. The development of the TSP is also one of the Periodic Review work elements.

2.1.2 City of Bend Zoning Ordinance NS 1178

Bend's zoning ordinance is an additional document that implements the BAGP. The ordinance is designed to regulate the location and use of buildings, structures and land for residential, commercial, industrial, or other uses. The zoning ordinance was amended, in 1993, to comply with the TPR requirements for bicycle, pedestrian and transit planning. [Bend was one of the first cities to comply with these expedited elements of the TPR.]

A substantial update of the Subdivision Ordinance is now underway. Some of the updated items were completed in response to meeting TPR stipulated requirements (e.g., street widths and block lengths, etc.)

2.1.3 City of Bend Subdivision Ordinance NS-1349

The City Subdivision Ordinance is an additional document that implements the BAGP. This ordinance sets forth the minimum standards governing the approval of subdivisions and partitioning. One of the primary purposes of this ordinance is to encourage subdivision development that is well planned and to create livable neighborhoods with all the needed amenities and community facilities. The subdivision ordinance was amended,

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

in 1993, to comply with the TPR requirements for bicycle, pedestrian and transit planning. In the fall of 1999, the City began the process of updating this Ordinance to address, among other items, TPR-related changes.

2.1.4 City of Bend - Street Policies

In addition to the zoning and subdivision ordinances, the City has adopted several policies regarding city streets. These Policies provide supplemental regulatory and procedural guidance regarding the management of public streets within the city limits. These policies are included in Resource Document A.1.

2.1.5 City of Bend Street - Standards and Specifications

The City also provides a detailed set of construction street standards and specifications (Resource Document A.2). These standards and specifications are incorporated into any City contract for the design and construction of City owned and maintained street facilities. These standards and specifications are intended as a supplement to the American Public Works Association Standards and they comply with the Americans with Disabilities Act (ADA) requirements. A substantial update of the City Street Standards is now underway.

2.2 DESCHUTES COUNTY

Deschutes County, by virtue of a City/County agreement^{A.9}, transferred building and land use authority for the unincorporated area between the city limits and the urban growth boundary (UGB) to the city of Bend, on July 1, 1998. Before that date, land use decisions for this area were administered by the ordinances, codes and roadway standards that were in place and adopted by Deschutes County. Also, as a result of a November 1998 voter approved measure, the City officially annexed these “unincorporated” areas out to the UGB on July 1, 1999.

2.2.1 Deschutes County Road Standards

The County Subdivision Ordinance also contains the design standards and construction specifications for public streets within the unincorporated planning area around the city [see: 2.2 – “jurisdiction transfer”].

2.3 STATE OF OREGON

2.3.1 Oregon Transportation Plan

In 1992, the Oregon Transportation Commission adopted the Oregon Transportation Plan^{B.14} (OTP) to provide the state with an overall policy plan for transportation. As stated in the Plan: “*The purpose of the OTP is to guide the development of a safe, convenient and efficient transportation system, which promotes economic prosperity and livability for all Oregonians*”. The OTP addresses statewide transportation for all modes including transit, bicycling, walking, air, rail and highway travel.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

2.3.2 Oregon Highway Plan

The Oregon Highway Plan^{B.17} was adopted, by the Oregon Transportation Commission (OTC) in 1991, and further updated in 1999, and represents the highway policy element of the state of Oregon Transportation Plan. It also outlines the revenue required to carry out those strategies and serves as a basis for planning transportation improvements through the State Transportation Improvement Program (STIP).

2.3.3 Oregon Bicycle and Pedestrian Plan

In 1995, the OTC adopted The Oregon Bicycle and Pedestrian Plan^{B.15}. The plan provides direction to the Oregon Department of Transportation (ODOT) for establishing bicycle and pedestrian facilities on state highways. It also guides cities and counties in establishing facilities on local transportation systems.

2.3.4 Oregon Public Transportation Plan

In 1997, the OTC adopted the Oregon Public Transportation Plan^{B.16}. The Oregon Public Transportation Plan provides guidance for the development of transit, rideshare and transportation demand management services in Oregon. This plan addresses methods to reduce traffic congestion and to expand and enhance public transportation services in the state.

2.3.5 Oregon Highway Corridor Strategy Plans

Three highway corridor plans have been developed for the Bend area. In 1995, the U.S. Highway 97 Corridor Strategy (Madras - California Border)^{B.11}. In 1996, the U.S. Highway 20 Corridor Strategy (Bend – Vale)^{B.12}. And the Interim Corridor Plan for U.S. Highway 20 and OR 22 (Salem - Bend) was completed in 1998^{B.13}.

The intent of *corridor planning* is to accomplish the following:

- to translate the policies of the OTP into specific action;
- to describe the functions of each transportation mode, consider trade-offs, and show how they will be managed;
- to identify and prioritize improvements for all modes of travel;
- to indicate where improvements should be made;
- to resolve any conflicts with local land use ordinances and plans; and
- to establish guidelines for how transportation plans will be implemented.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

3.0 CURRENT TRANSPORTATION CONDITIONS

The foundation component of the TSP is an assessment of the existing transportation system. This includes an inventory of facilities and services by function, type, capacity and condition (as of June 2000).

3.1 STREET SYSTEM

The street system provides a comprehensive system of transportation facilities serving the Bend urban area. It provides carrying capacity for automobiles, trucks, bicycle, pedestrian and public transportation. The existing Bend street system includes approximately 77 miles of arterials and 35 miles of collector roadways. The existing major street system is illustrated on Figure 2.

Several state highways serve the Bend area. These highways include the Dalles-California Highway and Third Street (U.S. Highway Route 97), the McKenzie-Bend Highway (U.S. Highway Route 20 - "to the west") and the Central Oregon Highway (U.S. Highway Route 20 - "to the east"). Also, Century Drive (State Highway No. 372) provides access to Mount Bachelor from Bend. Like many of the cities east of the Cascades, the state highway system represents the most significant transportation corridors within the community. They also provide important linkages to the city from adjoining areas of the county and other parts of the state.

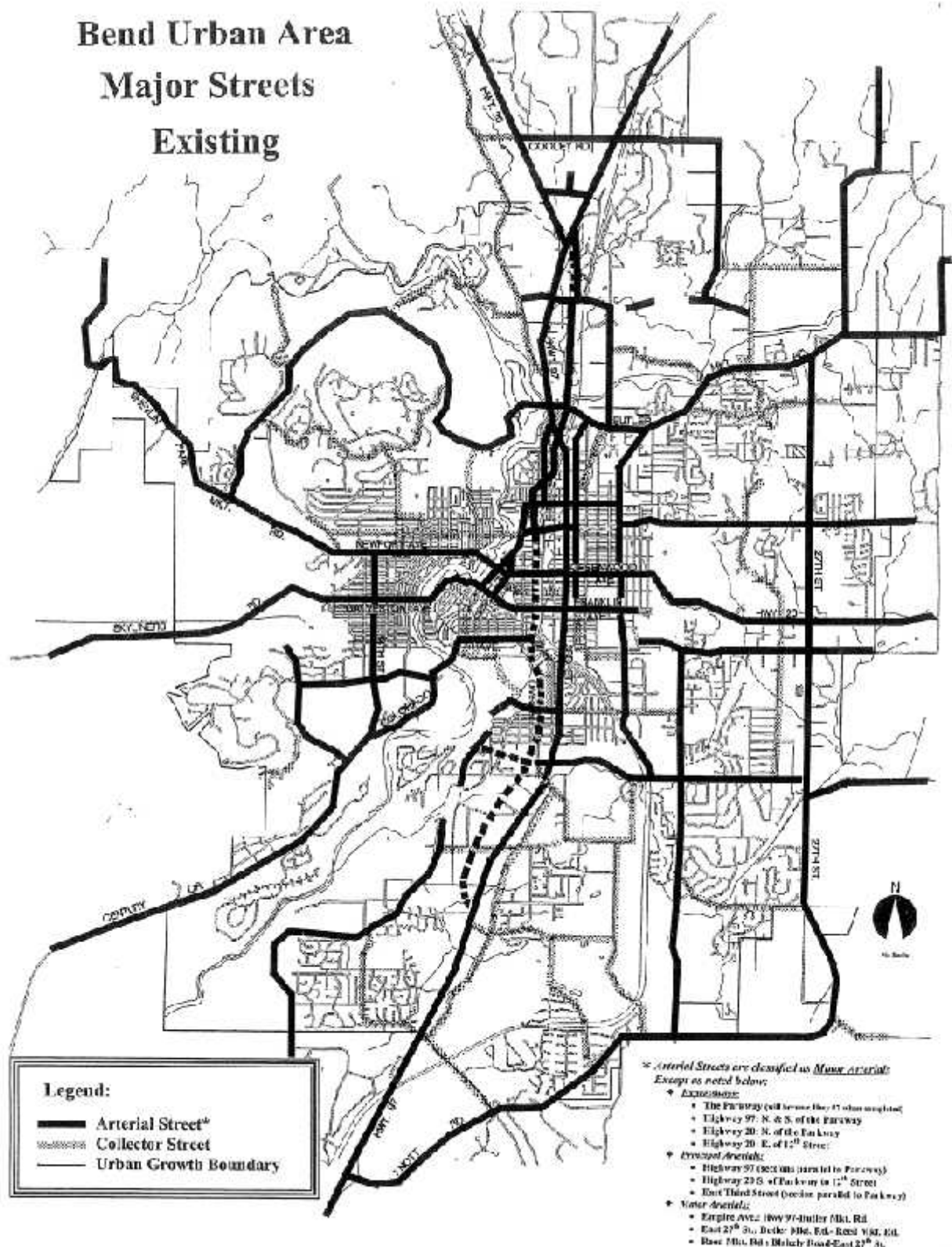
The state highway system plays a dramatic role in the organization and layout of the town. Highway 97 bisects the city into east and west halves, and the eastern extension of Highway 20 further divides the city into north and south sectors. The state highways carry the highest traffic volumes in the community. Land uses along these corridors are also highly automobile oriented including shopping malls, restaurants, lodging, recreation vehicle and automobile sales, gas stations and automobile service facilities. Current traffic volumes on these highways range from 20,000 to 50,000 vehicles per day. Seasonal fluctuations, such as the summertime tourist peak, generate July and August traffic volumes that are upwards to 30-percent higher than the average yearly month. The Parkway facility, now under construction, is expected to relieve much of the north-south congestion when it opens at the turn of the century. The Parkway is a controlled access *expressway*.

3.1.1 Street System Inventory

An inventory of the major streets is detailed in Appendices **A-D**. The tables list streets by functional classification beginning with arterial streets (principal, major and minor) followed by major collectors. Each street is divided into segments as defined by the respective arterial and collector streets that intersect each roadway. The tables are organized with street segments being sequenced from north to south or west to east (there are gaps in this sequencing where there are future street segments planned).

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 2
Map of Bend Urban Area - Existing Major Street System



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The inventory detail, in Appendix A-D, includes the following elements:

- **MILES:** This column converts the linear footage of each roadway segment into the nearest *hundredth of a mile distance*.
- **ROW:** This column provides the *width of right-of-way* for the roadway segment. In areas where the right-of-way varies a range is listed.
- **Pave. Width:** This column lists the *pavement width* between inside face of curb, or edge to edge of paved surface. Where segments have varied widths, a range is listed.
- **No. Lanes:** This column describes the predominant *number of travel lanes*, including center turn lanes if available (odd numbers indicate the presence of a left turn lane), that are present on each roadway segment. Additional turn lanes, if present, are not included in the total. In most cases, these additional turn lanes (right or “double” left turns) are very localized and are present at only a few of the busier intersections.
- **Road Cond.:** This column indicates the *roadway pavement condition* that is based on public works records. This information includes data from both City and County public works surveys. Ratings are given for very good (**VG**), good (**G**), fair (**F**), poor (**P**) and very poor (**VP**). The city of Bend utilizes a Pavement Condition Index (PCI) that visually evaluates the surface conditions and assigns an index number based on the presence of potholes, cracking, weathering, asphalt bleeding, uneven pavement, wheel rutting, etc. The County utilizes a similar methodology that assigns an index number with a descriptive range of very good to very poor. Each agency utilizes this information to plan street chip sealing, overlays, reconstruction projects, and/or other roadway maintenance projects.
- **ADT/YR.:** These two columns provide *average daily traffic* count information for each roadway segment followed by the *most current year* that data has been collected. Actual traffic count volumes may vary along these roadway segments and the traffic volumes are typically derived from a variety of data sources. Where an “E” appears in the year column, these volumes represent *estimates* based on comparisons of roadways with similar traffic conditions.
- **Curb, Bike Lane, Sidewalk:** These columns provide a general summary for the *presence of curbs, bike lanes or sidewalks* along each roadway segment. The columns are annotated with either a yes (**Y**), no (**N**) or partial (**P**) for the presence of the facilities. City sidewalk inventory information is depicted on Map Exhibit D.
- **J:** Jurisdiction over roadway segment; City of Bend (B), ODOT (O) and Deschutes County (D).

The following are additional inventory items illustrated on the following figures:

- **PM Peak Hour Volumes:** *Peak hour traffic volumes* have been calculated from the City’s calibrated transportation model. Appendix F, Figures 9a-d, provides a graphic illustration of the existing *summer* peak hour traffic volumes for the urban area.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- **Link Capacities and LOS:** *Link capacities* and *level of service (LOS)* calculations have been made from the City's transportation model. Link capacities and levels of service for the existing system are also illustrated graphically in Appendix F.
- **Major Intersection Control:** There are currently 31 traffic signals in the Bend urban area. ODOT owns and maintains 23 of these existing facilities and the City owns the six downtown signals, the signal at 27th Avenue and Neff Road and the new Boyd Acres/Butler Market Road signal. The city contracts with the state of Oregon to maintain these eight traffic signals. The existing traffic signal locations are listed in Table 2. Traffic signals are also included in the future construction plans along the Parkway at the intersections of Powers, Pinebrook and Highway 97 (i.e., at the south end of the Parkway). There is currently one roundabout at the intersection of Colorado Ave./14th St./Century Drive.

Bridge System Inventory: Bridges in the urban area are listed in Table 3. As illustrated in Figure 3, there are 46 bridges in the Bend urban area. The Figure differentiates between water crossings and other types of bridges. There are six existing roadway crossings of the Deschutes River, plus the "new" Old Mill bridge.

Not included in this inventory are many other pipe and box culvert crossings (that measure *less than twenty feet* in roadway length). These cross under streets and highways at numerous drainage, canal and "lateral" crossings (i.e., the "laterals" are the small, supply ditches associated with the network of irrigation canals).

In addition to the roadway river crossings (and not shown on Figure 3), there are also six exclusive *footbridges*. The structure in Sawyer Park is the most northerly of these bridges. In Drake Park, a wood structure, which was recently widened and raised (for added river clearance). Another wood bridge, that connects Columbia Park to the eastern side of the river, has also recently been reconstructed (it was replaced due to failing trusses). Farther south (a former paved roadway crossing that predates the Colorado Avenue improvements) has been converted into a non-motorized footbridge. Between Colorado Avenue and (the new) Old Mill Site roadway bridge, is another new bicycle and pedestrian (concrete) bridge. And finally, moving further to the south and into the Old Mill development, is a former mill service bridge (a timber structure) that has been reconditioned for non motorized vehicle use.

3.1.2 Street System Design

A large portion of Bend's *major street system* is laid out in a grid-like pattern. The grid street system is interrupted by prominent topographic features of the city such as; the Deschutes River, Awbrey, Overturf and Pilot buttes, the railroad, and the canal system. In these various topographically constrained areas, roadways have either followed the prevailing contours, bridges have been constructed, or the streets were discontinued.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The *local street system* was developed with a grid-like street pattern in neighborhoods beginning in the early 1900's and continuing on into the 1950's. In the decades that followed, street design turned to more curvilinear streets with less emphasis made on maintaining the street grid network. Yet later on, discontinuous streets and cul-de-sac construction became even more frequent. Local streets constructed during those early periods were commonly 30 feet wide with recent construction building wider, 36-foot roads. There are various other street widths found throughout the community but the 30 and 36-foot street dimensions represent the greatest percentage of the local road system. Historically, right-of-way widths have commonly been sixty feet for local and collector streets, and eighty feet for arterial roadways.

Table 2
Bend Urban Area Existing Traffic Signals (and Roundabout)

No.	Street	Cross Street	Jurisdiction
1	Highway 97	Cooley Road	ODOT
2	Highway 97	Robal Road	ODOT
3	Highway 97	Empire Avenue	ODOT
4	Highway 97	Bend River Mall Avenue	ODOT
5	Highway 97	O. B. Riley Road	ODOT
6	Highway 97	Mt. Washington Drive/Butler Market Rd.	ODOT
7	Highway 97	Division (north)	ODOT
8	Highway 97	Revere Avenue	ODOT
9	Highway 97	Greenwood Avenue	ODOT
10	Highway 97	Franklin Avenue	ODOT
11	Highway 97	Wilson Avenue	ODOT
12	Highway 97	Reed Market Road	ODOT
13	Highway 97	Division (south)/Brosterhous	ODOT
14	Highway 97	Reed Road /Meyer Drive	ODOT
15	Highway 97	Powers Road	ODOT
16	Highway 97	Badger Road	ODOT
17	Highway 97	Murphy Road (Wagner's Mall)	ODOT
18	Division Street	Revere Avenue	ODOT
19	Parkway	Colorado Avenue (west leg)	ODOT
20	Wall Street	Newport/Greenwood	City of Bend
21	Wall Street	Oregon Avenue	City of Bend
22	Wall Street	Franklin Avenue	City of Bend
23	Bond Street	Greenwood Avenue	City of Bend
24	Bond Street	Oregon Avenue	City of Bend
25	Bond Street	Franklin Avenue	City of Bend
26	Highway 20	NE 8th Street	ODOT
27	Highway 20	Purcell Blvd.	ODOT
28	Highway 20	NE 27th Street	ODOT
29	Revere Avenue	Hill Avenue	ODOT
30	Neff Road	27 th Street	City of Bend
31	Butler Market Road	Boyd Acres Road	City of Bend
32	Century Drive Roundabout	Century Dr./14 th St./Colorado Ave.	City of Bend
33	Industrial Way	Wall Street	City of Bend
34	Industrial Way	Bond Street	City of Bend
35	Colorado Avenue	Industrial Way	City of Bend
36	Colorado Avenue	Bond Street	City of Bend

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Table 3
Existing Bend Urban Area Bridges

Location		Type
City Maintained:		
American Lane	South of Reed Market Rd.	RR flatbed across Canal
Archie Briggs	At Deschutes River	Bridge structures (2)
Bear Creek Road	East of 27 th Avenue	Canal crossing
Benham Road	At Willapa Court	Canal crossing
Blakely Road	At Reed Road	Canal crossing
Boyd Acres Road	North of Butler Market	Canal crossings (2)
Brinson Road	West of Butler Market	Canal crossing
Brosterhous Road	East of Highway 97	Canal crossing
China Hat Road	Northwest of Knott Road	Canal crossing
Deschutes Market Road	North of Butler Market	Canal crossing
Division Street	South of Highway 97	Canal crossing
Empire Avenue	At Parkway	RR over-crossing
Empire Avenue	East of 18 th Street	Canal crossing
Ferguson Road	East of King Solomon	Canal crossing
Galveston Avenue	At Deschutes River	Bridge Structure
Mt. Washington Drive	At Deschutes River	Bridge Structure
Newport Avenue	At Deschutes River	Bridge Structure
Pettigrew Road	South of Bear Ck. Rd.	Canal crossing
Portland Avenue	At Deschutes River	Bridge Structure
Shevlin Park Road	At Tumalo Creek	Creek Bridge
Wilson Avenue	At Parkway (Division)	Roadway over-crossing
Yeoman Road	South of Empire Ave.	Canal crossing
SE 15 th Street	North of Reed Market Rd.	Canal crossing
SE 27 th Street	South of Reed Market Rd.	Canal crossing
City Maintained – Trail Bridges:		
Drake Park	At Deschutes River	Bridge Structure (trail crossing)
Gilchrist (Columbia Park)	At Deschutes River	Bridge Structure (trail crossing)
BMPRD Maintained –Trail Bridges:		
Shevlin Park - Covered Bridge	At Tumalo Creek	Stream crossing
Shevlin Park – log bridge	At Tumalo Creek	Stream crossing
Shevlin Pk – Fish hatchery bridge	At Tumalo Creek Pond	Pond crossing
State Maintained – Road Bridges:		
• Parkway:	At Empire Avenue	Road crossing
	At Butler Market	Road crossing
	At Highway 97	Road crossing
	At Division Street	Road crossing
	At Revere Street	Road crossing
	At Olney Street	Road crossing
	At Greenwood (under construction)	Road crossing
	At Franklin (under construction)	Road crossing
	At Colorado Avenue (2)	Road crossing, railroad
	At Reed Market (near future)	Road crossing & canal crossing
• Highway 97:	At south of Division Street	Canal crossings, 2 large box culverts
	South of Brosterhous Road	Canal crossing
• Highway 20 (northbound):	At Highway 97 (Sisters interchange)	Road crossing
• Colorado Avenue	(2) At: Deschutes R.& Shevlin Hixon	(1) River crossing, (1) Rd crossing

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

**Table 3
(continued)**

State Maintained – Trail Bridges:

Colorado (old road bridge)	At Deschutes River	Bridge Structure (trail crossing)
Sawyer Park	At Deschutes River	Bridge Structure (trail crossing)

Railroad Maintained:

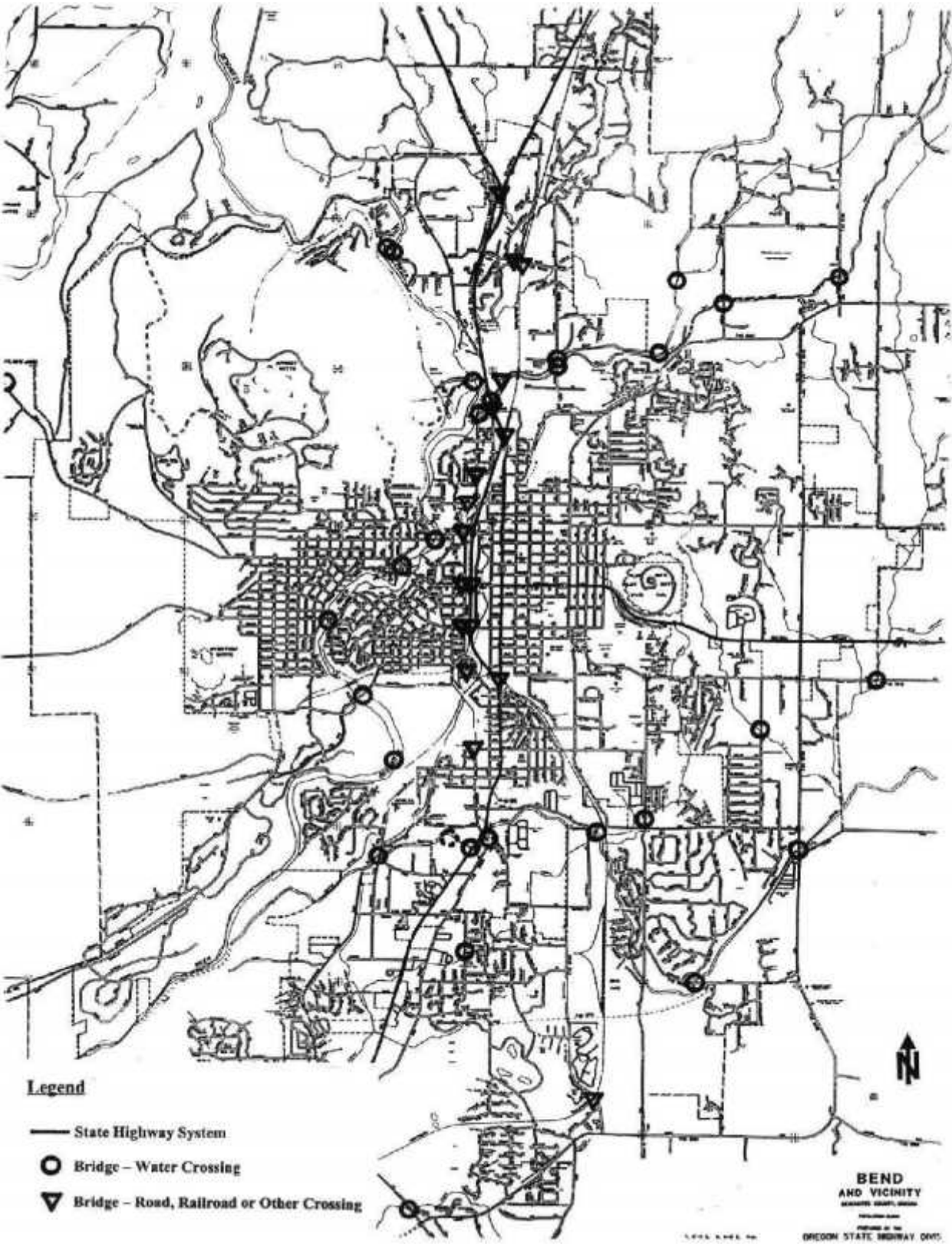
Brosterhous Road	North of Knott Road	RR under-crossing
Franklin Avenue	At Parkway	RR under-crossing
Greenwood Avenue	At Parkway	RR under-crossing
Highway 97	At south of Burnside Street	RR under-crossing
Highway 97	At south of China Hat	RR over-crossing

Privately Maintained:

• OMD Local Bridge	At Deschutes River	Bridge Structure
• OMD pathway undercrossings	On each side of the river	Box culvert undercrossings
• OMD Trail Bridge (New)	At Deschutes River	Bridge Structure (trail crossing)
• OMD Trail Bridge (Old)	At Deschutes River	Bridge Structure (trail crossing)

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 3
Map of Bend Urban Area Bridges – Existing



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

3.2 PEDESTRIAN (SIDEWALK) SYSTEM

The city of Bend requires the construction of sidewalks on both sides of a street in new residential areas, except in steep terrain areas, where exceptions allow sidewalks on one side of the street. Currently, there are about 60 miles of sidewalks along arterial and collector streets, or about one-fourth of the major street system frontage has walkways (on at least one side of the street). The existing sidewalk system inventory is depicted on Map Exhibit D. There are many gaps in the sidewalk system.

3.3 BIKEWAY SYSTEM

3.3.1 On-Street Facilities

On-street bikeway facilities have been constructed and striped along many of Bend's arterial and collector streets since the early 1980's. Today, about 70 miles or about two-thirds of the *major streets* are striped with bike lanes, or wider "fog-lined" shoulders. Because local streets carry considerably lower traffic volumes and speeds, there is rarely a need to stripe bike lanes on these types of roadways. Both the existing on street and "primary" trail systems are depicted on the Bend Urban Area - Bicycle and Primary Trail System Plan (Map Exhibit B).

3.3.2 Off-Street Facilities

The off-street facilities (trails) are used by a wide range of people including; bikers, pedestrians, hikers, joggers, strollers, (even cross-country skiers in the winter), etc. Bend is renowned for its beauty, views and urban wildlife, and the system of off-street trails is used daily, by locals and visitors alike, to help gain access and enjoyment of these natural resource areas.

In 1995 a study, titled the *Bend Urban Trails Plan*^{B.2}, was prepared to provide a comprehensive inventory of trails, an analysis of opportunities and constraints, issues, design applications, standards and funding.

Using this report as a basis, there are approximately 28 miles of trails open to the public in the Bend urban area. Approximately half of these trails are located on private property where public access is allowed. The majority of the existing trails are located along the river and on the west side of Bend. Table 4 provides a summary and description of the existing "public use" trails in the Bend urban area.

There are a number of other "informal" trails, "ditch rider" roads, utility corridors, accessways, and the like, that may not have a formal "easement" for public trail use, but are also used by the public on a daily basis. Estimates for this mileage can vary, depending upon which trails to include, but the additional mileage of these trails may be in excess of 50 miles. Most of these trails are located on the east side of the river. Due to some private property concerns, some of these areas have also been posted for "no trespassing".

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Table 4
Existing Urban Area Trails Inventory (open to public use)

Trail Segment	General Description	Length (miles)
Awbrey Butte Trails:	Some existing and the majority of trails <i>will be built</i> as development occurs. Trails are mostly gravel & dirt single-track type. Some of the trails to be paved.	4.0 (est.)
River & Waterway Trails:		
● Awbrey Meadows Subdivision (gate) to Mt. Washington Drive	Moderate use trail, portions of trail on slopes exceeding 10%. 10'+ wide, gravel & dirt trails.	2.0
● Mt. Washington Drive to 1st Street	High use trail. 10-15' wide, gravel, bark & dirt trail.	1.0
● O.B. Riley Road to River Run Trail	Moderate use trail through Sawyer Park. 4', gravel & paved trail.	0.5
● Newport to Galveston (north-south): through Drake Park * [a BMRD project is replacing old s/w w/pavers]	High use trail through Drake Park. Includes 6' wide boardwalk & paved trail (on north), mostly un-improved bark chip & grass trail through the park.	0.5
● Drake Road to Riverside Boulevard (east-west) & "Drake footbridge" *	Very high use trail. New wood bridge across river. An 8-9 ft. paved pathway leads to/from the bridge.	0.2
● Columbia to Riverfront streets, including the "Gilchrist footbridge"*	High use trail. New wood bridge across river. 6-10' gravel and bark chip trail.	0.2
● From Commerce Avenue, along the west side of river, to the south UGB	High use river trails. Mostly private property, some use restrictions. 8-10', gravel & dirt trail, some paved.	4.0
● C.O.I.D.nature trail, Blakely Road to the Deschutes River	Low use. 8-10', gravel & dirt surface	1.0
● Larkspur trail, Reed Market Road to Bear Creek Road *	Moderate use. Connects a number of local parks. Follows primarily a dirt, 8-12', "ditch rider road"	1.5
Roadway Corridor:		
● Riverside Blvd. to Mt. Washington Drive (via Colorado/Century Drive)	High use trail. Width varies. Mostly a 10', paved trail located along (eastern) right-of-way edge.	1.0
● Simpson to Mt. Washington Drive (via Century Dr. & 14th Street)	Moderate use. School access route. Paved 8-10' wide along (west) ROW. [Now partly under reconstruction]	1.5
Others:		
● Broken Top to Cascade M. S., Westgate preserve and USFS prop.	Low use. Private & public trails. 2-4' single track dirt trails.	0.5
● Mt. Gate development trails	Low use. Private trails. 8-10' paved trails.	2.5
● Wood River Park Trail	Low use. Single track dirt surface trail.	0.5
● Lotus Drive to Pilot Butte School	Low use. Single track dirt surface trail (width varies)	0.5
● Shevlin Park Trails *	Moderate use. A paved, low volume road runs the length of the park, plus many single tracks, dirt surface trails through the park. (Several additional miles of single track bike trails extend beyond the UGB area into U. S. Forest Service lands)	2.3
● Broken Top development trails	Low use. Private trails. 8-10', paved surface.	4.5
Mileage Total* (approximate) =		28.2

* Adjustments have been made to the 1995 Trails Report inventory

Source: Bend Urban Trail Plan, 1995

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

3.4 PUBLIC TRANSPORTATION SYSTEM ⁹

3.4.1 BEND DIAL-A-RIDE PROGRAM

Bend's Dial-a-Ride (DAR) system is available for use by low income seniors (60 and older) not living near a bus route and eligible disabled persons unable to use the fixed-route bus system. The Dial-a-Ride transit provides personalized door-to-door service and requires reservations up to two weeks in advance of a planned trip. The service is provided to participants within the city limits. The program operates Monday through Friday from 6:15 AM to 6:15 PM, and on Saturday 7:15 AM to 5:15 PM, and Sunday from 9:30 AM to 3:30 PM. The rides are provided at a cost of \$2.00 per one-way trip, and \$1.00 for certified low income riders. All vehicles are equipped with wheelchair lifts. ⁹

3.4.2 OTHER EXISTING PUBLIC TRANSPORTATION FACILITIES

There are currently two Park and Ride facilities located in the city of Bend. One is in the north (State owned) parking lot of the ODOT, Region 4, Administration Office and the other is the Mt. Bachelor (private owned) Parking lot, located at the northeast corner of Simpson Avenue and Columbia Street. The Mt. Bachelor parking lot is primarily used by Mt. Bachelor employees and their customers however some other park-and-ride (and, park-and-walk) activity is permitted at that location. Capacity of this lot is currently about 580 parking spaces. Mt. Bachelor staff has estimated that peak weekends use about 85-percent of the lot and normal weekend ski activity uses about 60 to 70-percent of the lot. The lot has also been used as an overflow, shuttle parking lot for large events in the Old Mill District, the downtown area and shuttle service during the County fair in Redmond each summer. Also, Commute Options for Central Oregon has been actively seeking other sites for Park and Ride activity. ⁹

3.4.3 OTHER PUBLIC TRANSPORTATION SERVICES

There are several private transportation vendors and cab companies that provide regular daily service to and from the city from outside the Bend area. Major service providers include (fares vary):

- **Greyhound:** Greyhound offers daily service from a single bus station in Bend that is located on Highway 20/97 just south of Empire Avenue at the Tom Tom Diner/Motor Inn. There are three departures daily: 1) to Portland, 2) to Seattle, and 3) to Klamath Falls. There are also three arrivals daily: 1) from Klamath Falls, 2) from Portland, and 3) from Seattle. Three other services (Valley Retriever, Porter Stage Lines and the People Mover) meet at the Greyhound bus stop.
- **Valley Retriever Bus Lines:** Valley Retriever operates one bus daily Monday through Saturday to and from the Greyhound stop in Bend. It provides local connection to/from the cities of Salem, Albany, Corvallis and Newport (and some stops in between).
- **Porter Stage Lines:** Porter Stage also uses the Greyhound stop in Bend. It provides daily service to/from Eugene and Coos Bay (and some stops in between).

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- ***The People Mover:*** The People Mover, operated by the Grant County Public Transit District, offers local connections to the cities of Redmond, Prineville and John Day three times a week.
- ***CAC Transportation:*** CAC Transportation offers daily service to/from Portland from The Riverhouse. CAC also offers a demand responsive shuttle service, by reservation, to the Redmond Airport.
- ***Mt. Bachelor Super Shuttle and Employee Shuttle:*** During the height of the skiing season (typically between Thanksgiving through mid-April), Mt. Bachelor Ski Resort operates eleven buses that provide rides between their park-and-ride lot, at Simpson and Colorado, and the skiing area for both employees and the general public. Cost to the public is currently \$1.00 per one way trip. There are about three morning departures and four returning trips, with extra service provided on weekends. The employee shuttle makes nine daily trips to and from the mountain.

3.5 RAIL, AIR AND ROAD FREIGHT SYSTEMS

3.5.1 RAIL SERVICE

3.5.1.1 Freight Rail Service: The Burlington Northern-Santa Fe Railroad provides freight rail service to Bend. The rail line runs generally north/south through the center of town. The rail activity is primarily freight that is being hauled through the area. There is no existing or planned inter-modal truck-rail reload facility in Bend, but a few local industrial firms are served off short spur tracks. Most of the local rail users receive bulk shipments of materials used in manufacturing products that are shipped out by truck. One local user ships out pumice and other rock products mined near Bend.

A railroad-switching yard is located east of the intersection of Colorado Avenue and Division Street. A rail car weigh station, serving the freight shipping needs of the Central Oregon area, is located west of Division Street along a spur track that runs south of, and parallel to, Colorado Avenue. The BNSF railroad lines are indicated on the Bend Urban Area Roadway System Plan (Map Exhibit [A](#)).

3.5.1.2 Passenger Rail Service: There is currently no passenger rail service in Bend. The nearest connection to passenger rail service in Central Oregon is in the town of Chemult, which is located about 70 miles south of Bend. The AMTRAK “Coast Starlight” train currently has daily service, in Oregon, to Klamath Falls, Chemult, Eugene, Albany, Salem and Portland. The feasibility of extending AMTRAK service to the Bend area was analyzed during the development of the 1992 Oregon Rail Passenger Policy Plan. The study concluded it would be impractical to provide passenger service

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

to Bend. In 2000, the state funded two “throughway” bus connections with AMTRAK that pass through Bend. One travels from Portland to Boise, Idaho, and the other connects the Chemult rail station with the Bend area.

3.5.2 AIR SERVICE

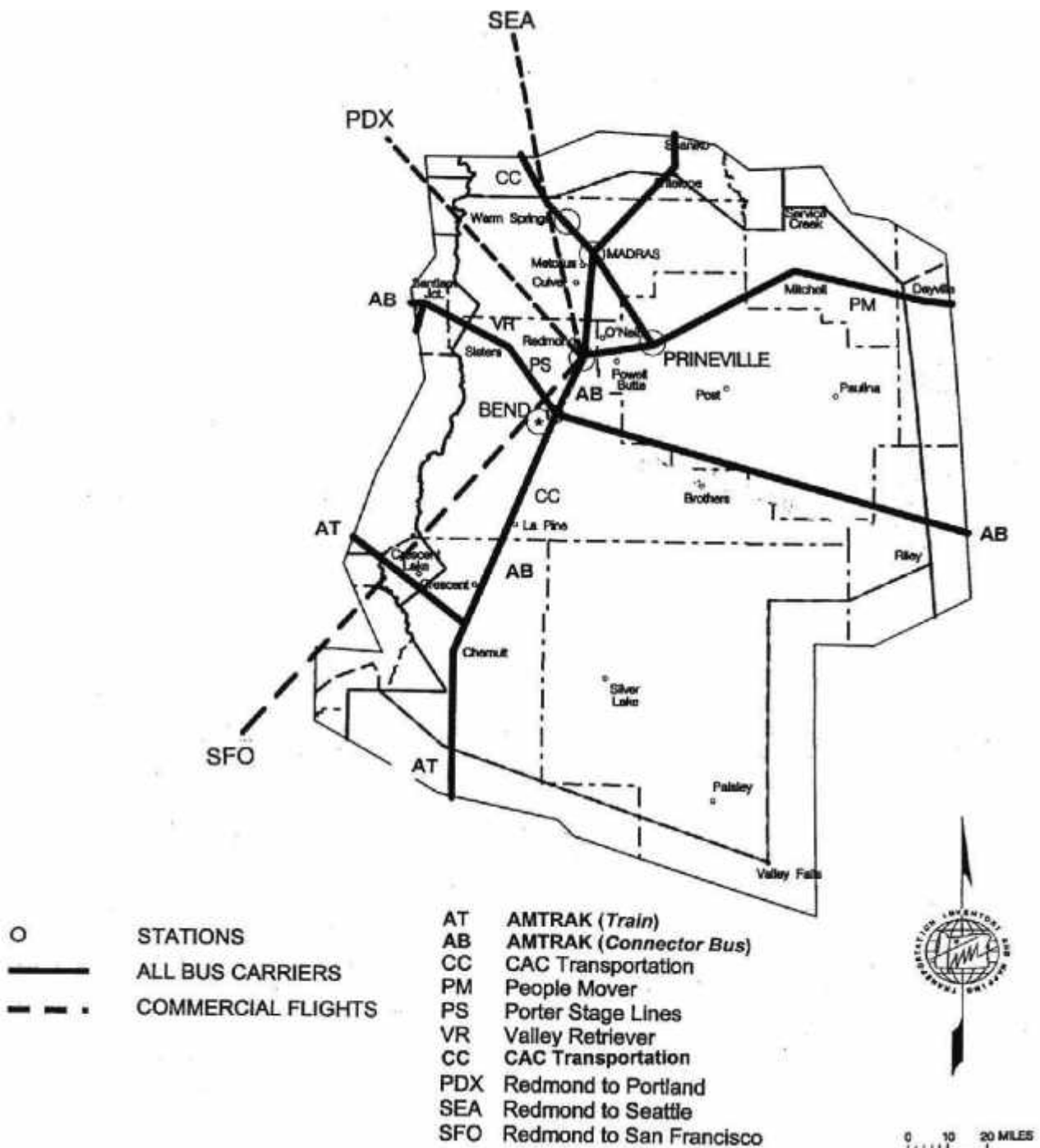
3.5.2.1 Local Air Service: The Bend Municipal Airport is located approximately five miles northeast of the Bend urban area. The airport is owned and operated by the city of Bend and is located in an unincorporated portion of Deschutes County. Development of the Bend Airport dates back to 1942 when the land was deeded to the city in an effort to establish a municipally owned and operated landing strip in the Bend area. The airport is classified as a General Aviation/General Utility airport. There is no regular scheduled commercial passenger service at this airport.

3.5.2.2 Regional Air Service: Daily air passenger service is provided to the Central Oregon area at the Redmond Municipal Airport, which is located approximately sixteen miles north of Bend. The Redmond airport is classified as a Primary Service/Transport airport. It provides scheduled passenger service, and it accommodates larger and higher performance aircraft than the Bend facility. The Redmond airport is currently occupied by two commercial carriers, Horizon Air and United Express. Currently, there are direct flights to Portland, Seattle and San Francisco.

An illustration of public transportation services to the Central Oregon area is shown in Figure 4.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 4
Central Oregon Public Transportation Services – Existing



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

3.5.3 ROAD FREIGHT SYSTEM

Both US Highway 97 and US Highway 20 are designated Freight Routes in the *Oregon Highway Plan*. These two routes in Bend serve as a major connection between north/south and east/west freight movement east of the Cascades in Oregon. All of the regional and inter-state truck freight moving through the city, or with a destination or origin in Bend, use US 97 and US 20. In the mid-1990s, ODOT widened the corner radius at the intersection of US 97 (3rd Street) and US 20 (Greenwood Avenue) to improve truck-turning movements between the highways.

Table 5 shows the level of truck activity as recorded by the ODOT automatic recorders nearest to Bend.

Table 5
Truck Activity on US 97 and US 20

Highway	Location	1998 ADT	Truck Percent
US 97 North	9 miles North of Bend	22,911	6.2%
US 20 East	5 miles East of Bend	2,609	11.6%
US 97 South	2 miles South of Bend	18,760	6.7%

US 97 and US 20 are classified as Expressways and Principal Arterials in the Bend Area General Plan and Transportation System Plan. Both highways have a five-lane section throughout the urban area, except for parts of US 20 east of Pilot Butte. The existing US 97 route is entirely through commercial or industrial areas of the community, although the southern portion of the Parkway (future US 97) will pass through residential areas. US 20 has commercial development along the whole route except for two blocks of residential development near Pilot Butte and at the east edge of the urban area.

3.5.3.1 Freight Generators and Receivers

The main truck freight generators in Bend are manufacturing firms that ship their products throughout the region or the country. A few regional trucking and delivery firms are based in the city. All of Bend's existing manufacturing and shipping areas are within 1 ½ mile of US 97 or US 20. The local arterial street system links these areas to the highways to provide efficient and direct movement of freight goods out of Bend and onto the state highway system.

Bend's population and role as a regional center has generated the development of large retailers – including supermarkets, vehicle sales, and restaurants – that receive all their goods by truck. The large retailers are mainly located along US 97 and US 20. Other retailers or service providers that receive large or frequent truck deliveries are on local arterial streets that connect into the state highways.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

3.6 PIPELINE SYSTEM

Two major natural gas transmission lines, operated by PG&E Gas Transmission-Northwest, serve Bend. These transmission pipelines extend north-south through the state and are located approximately 1 to 2 miles east of the Bend urban area. Cascade Natural Gas provides the natural gas service to the city of Bend. No other major utility pipelines serve or pass through the Bend urban area.

3.7 SYSTEM SAFETY

3.7.1 MOTORIZED VEHICLES

Traffic collisions (crashes) at intersections represent the greatest identifiable source of transportation related safety issues in the Bend urban area. Table 6, provides a summary of the crash locations in the Bend Urban area and the respective number of vehicle collisions recorded during the three year period 1996 through 1998 (for the Top 12 crash totals). Not surprisingly, the highest collision locations correspond to the busiest traveled intersections in town.

Many of the signalized intersections along Highway 97 appear at the top of the crash total list. For most of these *signalized intersections* driver error, disregarding a traffic signal or driving too fast for conditions (e.g., snow or ice) represent the highest cause of vehicle collisions.

In the case of the *non-signalized intersections*, turning movements and failure to yield right-of-way were the principal causes of the greatest percentage of crashes. The non-signalized high vehicle crash locations are at Franklin Boulevard and NE 2nd Street and at Highway 20 (Greenwood) & NE 4th Street.

3.7.2 PEDESTRIANS AND BICYCLES

The crash record for pedestrians and bicycles is very sporadic throughout the community. No doubt more crashes occur than are actually accounted for in the ODOT database record. But similar to motor vehicle collisions, incidents of recorded pedestrian and bike crashes typically occur more frequently at intersections or unprotected crossing points with high volume vehicle traffic. These incidents are normally caused as result of human error or poor judgment of conditions. Specific locations have not been identified that have abnormally high pedestrian or bicycle crash rates with motor vehicles, nor have specific sites been identified with roadway geometry, sight distance or design problems that need to be addressed (to improve non-motorized safety).

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Table 6
Top Intersection Locations for the Bend Area
Ranked by Number of Crashes 1996-1998

Rank	Major Street	Cross Street	Intersection Type	Total
1	Highway 97	Greenwood	4 leg, w/signal	43
2	Highway 97	Revere Avenue	4 leg, w/signal	32
	Highway 97	N. Division	3 leg, w/signal	32
3	Highway 97	Empire Boulevard	4 leg, w/signal	31
4	Highway 97	Division (S)/Brosterhous	4 leg, w/signal	30
5	Highway 97	Reed Market	4 leg w/signal	29
6	Highway 97	Butler Market Road	4 leg w/signal	28
7	Highway 97	Wilson Avenue	4 leg w/signal	27
	Highway 97	Franklin Blvd.	4 leg, w/signal	27
8	Division Street	Revere Avenue	4 leg, w/signal	25
9	Highway 20(Greenwood)	NE 8 th Street	4 leg, w/signal	24
10	Highway 97	Reed Lane	4 leg, w/signal	23
11	Franklin Avenue	2 nd Street	4 leg, w/stops on 2 sides	21
12	Greenwood	4 th Street	4 leg, w/stops on 2 sides	20

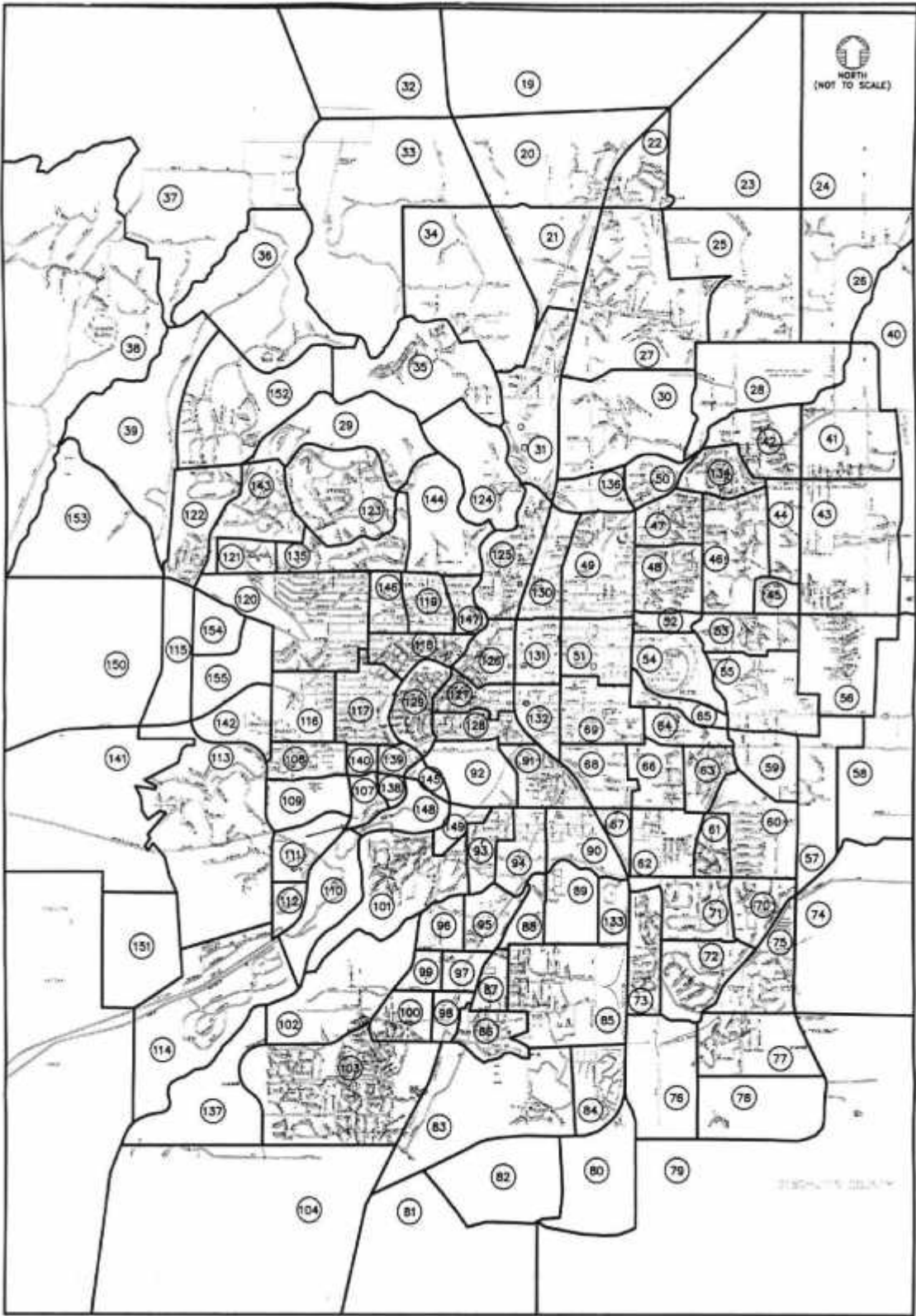
Data source: Deschutes County Safe Communities Program

3.8 EXISTING POPULATION AND EMPLOYMENT

A basic building block of a travel-forecasting model is population and employment data. As a part of the transportation model update, population and employment estimates were developed based on building permit information, census data, Bureau of Labor statistics, residential, industrial and commercial inventory information, aerial photos, and staff knowledge, to determine the number of households and jobs in the urban area. The urban area was divided into 155 districts, known as transportation analysis zones (TAZs), and population and employment numbers were assigned to each TAZ according to the respective zone characteristics. Figure 5 is a map illustrating the location of these TAZ districts. Individual TAZ data is summarized in Appendix F (in the KAI Report Appendices, and large-scale TAZ map - KAI Figure 1).

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 5
Map of Transportation Analysis Zones (TAZs)



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

4.0 TRANSPORTATION NEEDS ANALYSIS

The city of Bend engaged the services of several consultants to assist in the assessment of transportation needs during the preparation of the Transportation System Plan. Analysis was conducted to assess needs of the Airport (1994)^{B.1}, Urban Trails (1995)^{B.2}, Transit Feasibility (1994^{B.3} and 1996^{B.4}), Downtown Parking (1996)^{B.8} and an update of the Transportation Model (1996^{B.10} and 2000^{Appendix F}). These reports are the basis of much of the information contained in the “needs analysis” chapter of this plan.

4.1 COMPUTER MODELING OF THE TRANSPORTATION SYSTEM

The Bend Urban Area -*Transportation Model Update* Report, prepared by Kittelson and Associates, Incorporated (KAI), in 2000, is a major source of the roadway needs assessment analysis. This traffic modeling effort was, in part, a re-calibration of an earlier edition of the transportation model (EMME/2) originally prepared for Deschutes County in 1991^{B.9}, updated in 1996^{B.10} and further updated in 2000^{Appendix F}. The 2000 version of the model primarily updated the transportation analysis zone population and employment forecast information based on the 1998 changes to the General Plan. In addition, several street linkages were added to better represent the impact and effect of other important street circulation routes, other transportation system strategies were added (i.e., the Colorado/Arizona/Wall/Bond one way pair network) and the number of transportation analysis zones was increased. Traffic screen-line volumes, origin and destination surveys, and other model calibration work is summarized in the KAI report.

The Bend Transportation Model has been developed following the criteria and procedures prescribed by the state of Oregon. The EMME/2 Model for the urban area is also consistent with other state of the art transportation modeling guidelines and practices.

4.1.0.1 Population and Employment Forecasts

In 2000, population and employment data were prepared in the updated model for a twenty-year forecast (2020). Transportation Analysis Zones were expanded to 155 to better replicate travel characteristics of the community. Summaries of this zone by zone traffic analysis (TAZ) information are illustrated in the KAI Report Appendices. A copy of the TAZ map is shown on Figure 5. This information represents principally the number of employees and the number of dwelling units estimated for each zone. This TAZ information is separated into the following types of employment: retail, service, school and “other” employees. Household information is provided for single-, multi-family and mobile home dwelling units. Information is also provided on forecasted student enrollment and the number of motel rooms.

4.1.0.2 Refinement of the Roadway Network

In addition to the refinements made to the TAZ system, the roadway network was refined and updated to ensure that a complete and representative street network was included in the model. In addition to the collector and arterial street network, this included other important *local* circulation routes, such as Columbia Street, Eagles Road, Morningstar Drive, Boyd Acres, Shepard Road and Pinebrook Blvd. The resultant *existing* road

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

network is illustrated on Figure 6. The *future* planned roadway network is illustrated on Figure 7.

4.1.0.3 Trip Generation

The first major step in estimating the existing traffic conditions was the calculation of trip generation based on the land use inputs (housing and employment). A total of 27,143 P.M. peak-hour, (summer) weekday trips were estimated for the existing (year 2000) system in the urban area. While actual alternative mode trips are difficult to count or to estimate, it is important to note that these trips are reflected in the calibration process and are not included in the motor vehicle volumes. Thus, care was taken during the Bend travel-forecasting model calibration to accurately reflect existing vehicular traffic volumes (which already account for non-motorized travel) and **to** develop a model that accurately portrays local travel behavior.

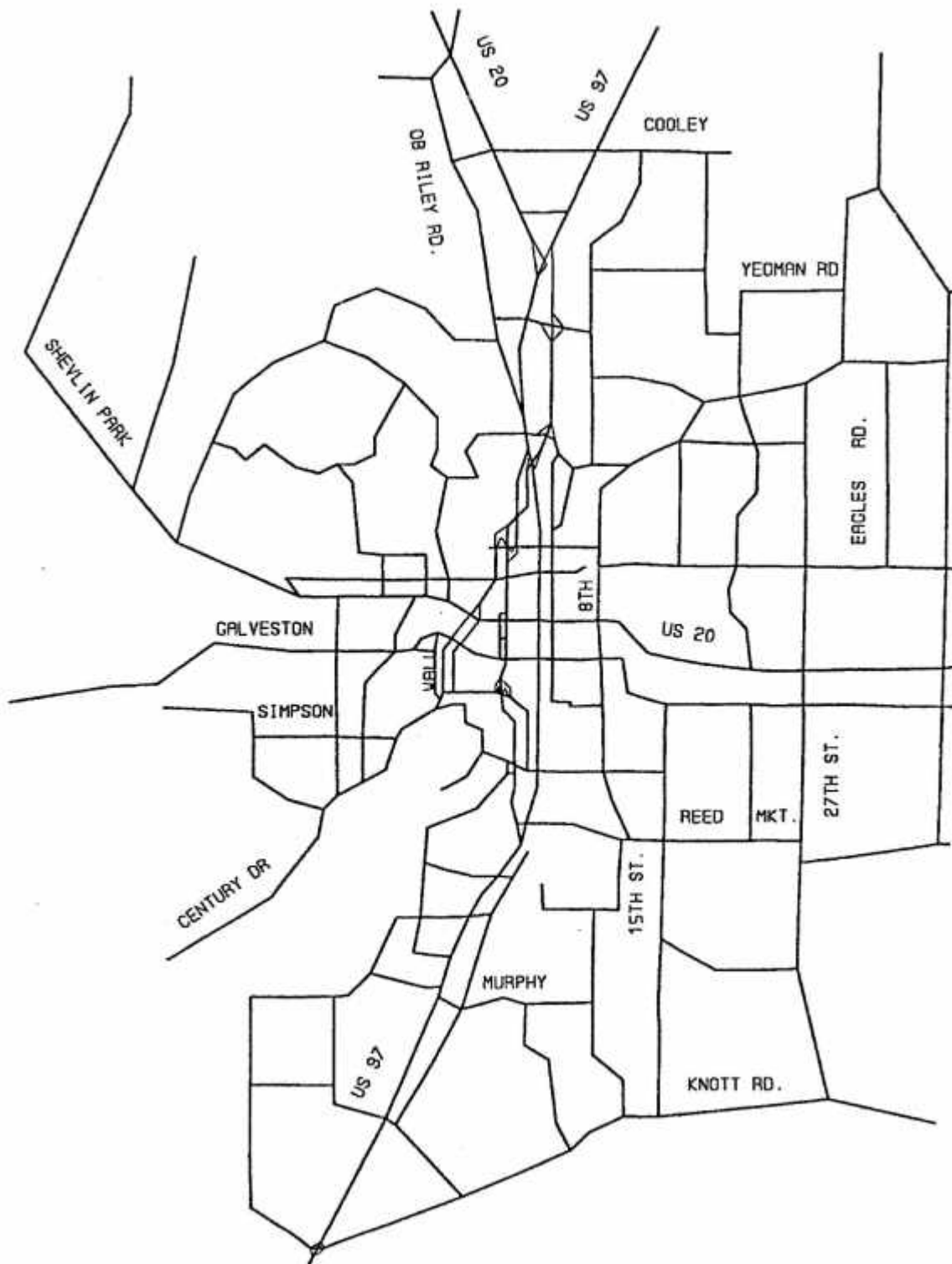
Summer time peak traffic: In an effort to account for the higher travel demand on the transportation system, revisions were also made to the model to reflect summer time traffic for the urban area. In order to estimate the increment of added trips due to increased travel during the summer weekday, the seasonal fluctuations on U.S. Highways 20 and 97 were examined. Data from the ODOT permanent recorder stations located about 3 miles south of Bend, on U.S. 97, and 5 miles east of Bend, on U.S. 20 was used to help in this estimation. The data from these stations indicated that travel during July and August is approximately 24 percent higher than that of the yearly average weekday. Therefore, estimates of external-external and external-internal-external travel were increased by that amount and reassigned to the roadway network.

Another means used to account for this summer increase in traffic was to estimate recreation related travel in the Bend area. Research of local motels indicated that during the weekday in the summertime, the average occupancy rate at the hotels/motels in Bend was approximately 30 percent higher than the yearly average weekday. During the off-peak months, typical occupancies are in the range of 50-60 percent, while during the peak season, occupancies are 85-90 percent.

The Bend Chamber of Commerce was also contacted to further substantiate increased tourist related activity during the summer. Although the chamber does not compile information about hotel and motel occupancy rates, chamber staff felt that the 30 percent increase was a reasonable estimate. As it relates to tourist activity, the chamber did have an activity report for the *Welcome Center* (i.e., the chamber's public interface for distributing tourist information). According to the report, approximately 30-35 percent more people visited the *Welcome Center* in July and August than in June or September (When also compared to October, this number nearly doubles.)

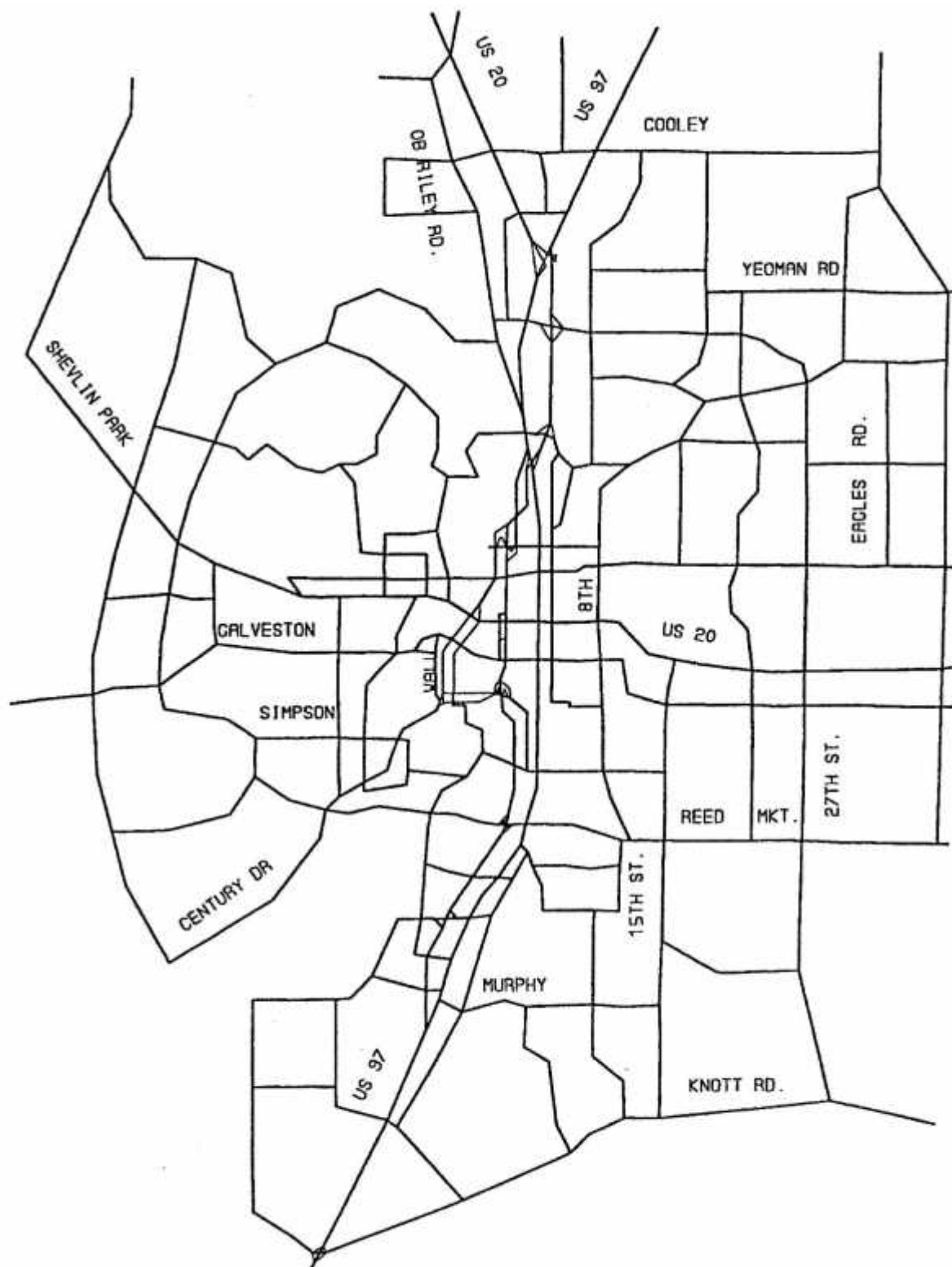
BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 6
EMME/2 Traffic Model – Existing Road Network



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 7
EMME/2 Traffic Model – Future Road Network



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Therefore, a separate trip table was created to account for trips during the P.M. peak hour between the motels and the commercial areas in the central business district. This table was created using the standard trip generation assumptions for motels documented in the ITE Trip Generation manual, 6th Edition. The vehicles generated by the increased occupancy rates were then distributed between the hotels/motels and the commercial areas in the CBD.

Other conditions that could contribute to seasonal fluctuations include the increased use of recreational homes. Currently in Bend, there are very few homes that are used exclusively for recreational purposes within the urban area. The greatest majority of these types of households are located in Sunriver and other locations outside of the urban area; therefore, adjustments were only made for the hotel and motel trips. Rental units in developments such as Mount Bachelor Village were included in the hotel/motel category.

4.2 TRANSPORTATION SYSTEM NEEDS

4.2.1 ROADWAY SYSTEM

When using the transportation model as a tool, a starting point in the assessment of roadway needs is assigning 20-year projections of population and employment to the system. This is done *without* making additional roadway capacity adjustments in the model beyond those roadway improvements that are already programmed or under construction (i.e., the Parkway is a good example of one of these projects). This is commonly referred to as a “no-build” alternative or the “Base Case” in the modeling work. These deficiencies can be illustrated by generating a *level-of-service (ratio of traffic volume to road capacity)* plot through the computer system. A plot of the twenty-year projection is provided in the KAI Report (Appendix B - Figure 13). As shown in the figure, several roadways throughout the urban area will approach, or exceed, their capacities under the “no-build” conditions during the peak hour.

The evening peak hour is typically the time of day of highest traffic congestion and the most likely hour of the day to reach roadway capacity and hence the subject of modeling data output. Although it is not normally a focus of model output, it is worthwhile to point out that many of the other hours of the day will experience congestion levels on the transportation system. Clearly, these *will also* be *times* when traffic conditions are worse than today’s congestion levels (conditions that may, or may not, exceed the capacity of the roadway). This added travel delay and inconvenience would likely be a source of frustration to the motoring public.

Consequently, the relatively poor performance of the no-build alternative is not surprising. And, these levels of congestion are clearly going to be much worse than today’s conditions. Generation of this (unlikely) traffic scenario is simply one method of illustrating the effect that growth will have on roadway congestion. The value of this exercise is that it helps to isolate areas or roadway segments that are likely to have capacity problems in the future. There are several remedies to ease most of these congestion problems. Either the demand on the system could be reduced through

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

increased use of alternative modes (to lower the number of vehicle trips), or alternatively, roadway capacity improvements could be made to the transportation system to handle the new demand. These two strategies are not mutually exclusive and could also be done in some combined form (See: Chapter 5).

4.2.1.1 Modernization and Capacity Improvements

Modernization: Traditionally, roadways have been “modernized” through improvements that include adding sidewalks, bike lanes, bus turn-outs, turn lanes and other measures that help aid alternative mode travel and improve the efficiency of a roadway (see: “Transportation System Management” in Section 6.1). This is quite common within developing areas as many of the old “farm-to-market” roads typically, over time, face increasing urbanization pressures. In fact, many of these roadways do get improved as the area around them intensifies. In this fashion, *new developments* take on the financial responsibility to make these improvements, thus helping to offset the increased demand that these new person-trips place on the transportation system. In other situations, city, county and state government financial resources are utilized to reconstruct or “modernize” these roadways.

Capacity Improvements: Capacity improvements, or in most cases the widening of roadways, are the most common means of compensating for the eventual loss in roadway level of service or performance. Roadways that are most likely to need additional widening are discussed, in Chapter 5, under the discussion of alternatives. For many of Bend’s older arterial streets, this typically means widening of the road to accommodate a center turn lane (otherwise known as creating a 3-lane roadway). In some cases, another alternative to the road widening may be as simple as re-striping the roadway to skinnier lane widths (e.g., taking a 40-foot wide, 2-lane roadway with parking, and converting it into 3 vehicle lanes, 2 bike lanes and no parking). Where traffic speeds, volumes or parking demands are low enough it may permit this kind of street retrofitting. In other cases, typically along the principal and major arterial street system, traffic demands are much greater and 4 to 5-lane wide roadways may be necessary to address system capacity problems.

Timing of Future Roadway Improvements: Many of the collector and arterial streets in the Bend urban area will be modernized or widened during the twenty-year planning period. Therefore, it is assumed (in the planning effort) that either one of these two roadway improvement mechanisms (modernization or capacity improvements) will be used to make these types of improvement to the roadway.

For the sake of making a determination of roadway improvement costs, all roadways in the urban area have been estimated as being completed to the *Plan Standard* during the twenty-year planning period. Roadway modernization, capacity improvement and new roadway link costs have been estimated and “planning level” calculations have been prepared for the entire collector and arterial street systems of the urban area (Appendix A-D). These roadway costs include the construction of missing curbs, sidewalks, bike lanes, and other vehicle lane improvement and widening costs, other “new” roadway

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

construction, plus an estimate of right-of-way acquisition (if the road widening was to be less than five feet, then no improvement costs were calculated). These estimates range from the current cost of construction to an upper range estimate (i.e., the upper range includes an increase of 50-percent). This higher-end estimate is made to account for inflation and other factors over time that will increase the cost to improve roadways. ***All of these estimates are very preliminary in nature and should be treated as such. A more accurate estimate of actual roadway costs should be based on a specific design for the individual improvements.*** The upper cost range estimate is included to account for the difficulty in making future construction estimates when considering the fluctuations in crude oil prices (i.e., asphalt costs), labor markets, land value, construction material prices and other factors that influence the cost to build roadways.

4.2.1.2 Safety Improvements

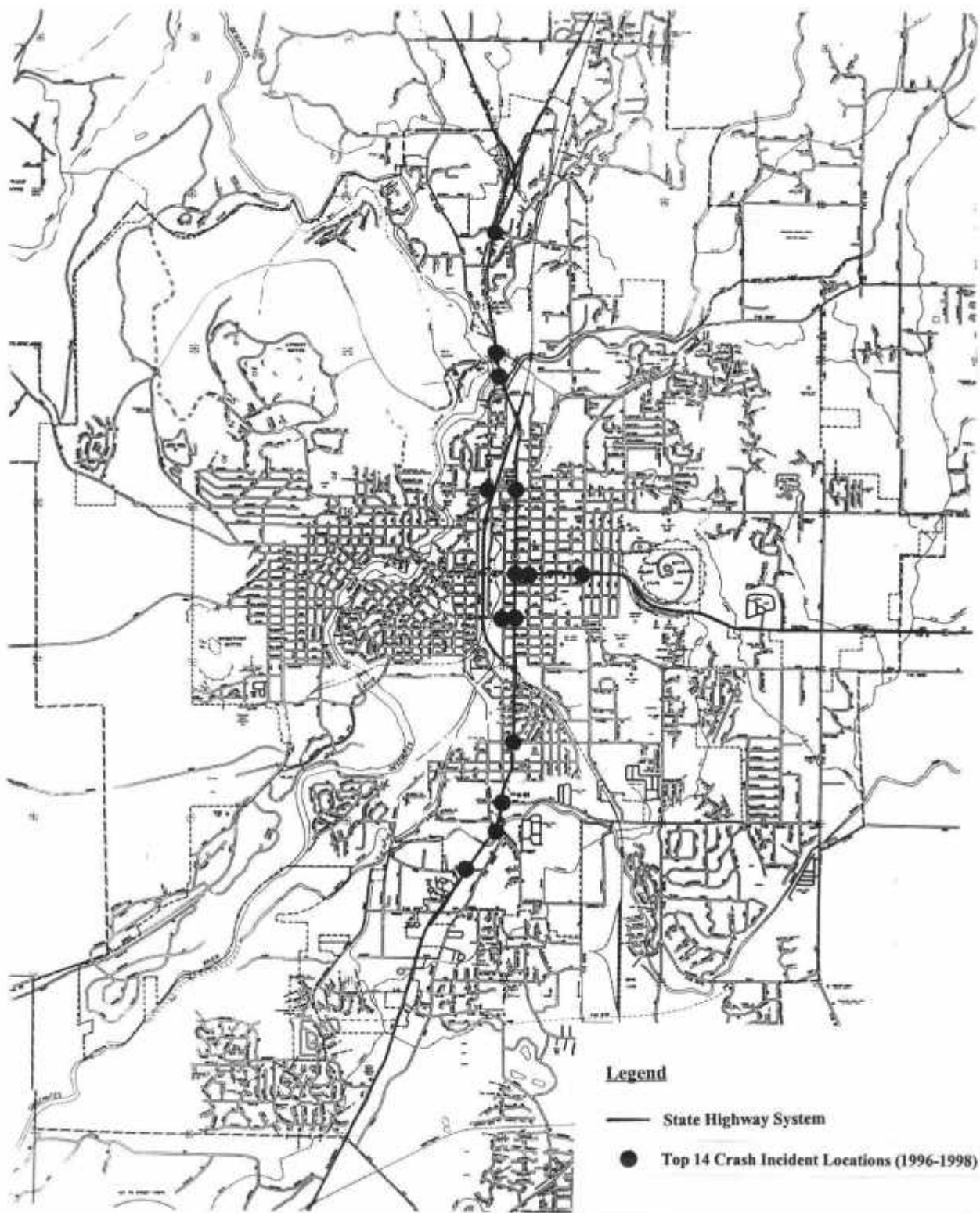
Motorized Vehicles: Vehicle collisions (crashes) *at intersections* represent the greatest identifiable source of transportation related safety issues in the Bend urban area. Figure 8 (and Table 6, in Chapter 3) illustrates motor vehicle crashes in the Bend Urban area for highest (the Top 14) incident locations. Not surprisingly, the highest collision locations correspond to the busiest traveled intersections in town. Many of the signalized intersections along Highway 97 and Highway 20 appear at the top of the crash total list. The high incident, non-signalized, motor vehicle crash locations are at Franklin Boulevard and NE 2nd Street and at Greenwood (Hwy. 20) and NE 4th Street.

For most of the *signalized intersections*, driver error, disregarding a traffic signal or driving too fast for conditions (e.g., snow or ice) represent the highest cause of vehicle collisions. In those cases, remedies are largely limited to increased police enforcement or public education campaigns to remind motorists of these common causes of crashes. Because Highway 97 is the source of the greatest concentration of collisions, it has been the subject of target police patrols for many years, and recently, public service television spots were focused on the issue of obeying traffic signals. Crash totals would no doubt be higher in the absence of these aggressive public safety efforts.

In the case of the *non-signalized intersections*, turning movements and the failure to yield the right-of-way were the principal causes of the greatest percentage of crashes. Due to the high number of collisions that were occurring at Greenwood and 4th Street, turn restrictions were imposed that prohibit left turns from 4th Street. This change was instituted to eliminate the conflicts that were causing the greatest number of crashes. A preliminary review of the record, since the turn restrictions were imposed, indicates that it has dramatically improved the crash history. The City used a more aggressive approach of inserting a narrow raised median on Greenwood Avenue between 3rd and 1st Street to prevent left turn and through movements on NE 2nd Street. Other non-signalized intersection solutions may include the construction of traffic signals, roundabouts, turn pockets, raised medians, or other turn restrictions which may help to reduce the crash potential.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 8
Top 14 Crash Incident Locations – Bend Urban Area (1996-1998)



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Non Motorized Travel: Similar to the motor vehicle collision record, incidents of recorded pedestrian and bike crashes typically occur more frequently at intersections or unprotected crossing points with high volume motor vehicle traffic. These incidents are normally caused as a result of human error or poor judgment of conditions. The record for non-motorized crashes is fairly random and specific locations have not been identified that have abnormally high pedestrian or bicycle crash rates with motor vehicles, nor have specific sites been identified with roadway geometry, sight distance or design problems that need to be addressed (to improve non-motorized safety).

Figures 9 and 10 provide summary information concerning ODOT reported pedestrian and bicycle crash injury severity for a three-year period (1996-1998), in Deschutes County. Emergency room records indicate that there are many more related injury crashes involving *bicycles* that don't get reported in the ODOT record and that don't involve motor vehicles (other *pedestrian* related injuries are even more troublesome to track). Due to the differences in reporting, it is difficult to draw any specific comparisons of the two data sources. However, one can conclude that the ODOT records may not be a full indication of the total extent of non-motorized crash experience. This is a data relationship of reported crashes versus emergency room cases that is a common in many other communities.

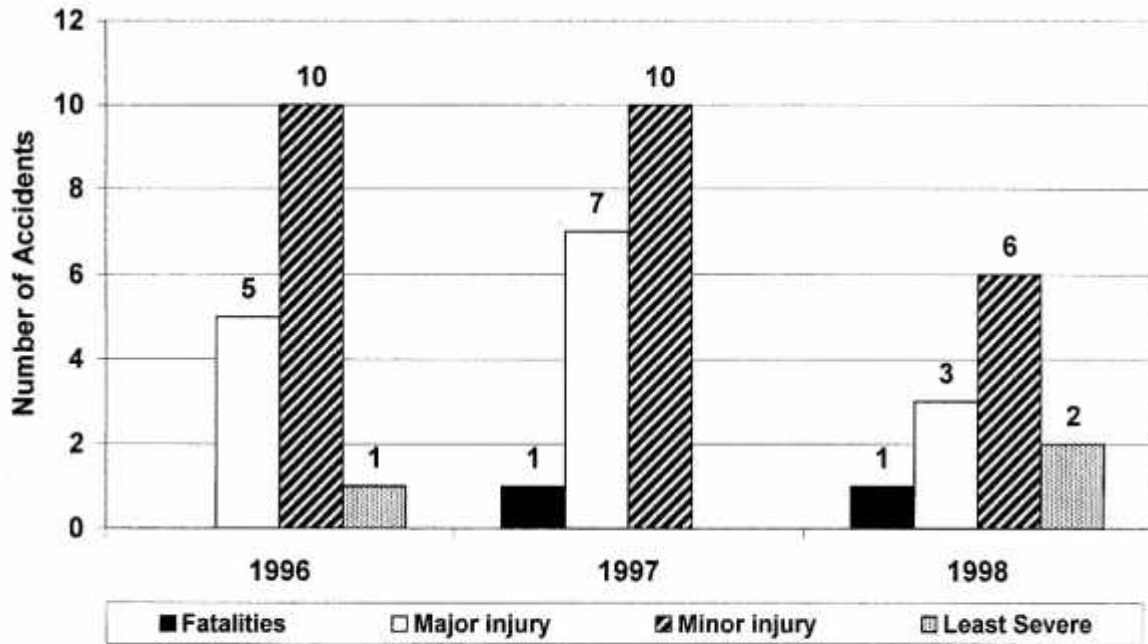
4.2.1.3 Operation and Maintenance

There are various responsibilities that the City tends to each year as it relates to operation and maintenance of roadways. These responsibilities include; winter street sanding and snow removal, year-round street sweeping, pavement maintenance (from crack sealing to overlays), bridge maintenance, signing and striping (including new or replacement), maintaining traffic signals, the installation and maintenance of various traffic calming devices, and a sidewalk construction program. In addition, the City's Public Works Department maintains the fleet of street maintenance vehicles, equipment and operating facilities, not to mention other street utility maintenance responsibilities (water systems, and sanitary and storm sewers). Figure 11 is a five-year maintenance schedule (FY 99-03) including the planned street "overlay" program and a projection of major maintenance equipment needs.

On July 1, 1999, the City annexed the area out to the UGB line (See: Figure 12). Thus, the City's responsibility for non-standard or poor condition roads grew dramatically. Beginning in 1999, the City took over the responsibility for this area (per an IGA with the County). The City overlaid approximately 10 miles of roadways in this newly annexed area last fiscal year and continued with about another 10 miles of overlays this fiscal year. Typically, the City overlays about 25-30 streets (priority given to those of greatest need) per year depending on private contractor bid prices received.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 9
Pedestrian/Automobile Crashes in Deschutes County (1996-1998)

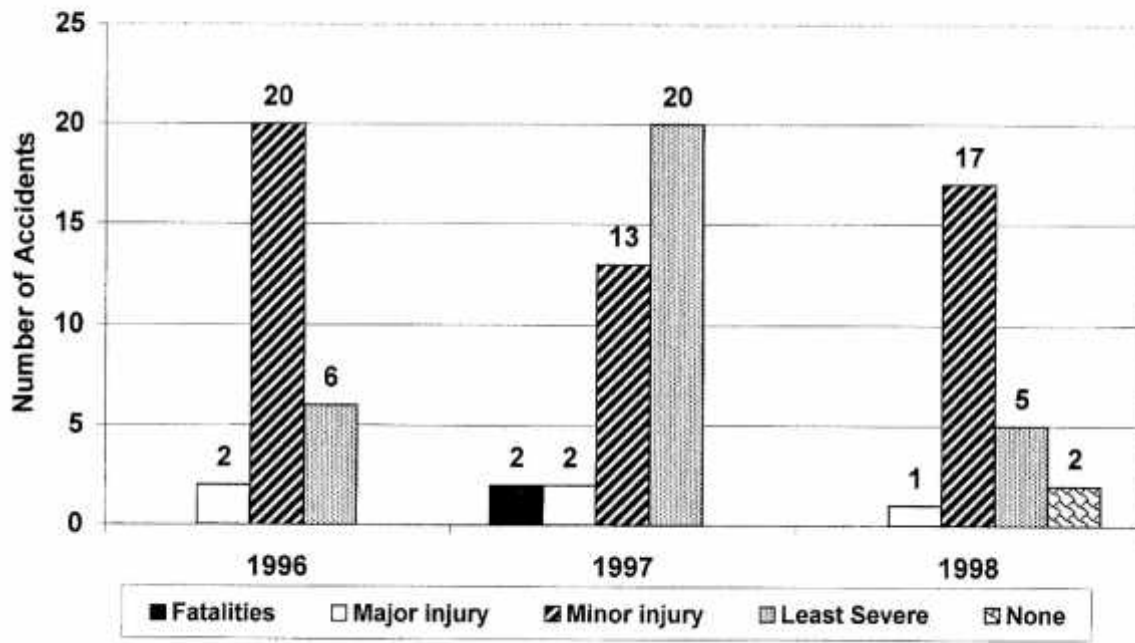


Q:\DataSummaries\Pedsba.xls

Compiled by Deschutes County Safe Communities

Source: ODOT, 7/1/99

Figure 10
Bicycle/Automobile Crashes in Deschutes County (1996-1998)



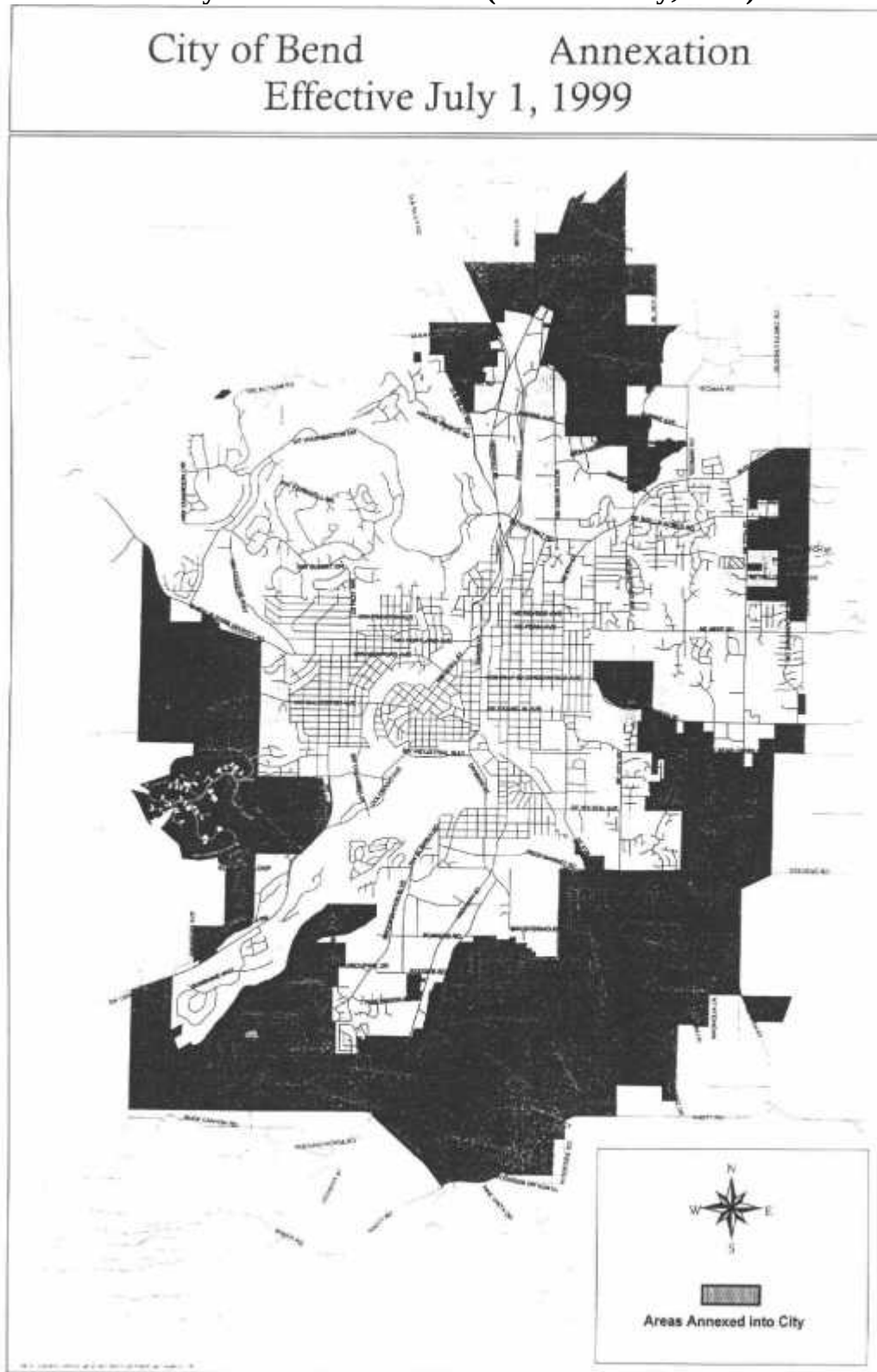
BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 11
Street Fund Five Year Capital Schedule
Transportation System Repair and Maintenance
(FY 99-03)

Project Description	Priority	(Amounts in thousands)				
		99-00	00-01	01-02	02-03	03-04
Priority 0= Continued 1= Critical 2= Essential 3= Necessary 4= Desirable 5= Pending Definition Construction contracted as of June 30, 1999 Imperative for reliable street operations Absolutely necessary for operation of system Needed for efficient operation of system Useful for proper operation of system Of no immediate consequence						
Street Overlay Project - may include the following: NE Cooley, Hwy. 20 to Hunnel NW Baltimore, 14th to Columbia NW Cumberland, 14th to Columbia NW Galveston, 14th to 17th SE West View, 15th to Fargo SE Desert Wood, 15th to King Hezekiah SE King Solomon, Ferguson to King Hezekiah SW Rae, Parrell to Benham SW Benham, Murphy to Chase SW Mahogany, Lodgepole to Targee SW Cinder, Ridge to Alpine SW Granite, Mahogany to Ponderosa NW Albany, 14th to Columbia NW OB Riley, Empire to Hwy. 97 NE Harvey, Thompson to N. Pilot Butte NE Drost, Harvey to Shepard NE Neff, Purcell to Top of the Hill NE Neff, 27th to Eagles NE 12th, Franklin to Greenwood NE Bear Creek, 15th to Craven NE Glenwood, 5th to 9th NW Shevlin Park, Mt. Washington to College NW Saginaw, West Hills to Juniper NW Nashville, Newport to Harmon NW Federal, Galveston to Nashville	1	800.0	800.0	800.0	800.0	800.0
2- ATVS with Trailer for Sidewalk Snow Removal	1	14.0				
Vehicle Replacement	1	24.0	25.0	26.0	27.0	28.0
Two 5-Ton 4x2 Wheel Truck Chassis	1	60.0	63.0			
One 5-Ton 4x4 Truck Chassis	1	86.0				
3 - Sander Units	1	25.0	12.5			
3 - Underbody Plows	1	14.0	7.0			
1 - Asphalt Hot Box	1	13.0				
Sidewalk Installation Program	1	150.0	150.0	150.0	150.0	150.0
Greenwood & 2nd Intersection Median	1	20.0				
Brooks Alley Paver Repair (Urban Renewal Funding \$40,000)	1					
Misc. Capital - may include the following:	1	9.5	10.0	10.0	10.0	10.0
Lawn Maintenance Equipment						
Vacuum						
Brush Trimmer						
Third Street, Greenwood North, State Grant Project	1	90.0				
Sweeper Replacement Street Division	2		130.0		140.0	
Used Grader Purchases Street Division	2		110.0			115.0
12th & Newport Intersection Improvements	2		35.0			
Front End Loader Replacement Street Division	3			125.0		
Wells Acres & Butler Market Intersection	3			40.0		
College Way & Newport Intersection	3			40.0		
Total		1305.5	1342.5	1191.0	1127.0	1103.0

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 12
City of Bend Annexation (Effective July, 1999)



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Bridge Maintenance: A bridge condition inspection of the many city-maintained bridges was recently completed. The survey indicated that the only major bridge in need of potentially costly maintenance is the Newport Avenue crossing of the Deschutes River. The City is seeking state/federal grant funding (HBR funds) to assist in the high cost of these repairs. In the event that a major rehabilitation of the bridge is not imminent, a short-term remedy may be to limit truck weight on the structure, although the inspection reports do not indicate that this action is necessary at this time.

4.2.2 SIDEWALK AND BIKEWAY SYSTEM

4.2.2.1 Sidewalk Needs

The sidewalk system is generally well defined and improved in many of the older parts of the downtown area and in newer subdivisions. The primary need in many of the older parts of town, in addition to adding various missing linkages, is the retrofitting of intersection corners with Americans with Disabilities Act (ADA) standard wheelchair ramps. Typically in the older areas of town, either the ramps are altogether missing or they may have various design features that may not meet the current ADA standard. Another sidewalk need is the replacement of damaged sidewalks. Most of these sidewalks include problems due to age-related cracks, tree root damage or other surface deterioration (which may have been caused by years of “de-icer”/rock salt use). By City Code, sidewalks are to be maintained by the abutting property owner.

There are many gaps in the city sidewalk system and these are visible on Map Exhibit D. Completion of a total system of sidewalks will be very expensive and a time consuming process. The City is proceeding with a sidewalk construction program to complete walkways along the heavier traveled streets, such as; the arterial and collector streets, to focus improvements where walking demand and needs are, and will be, highest. The City has historically sought state and federal grants to help fund these needed sidewalk system linkages.

The citizen advisory committee (BTAC) also recommended that: a priority be given to school walking routes, sidewalks be retrofitted along select collectors and arterials with “property-tight” walkways, and other improvements be made to eliminate pedestrian barriers (see: Section 6.9.4 Pedestrian and Bicycle Systems Policy #9). A sidewalk improvement priority list is illustrated in Figure 16 b. This priority list will be revised each year as a part of the Capital Improvement Program update process to reflect emerging community needs, safety issues, and other building activity and improvements.

4.2.2.2 Bike System Needs (on street)

There are a number of bike system deficiencies that need to be addressed to better facilitate bicycle travel on the street network. The planned bicycle system map, illustrated on Exhibit B, is helpful in defining gaps in the on-street system. Some collector or arterial streets have limited width to accommodate bike lane striping and street widening may be necessary. Other cases where lanes are missing in the built-up central part of the community, where the combination of high parking demand, high

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

pedestrian use, and the high cost to widen the street, may make the construction of separate bicycle lanes difficult. A bike lane improvement priority list is illustrated in Figure 16c. This priority list will be revised each year as a part of the Capital Improvement Program update process to reflect emerging community needs, safety issues, and other building activity and improvements.

There are also many physical barriers to travel in the Bend area, such as the river, the railroad, major roadways and the various buttes that limit the number and type of crossing points. For east-west travel, the railroad/Parkway underpass at Franklin, and the river crossings of Galveston, Newport and Portland avenues are narrow and do not have sufficient space to stripe separate bike lanes. Widening improvements to these structures that will better accommodate both bicycle and pedestrian travel should occur when these facilities are reconstructed. The Third Street railroad underpass also needs to be widened to better accommodate bikes for north-south travel.

4.2.2.3 Trail System Needs

The City's plan to add trails to the system of canals, laterals, riverfront properties and other locations is an ambitious one. The high cost of right-of-way acquisition, various privacy issues and other financial obstacles (e.g., State gas tax monies cannot be spent on these off-street systems) makes the development of this trail system challenging. The City is working with the Bend Metro Park and Recreation District to partner many construction, maintenance and grant projects on the trail system. Some developers in the Bend area have also been very receptive to the importance of trails within their respective developments and have either built public walkways and/or have provided public access easements across their property. An example of this is the Old Mill District, where continuous, public access trails are planned on both sides of the river as a part of that development. The developer is so supportive of the concept of encouraging non-automobile travel that some of the first site improvements were the construction of a bicycle/pedestrian bridge south of Colorado and the rehabilitation of an old mill access bridge (located farther south) for non-automobile use. This developer also plans to build another footbridge immediately to the south of the Colorado Avenue in a future phase of the development.

Concerning other non-automobile bridges, two other footbridges are planned to cross the Deschutes River. One is proposed downstream from the Portland Avenue (roadway) bridge and is planned to connect the (existing) "river trail" system on the west side of the river to Pioneer Park on the east. The other bridge crossing will be located near the southern UGB. Existing and planned, on-street bikeways and "primary" trails are depicted on the Bend Urban Area Bicycle and Trail System Map – Exhibit B. Approximately 32 more miles of trail improvements will be necessary to complete the primary trail system.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Section 4.2.2.4 Neighborhood Accessway System Needs

Accessway Deficiencies: There may be some areas of the City where mobility for non automobile modes of travel is hampered by a lack of good system connectivity or there are certain physical or psychological barriers, such as the combination of the Parkway, the Railroad and Third Street that limits route alternatives for east-west travel across the center of town. There are no specific locations or areas that have demonstrated a bicycling or walking crash record or a degree of user difficulty that warrants urgent remedial action. And, there are undeveloped areas of the community that will need to follow a grid street pattern to ensure that an adequate system of accessways is achieved. It is anticipated that a complete accessway system will develop as other public infrastructure is constructed. As such, it is difficult to prioritize any particular accessway deficiency as a near-, intermediate- or far-term need for the community. Addressing the timing of any accessway deficiency remediation is also problematic given either the existing lack of, or limitation of, funding for these types of improvements.⁶

4.2.3 PUBLIC TRANSPORTATION SYSTEM

4.2.3.1 Intra-city Public Transportation: The feasibility of providing a local, “intra-city” type of transit service within the Bend urban area has been the subject of two separate studies. In 1994:^{B3}, the City studied Bend’s demographic, employment, travel and transportation system characteristics in relation to how they might support transit use. In 1996:^{B4}, the City hired a transit consultant to further evaluate how transit could be implemented in the community. This study augmented the previous analysis of transit feasibility by analyzing transit systems from similar sized cities, developing system evaluation criteria, conducting a public opinion survey on transit attitudes and financing methods, and evaluating capital needs and financing strategies.

Results of the 1994 study:^{B.3} indicated that there are many factors present in the Bend urban area that would make the generation of good transit rider numbers difficult. This study pointed out many factors that are working against transit usage in Bend. These characteristics include:

1. A relatively high per-capita and household income
2. A high number of cars per household
3. A relatively low population density (when compared to other metropolitan areas)
4. Not a particularly good concentration of employment (albeit, there are employment concentrations in the downtown, Central Oregon Community College, St. Charles Medical Center, Bend Memorial Clinic and Bend Millworks)
5. A relatively short length of trips and ease of travel throughout town
6. Not the level of traffic congestion that other communities typically experience on their arterial street systems
7. The availability of easy, “free” parking nearly everywhere (the only fee to park is in the downtown central business district for parking, in excess of 2 hours, on weekdays)

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

8. Some areas are difficult for pedestrians to access (due to cul-de-sacs within neighborhoods) and the lack of good sidewalk facilities along the arterial street system (where public transportation services are most likely to run).

The study does point out that transit would improve *mobility* for serving “transit dependent” citizens (those who can’t drive, do not have access to, or don’t own a car). The study also states that there are other benefits to having a public transportation system. Principally these are providing a good substitute for the car (particularly commuting trips), transit-use helping to reduce automobile caused environmental degradation (particularly air quality) and helping to reduce the need (or delay the need) to add roadway capacity improvements.

The 1996 feasibility study^{B.4} took another approach to analyzing the transit question. This study assumed that if there was a fixed-route transit system - what would it look like and how much would it cost? Principally, the study evaluated possible route networks, the number and capacity of buses, the type of fuel consumption (e.g., diesel, natural gas, electric) and most importantly, system costs. This study also evaluated voter attitudes toward support of different funding mechanisms. The study provided a good preliminary evaluation of what kind of transit system that the City might need. It mapped out various funding scenarios for transit and delineated possible bus routes for different sized systems – these varied from a 3 to 9-bus network.

The public opinion survey, conducted by the transit consultants, indicated that citizen support was there for the community’s *need* for a transit system (that Bend had become a town big enough to warrant public transportation), however support was not there financially. Specifically, if support was to come from some form of a voter approved initiative. Since the funding question was asked via a random phone survey, respondents were forced to answer questions without any background on the subject. It is assumed that today’s voter attitudes are generally not likely to be in favor of adding more tax burden (for almost anything) and would likely respond negatively to any new funding questions. It is hoped that a good campaign to educate voters why a public transportation system would be beneficial and valuable to the community might overcome any negative feelings they may have towards supporting such an initiative.

After City Council received the report, they “declared” that transit would be feasible “at build-out”. By taking this position, City Council acknowledged that Bend would *someday* be ready for public transportation.

The question of transit needs was overshadowed in 1996 by a major school capacity problem that was also going to the voters. While the new schools initiative was defeated the first time, voters eventually passed it. The City is now looking at the possibility of a transportation funding measure that is likely to include some form of public transportation enhancement.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The City is further continuing to study the delivery of public transportation service alternatives. The most current study^{B5} has looked at the existing Dial-A-Ride system and has evaluated possible system improvements. This study recommended that the City consider expanding the present Dial-A-Ride system to be available to the general public and rather than starting with a rigid fixed-route system, the study proposed that the City implement a “zone route” system that is demand responsive. This would result in better city coverage with a six-route zone system (see: Figure 15). In 2000, BTAC recommended that the City pursue the expanded Dial-A-Ride system (recommended in the study) as a first step toward implementing a public transportation system. They also recommended that the City should seek voter approval of a funding measure to support this new service.

4.2.3.2 Inter-city Public Transportation: Today there are a limited number of public transportation services that connect between Bend and other cities in the county, as well as, other parts of the state (See: Chapter 3.4.2). A more local shuttle service between Bend and Redmond, other than the current private taxi services, would be a welcome addition to the transportation disadvantaged. The existing services are probably too expensive to be economical for most people to plan *daily* work, shopping or other trips between the two cities. In this regard, inter-city needs include a more affordable, regular service between, at least, Bend and Redmond (and possibly other parts of the Tri-County area) to improve mobility for many *transportation needy* citizens of the City and the adjacent counties.

A recent study^{B.7}, by Commute Options for Central Oregon, evaluated the feasibility of providing a small commuter (work trip) shuttle service between Redmond and Bend. This study proposed using a system of smaller passenger (12- 15-person capacity) vans to collect patrons from the two cities at specific pick-up locations and take them to large employers or concentrated areas of employment. The system was designed to provide 30-minute “headways” (i.e., times between shuttles) using a fleet of about 3 to 5 vans. The conclusion of the report characterized feasibility as “a function of priorities”. The report went on to summarize feasibility as, “if an inter-city commuter service is a priority to the state, cities, employers, and public, then it can be provided.” By providing support, it is assumed that the report meant publicly funded. Funding is being sought from the ODOT Statewide Transportation Improvement Program (STIP) to help start up this program, but this project, like many other proposals, will have to compete with other agency funding requests throughout the state and the ODOT region.

4.2.4 AIRPORT SYSTEM

City of Bend Municipal Airport Master Plan: An update of the 1979 Bend Municipal Airport Master Plan^{B.1} was completed by a consulting firm in 1994. The Plan examined airport needs for the next 20 years and recommended a series of runway improvements to meet those needs. Key findings from this report were:

1. Aircraft operations are forecast to increase from 25,000, in 1993, to 50,000, in 2013. Even with a doubling of activity over the 20-year planning period, the

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

airfield system (runway and taxiway) will easily accommodate the forecast demand.

2. Aircraft based at the Bend Municipal Airport are forecast to increase from 110, in 1993, to 165, in 2013. Bend has adequate paved tie-down areas to meet demand but will need to add hanger space to accommodate demand for covered aircraft storage.

4.2.5 Downtown Parking System

City of Bend Downtown Parking Plan: A consulting firm completed an analysis of the downtown parking demand and requirements, in 1996^{B.8}. The analysis examined the existing and future parking demand in Bend and recommended strategies for accommodating these immediate and longer range needs. The following strategies are included:

1. Single management of the parking program [the City later contracted the patrol and fine collection services from a private firm]
2. A different system of managing and allocating the long-term parking areas
3. Explore implementation of TDM programs to reduce parking demand
4. Expanding the hours of enforcement
5. Parking fine structure changes
6. The parking in-lieu fee* to be increased from \$500 to \$3,000 [City Council chose not to implement this recommendation at this time] **(i.e., the fee paid by development for parking spaces when on-site space requirements cannot be met in the downtown only)*
7. A new parking deck (i.e., “a parking structure”) should not be considered until 50-100 new spaces are required by new development. Also, that such a structure should be funded by a public/private partnership.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

5.0 TRANSPORTATION ALTERNATIVES ANALYSIS

5.0.1 TRANSPORTATION GOALS

The city of Bend updated the Comprehensive (General) Plan in 1998. Included in the Plan were both a *goal statement* and a *series of goals* related to transportation planning. The establishment of these goals helped to provide an overall framework for developing criteria for the evaluation of transportation system alternatives. Also, Transportation Plan *objectives* and *policies* were included to provide further detail on Plan implementation. These are also included within the TSP (See: TSP Chapter 6) although they have been modified by the citizens advisory committee (BTAC).

5.0.1.1 Goal Statement

The following ***transportation goal statement*** appears in the current Bend General Plan:

“The transportation system that serves the Bend urban area must meet a complex set of community needs. The interrelated success of the economy and livability of our community depends upon the ability of the transportation system to effectively move people and goods, and to provide access to services and places of employment, while not disrupting the continuity and aesthetics of the community. Completion of a multi-modal road network, trail, and transit system will help to achieve a balanced transportation system and reduce automobile reliance. This, combined with the development of compact community design and the integration of land uses, will provide a strategic approach to fulfilling the transportation needs of the future.

Implementation of the transportation plan must be coordinated so that resources are allocated in an equitable and cost-effective manner. The transportation system will be developed with enough design flexibility to meet the needs of the urban area, as well as to be sensitive to important community values such as aesthetics, preservation of neighborhoods, natural features and other quality of life criteria. It is therefore essential that the goals, objectives and policies of the Transportation Plan provide community assurance that safety, accessibility and mobility will be provided for all users.”

5.0.1.2 Plan Goals

The Bend General Plan also articulates the following Transportation Planning Goals:

Mobility and Balance:

- Develop a transportation system that serves all modes of travel and reduces the reliance on the automobile.
- Provide a variety of practical and convenient means to move people and goods within the urban area.

Efficiency:

- Address traffic congestion and problem areas by evaluating the broadest range of transportation solutions.
- Coordinate and design transportation improvements to assure the expenditure of resources in the most cost-effective manner.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- Encourage the development of land use patterns that provide efficient, compact use of land, and facilitate a reduced number and length of trips.

Accessibility and Equity:

- Provide people of all income levels with the widest range of travel and access options within the Bend urban area.
- Provide all transportation modes access to all parts of the community.

Environmental:

- Recognize and respect the natural features over which transportation improvements pass to minimize adverse impacts.
- Design transportation improvements to preserve air and water quality, minimize noise impacts, and encourage energy conservation.

Economic:

- Implement transportation improvements to foster economic development and business vitality.

Livability:

- Design and locate transportation facilities to be sensitive to protecting the livability of the community.

Safety:

- Design and construct the transportation system to enhance travel safety for all modes.

5.1 DEVELOPMENT OF ALTERNATIVES

As discussed in Chapter 4, the City used the EMME/2 transportation computer model to compare and evaluate different future transportation system alternatives. A private consulting firm, Kittelson and Associates, Inc. (KAI), was contracted to update the model. A summary of KAI's work, including findings and recommendations, is included in the TSP (Appendix F).

In addition to the ***No-Build Alternative*** (as discussed in Chapter 4.2.1), three other “build” alternatives were developed and analyzed. These included a ***Comprehensive Plan Alternative***, a ***TDM Alternative*** and a ***Combined Alternative*** (that includes attributes of the Comprehensive Plan and TDM alternatives). Similar to the No-build Alternative, the first two alternatives may represent *unlikely* transportation improvement situations and are rather extreme examples of transportation improvement strategies. However, they help to focus the analysis on the most promising transportation components and help to develop the design of a (more realistic) ***Combined Alternative***.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

5.2 DESCRIPTION OF ALTERNATIVES

5.2.1 No-Build Alternative

No-Build Alternative: includes year 2020 land uses projected in accordance with the City's current Comprehensive (General) Plan, the same travel mode split (auto, pedestrian, bicycle and transit) that occurs in the City today, and a no-build transportation system (i.e., no transportation system capacity improvements beyond those that are currently funded).

In order to help depict the effect of different transportation “build” scenarios, it is also a useful exercise to generate a future *baseline* example for comparison purposes. This is normally more meaningful than trying to make various comparisons of *future* traffic to *current* conditions. This is commonly referred to as a future “No-Build Alternative” or a “Base Case.” This typically is a projection of community growth with little or no investment in transportation improvements. Thus, this alternative is included in the City's analysis of transportation improvement strategies.

The trip tables of the No-Build Alternative include the growth projections made for employment and population growth, over the next twenty-year planning period, as illustrated in the TAZ forecasts (included in the KAI Report Appendices, TSP Appendix F).

In order to help illustrate the anticipated growth, Table 7 provides a comparison of the 2000 and 2020 demographics and household types for the Bend urban area. As shown in the table, the total number of employees in the Bend urban area is expected to increase by approximately 74 percent while the total number of households is expected to increase by approximately 55 percent. This imbalance of projections is based on the assumption that this area will remain an employment center in the future and draw employees from a much larger geographical area than just the Bend UGB.

Table 7
Bend Urban Area Land Use and Demographic Data

Year	Employment					Households		
	Retail	Service	School	Other	Total	Single Family	Multi Family	Total
2020	10,673	13,812	2,328	13,017	39,830	31,057	10,005	41,062
2000	5,440	8,037	1,741	7,664	22,882	21,618	4,905	26,523
Growth	5,223	5,775	587	5,353	16,948	9,439	5,100	14,539
%	96%	72%	34%	70%	74%	44%	104%	55%

Data Source: KAI, Report, June 2000

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

5.2.2 Build Alternatives

The specific components and strategies contained in each of the Build Alternative are further detailed in the KAI Report (Appendix F). The following is a general description of each of the alternatives:

- **Comprehensive Plan Alternative**

The Comprehensive Plan Alternative: includes the same land use and mode split assumptions as the No Build Alternative plus the construction of all proposed arterial and collector roadways included in the City's current Comprehensive (General) Plan.

The Comprehensive Plan Alternative includes development of the land and transportation systems using generally a "roads only" approach. In this manner, roads are modernized and new capacity added (widened) nearly exclusively to accommodate the new system demand created by a growing community. Little emphasis has been placed on developing TDM or transit type strategies other than making improvements to the trail, on-street bikeway and sidewalk systems.

- **Travel Demand Management (TDM) Alternative**

The TDM Alternative: includes the implementation of alternative mixed use and high-density land use strategies, increased reliance on pedestrian and bicycle trip making, the implementation of a fixed-route transit system, and increased carpooling and ridesharing. No new roadways, beyond those identified in the No-Build Alternative, were assumed in the TDM Alternative.

The 2020 Travel Demand Management Alternative includes land use and TDM strategies aimed at reducing the reliance on the automobile. This alternative relies on the alteration of the existing land use patterns to allow for neighborhood commercial centers, mixed-use development and increased residential densities. This alternative also assumes the implementation of a fixed-route transit system. The objective of these strategies is to provide enhanced opportunities for pedestrian, bicycle and transit trip making in the Bend urban area. Trip reductions were made in the model to account for these various types of TDM measures.

- **Combined Alternative**

The Combined Alternative: includes a mixture of land use and transportation system strategies from both the Comprehensive Plan and the TDM alternatives.

This alternative was formulated using a combination of the strategies identified in the TDM and Comprehensive Plan alternatives. The combined alternative included the implementation of a fixed-route transit system, and increased reliance on walking, bicycling, carpooling, ridesharing, etc., to reduce reliance on SOV travel. Also TDM trip reduction efforts were combined with the construction of new roadways (to provide street connectivity and to mitigate roadway system capacity deficiencies) to create the combined alternative, although more conservative trip reduction characteristics were assumed than the TDM Alternative.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

5.3 EVALUATION OF THE ALTERNATIVES

Evening peak hour (P.M.) traffic forecasts were developed for each alternative. Based on these transportation model forecasts, estimates of roadway level of service, vehicle-miles traveled and vehicle-hours traveled were approximated for each alternative (for more detail see: the KAI Report, Appendix F).

Development of the P.M. Peak Hour Forecasts

Future P.M. peak hour traffic volumes for each of the alternatives were calculated based on the travel demand model. Modifications to the trip generation, mode-split and trip length assumptions for each alternative are described below.

- **No Build Alternative**

For comparison purposes, the results of the level-of-service analysis completed for the No-Build Alternative (year 2020) is illustrated in the KAI Report:^{Appendix F} (KAI Figure 13) . As shown in the figure, many of the roadways in the inner part of the urban area - bounded by 14th St. [on the west] to 27th St. [on the east], and Butler Market Road [on the north] to Reed Market Road [on the south], plus the state highway system - are projected to operate near or over capacity in the future. Again it should be noted, that the No-Build Alternative includes a *very limited* number of roadway improvements and no additional multi-modal opportunities are provided.

- **Comprehensive Plan Alternative**

Future P.M. peak hour forecasts were calculated based on the future land use assumptions of the No-Build Alternative and the Comprehensive Plan roadway system. This alternative focused primarily on improvements to the roadway system. By default, this included improvements to the pedestrian, bicycle and demand responsive systems that would otherwise be traveling these same roadways. It is assumed that today's level of non-SOV travel would be perpetuated by these roadway improvements.

Based on these assumptions, a level-of-service analysis was performed to identify deficiencies. The results of this analysis are illustrated in the KAI Report (KAI - Figure 16). As shown on the figure, even with the construction of several new roadway facilities throughout the Bend area, some roadways are still expected to operate over capacity in the future.

- **TDM Alternative**

Since this alternative relies on the implementation of travel demand management, alternative land use strategies and a fixed-route transit system, modifications were made to the trip length and mode-split assumptions used to develop the model. In addition, new estimates of 2020 households and employment were generated for each TAZ. Based on these estimates, a new trip table was created for the TDM Alternative. The identified alternative land use and TDM strategies provide intervening commercial and employment opportunities at nodes outside of the downtown.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The results of the TDM Alternative level-of-service are illustrated in KAI Report (KAI - Figure 20). As shown in the figure, the implementation of alternative land use and TDM strategies will provide relief to many of the capacity deficiencies identified in the No-Build Alternative. However, many roadways are still projected to operate over capacity in the TDM Alternative, *which suggests that **some roadways will still need to be constructed to mitigate future capacity deficiencies.***

- **Combined Alternative**

This alternative was formulated using a combination of the strategies identified in the TDM and Comprehensive Plan alternatives. Since this alternative relies on the population and employment forecasts generated for the No-Build Alternative, no adjustments were made to the original trip length assumptions. However, since this alternative does rely on the implementation of TDM more conservative mode split estimates were made.

A **second iteration** of the Combined Alternative was also evaluated. This included the widening of 27th Street – from Neff to Reed Market roads, and Reed Market Road – from the Parkway to 27th Street to 5 lanes in order to mitigate roadway capacity deficiencies. All other city roadways (i.e., city of Bend jurisdiction) in the urban area were assumed to be 2 or 3 lane roads (State highways, except Century Drive, have or are planned as 5 lane roadways). The resulting level of service is illustrated in KAI Report (KAI - Figure 24). As shown in the figure, these widening improvements diminish several of the remaining arterial capacity deficiencies.

5.4 PERFORMANCE OF THE ALTERNATIVES

5.4.1 Quantitative Comparisons

There are two methods of comparing the alternatives. One is a *quantitative* comparison that focuses on “*hard data*” and the other is a more subjective or *qualitative*, comparison of the alternatives. By using the outputs generated by the EMME/2 computer model, several of these quantitative comparisons can be made of the alternatives. Tables 8 and 9 provide a summary of vehicle-miles traveled (VMT), vehicle-hours traveled (VHT) and lane-miles of congestion for each of the alternatives. These tables include the existing (year 2000) weekday and adjusted summertime, and future forecasts (year 2020) for the No-Build, Comprehensive Plan, TDM, Combined (iterations #1 and #2) alternatives.

Vehicle Miles Traveled: Vehicle miles traveled (VMT), per capita, is one method used in quantifying and measuring changes in motor vehicle travel for transportation system alternatives. VMT “reduction” is a measurement stipulated in the TPR that is required in all MPO areas – with a 5% reduction (in twenty years) held as a TPR requirement for Oregon MPOs outside of the Portland metropolitan area. However it should be noted, that Bend is not currently designated as an MPO. Given that Bend is on the threshold of

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

becoming an MPO, this VMT calculation has been included for a comparison of alternative performance.

The Comprehensive Plan Alternative remains similar to the No-Build Alternative with a slight increase when compared to the existing summertime condition. The TDM Alternative, VMT per capita, decreased about nine-percent from existing summertime conditions. And the Combined Alternative represents about a six-percent decrease in VMT from the No-Build Alternative and the existing summertime conditions.

Vehicle Hours Traveled: Another quantitative measure is vehicle hours traveled (VHT). VHT can often provide an indication of either extra travel time on the system (due to delay associated with roadway congestion) or out-of-direction travel (to avoid roadway congestion). By virtue of the reduction of net trips on the system, the TDM Alternative performs well when compared to the No-Build Alternative with a relative reduction of about-six percent. The Combined Alternative that mixes roadway construction and a more modest TDM effort provides a reduction of about 2-3 percent. This is the result of both reduced trip activity and the reduction of roadway system congestion areas.

Lane-Miles of Congestion: Another measure is a comparison of the number of lane-miles or roadway segments (links) operating under, near and over capacity in each of the alternatives. This congestion measure is the more traditional indicator of travel problems (delay) associated with roadway systems. These figures diminish progressively as trip reduction, roadway construction, or combined strategies are implemented incrementally in the alternatives. Thus, with only approximately 13 miles of “congested” city roadways, the Combined Alternative (2nd Iteration) provides the most significant reduction in the number of lane miles operating near or over capacity in the future. It should be noted also that ODOT uses a different standard to determine “over” versus “under” capacity. This is a higher standard than that used by the City. The KAI Report differentiates these congestion levels using the different standards and is illustrated in Report Tables 17-19. Another point is the consistent “failure” of the state system under all alternatives using this higher standard with 30-35 miles (or about 50%) of the state system failing under each of the alternatives.

Further evaluation of the near- or over-capacity segments illustrated on Figure 17 was conducted in 2006. This analysis postulates that there may be some questions with the manner that the transportation computer simulation was coded. Such as, if provision of a more comprehensive system of connectors that load the transportation analysis zones onto the transportation system and if more appropriate link capacities were used for specific roadway segments (that may have been set too low for particular link segments) would likely have resulted in better transportation link service-level performances on the problem State highway segments than were illustrated in Figure 17. As these modeling assumptions were common within each of the System Alternatives compared in the Alternatives Analysis of the TSP, there should be no performance distinction between the alternatives reviewed, thus the system comparisons are still valid.⁸

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The city of Bend in cooperation with the Bend Metropolitan Planning Organization (MPO) and the State of Oregon – Transportation Planning and Analysis Unit (TPAU) is engaged in the development of a more detailed and updated transportation model over the course of the last several years. This new model is anticipated to be completed by early 2007. This new edition of the model includes a more comprehensive system of TAZs, TAZs connectors, and a thorough re-evaluation of roadway link capacities, among many other modeling refinements and enhancements. This work should yield a better and more accurate representation of transportation link levels of service.⁸

5.4.2 Qualitative Comparisons

Another method of analyzing the alternatives is a qualitative comparison. This is clearly a more subjective means of examining the alternatives, but it does provide another dimension in assessing how well established transportation planning goals are achieved. In this case, factors such as mobility, accessibility, costs, equity and other environmental or social impacts can be compared. Table 10, provides a supplemental comparison that rates the alternatives by their relative impacts to the respective factors.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Table 8
Comparison of Per Capita Vehicle-Miles Traveled (VMT)
And Vehicle-Hours Traveled (VHT)

Alternative	VMT (per capita)	% Change From Existing	VHT (per capita)	% Change From Existing
Existing (Summer 2000)	7.10	n/a	0.231	n/a
2020 No-Build Alternative/Base Case	7.11	+ 0.1%	0.244	+ 5.6%
2020 Comprehensive Plan Alternative	7.03	+ 0.1%	0.242	+ 4.8%
2020 TDM Alternative	6.43	- 9.4%	0.217	- 6.1%
2020 Combined Alternative ¹	6.67	- 6.1%	0.227	- 1.7%
2020 Combined Alternative ²	6.66	- 6.2%	0.224	- 3.0%

(1) 1st Iteration (2) 2nd Iteration

Data Source: KAI, Report, June 2000

Table 9
Comparison of Lane Miles of Congestion (City Facilities Only)

Alternative	Lane Miles			
	(a) Under Capacity (v/c ≤ 0.80)	(b) Near Capacity (0.80 < v/c ≤ 0.90)	(c) Over Capacity (0.90 < v/c)	(b) + (c)
Existing (Summer 2000)	228.2	3.2	2.0	5.2
2020 No-Build Alternative/Base Case	230.4	10.6	12.4	23.0
2020 Comprehensive Plan Alternative	262.7	10.7	12.4	21.9
2020 TDM Alternative	235.1	11.2	11.2	18.3
2020 Combined Alternative ¹	267.7	11.0	7.1	16.9
2020 Combined Alternative ²	279.8	7.7	5.9	13.2

(1) 1st Iteration (2) 2nd Iteration

Data Source: KAI, Report, June 2000

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The following is a *quick* synopsis of these various comparisons and an evaluation of positive versus negative impacts and illustrated on Table 10:

Transportation Impacts:

Alternatives that improve non-automobile travel have a positive impact value. Transportation impacts rate a negative value if congestion or delay impedes travel around the community. Congestion that will result in neighborhood “cut-through” traffic also has a negative impact rating.

Planning Impacts:

Fulfillment of state and local transportation and land use goals rate positive values, while alternatives that did not address *all modes* of travel have a negative rating.

Land Use Impacts:

A negative impact was associated with alternatives that do not provide good access to existing land uses for *all modes* of travel. Right-of-way impacts and costs were negative with roadway build alternatives. Both positive and negative impacts are associated with utilities (related to the road improvement alternatives). This was due to the negative aspect that utilities that need to be moved with road widening projects (i.e., due to the cost and necessity to relocate). And positive, due to the *opportunity* to put utilities underground (another Plan Goal) or the opportunity to upgrade these facilities.

Environmental Impacts:

Alternatives that limited impacts to the natural physical elements of the environment rated as positive impacts. Given that most road projects would *not* necessarily *always* impact the natural environment, road construction alternatives were given a moderate level of impact. Other environmental impacts rated a negative impact if higher traffic congestion made existing conditions worse. New roads were rated negative due to more lanes of asphalt contributing to the potential for water (run-off) quality degradation.

Socio-economic Impacts:

Access to land uses by all modes of travel rated a positive impact in alternatives that support multi-modal travel. Energy consumption was lower in trip reduction strategies and rated a positive impact, while alternatives that created traffic congestion or out of direction travel had negative impacts.

Cost Impacts:

Cost impacts were more varied within the alternatives. Alternatives that had high costs (associated with road construction and trail development) rated a negative impact in the “Public Cost” categories (capital and maintenance). A converse relationship existed with the limited road construction alternatives where “Public Costs” rated positive, while “User Costs” were rated as a negative.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Table 10
Qualitative Comparison of the Alternatives

Impacts* <i>The impact is: Positive, Moderate or Negative</i>	Alternatives (2020)				
	No-Build	Comp. Plan	TDM	Combined 1	Combined 2
Transportation Impacts:					
Mobility	○○	○●	○○	●●	●●
Accessibility	○○	○●	○○	●●	●●
VMT	○○	○○	●●	●●	●●
VHT	○○	○○	●●	○●	●●
LOS	○○	○○	○●	○●	○●
Transit Use	○○	○○	●●	○●	○●
Mode Split	○○	○○	○●	○●	○●
Auto Occupancy	○○	○○	●●	○●	○●
Neigh. Traffic Infiltration	○○	○●	○○	●●	●●
Planning Impacts:					
Comp. (General) Plan Goals	○○	○●	○○	●●	●●
Statewide Planning Goals	○○	○●	○○	●●	●●
Land Use Impacts:					
Existing Land Use	○○	○●	○○	○●	●●
Right-of-way	●●	○○	●●	○○	○○
Utilities	○●	○●	○●	○●	○●
Environmental Impacts:					
Water Quality	●●	○○	●●	○○	○○
Air Quality	○○	○○	○●	●●	●●
Noise	○○	●●	○○	●●	●●
Visual	○○	○●	○●	○●	○●
Hazardous Material Transport	○○	●●	○○	●●	●●
Soils and Geology	●●	○●	●●	○●	○●
Natural Areas	●●	○●	●●	○●	○●
Wetlands	●●	○●	●●	○●	○●
Biological	●●	○●	●●	○●	○●
Cultural (historic, archeology)	●●	○●	●●	○●	○●
Socio-economic Impacts:					
Commercial/Industrial	○○	○●	○○	●●	●●
Residential	○○	○●	○○	●●	●●
Systemwide energy consumption	○●	○●	●●	○●	○●
Safety	○○	○●	○○	○●	●●
Cost Impacts:					
Public costs (capital)	●●	○○	●●	○○	○○
Public costs (maintenance)	○●	○○	○●	○○	○○
User costs	○○	○●	○○	○●	●●

(1)1st Iteration (2)2nd Iteration

* Impact index:

●●	A positive impact	○●	A moderate impact	○○	A negative impact
----	-------------------	----	-------------------	----	-------------------

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

5.5 RECOMMENDED ALTERNATIVE

As the population and employment levels increase in the urban area, the average daily motor vehicle trips in Bend are forecast to increase from 236,393 in 2000 to 355,674 in 2020 – a 50 percent increase in daily trip volumes. The recommended (or preferred) transportation system alternative to meet the vehicle needs and the growth in other transportation modes is the “**Combined Alternative**” (i.e., the second iteration). It is also the best alternative at meeting the transportation goals of the General Plan (i.e., the goals listed in Section 5.0.1.2).

The Combined Alternative includes the land use and employment allocations from the Bend Area General Plan. It also assumes greater demand management efforts such as public transit, more bike and pedestrian trips, and carpooling to reduce motor vehicle trips. The combination of land use patterns and demand management measures in the TSP Combined Alternative can result in a significant reduction in single occupancy vehicle trips less than two miles in length.

The Combined Alternative will complete the planned arterial and collector road system to provide more primary direct routes for motor vehicle trips, the major trip mode during the 20-year forecast period. Completion of the planned arterial and collector road system will allow area residents to have more efficient trip routes within the urban area. More efficient trip making, by any travel mode, will save residents time – a beneficial social impact on household time budgets. More efficient travel routes for motor vehicles can also save energy by reducing fossil fuel consumption.

The No-Build and Demand Management alternatives do not include any road system capacity improvements beyond those that are in the City’s 1999-2000 budget. With no new arterial or collector roads built, the substantial increase in daily trips on the existing system during the 20-year planning period will result in increased vehicle congestion along the existing road corridors. An increase in travel time between destinations is expected to occur due to higher congestion levels and out-of-direction travel. Higher congestion levels and out-of-direction travel create a social cost or impact due to lost time.

Higher congestion levels and travel times on the arterial and collector road system under the No-Build and Demand Management alternatives will cause more drivers to seek alternative routes through local residential streets. This will result in disruptive and unsafe impacts in residential areas. Also, the high congestion levels on the existing road system that would result from the No-Build or Demand Management alternatives are likely to produce a decrease in safe turning movements at intersections (24 conflict points) and driveways (9 conflict points) along busy arterials and collectors.

The Combined Alternative will help preserve air quality conditions by reducing idling time and stop-and-go driving conditions along arterials and collectors that would otherwise occur with higher congestion levels if the road system was not completed. Similarly, by reducing congested stop and go driving conditions along the arterial and collector corridors, the city will help reduce noise levels, especially from light trucks and business service/freight trucks, and school buses.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

With the Combined Alternative, improvements to vehicle and pedestrian safety would be accomplished by the functional components of new streets and modernization of existing arterials and collectors – median barriers, sidewalks separated from the curb line, good spacing of signals and roundabouts, and access control.

Improved traffic conditions resulting from the construction of new arterial and collector roads in the Combined Alternative would allow emergency vehicles to respond more quickly and operate more safely and efficiently than in either the No-Build or Demand Management alternatives.

The No-Build alternative and Demand Management alternatives could result in *fewer miles* of bicycle routes and pedestrian connections because sidewalks and bike lanes that would normally be included in new arterial and collector roadways would not be built. This negative impact could be offset by securing right-of-way and constructing bicycle and pedestrian facilities along these routes.

The TSP Combined Alternative includes “infill” sidewalks and additional bike lanes, in addition to new sidewalks and bike lanes on arterial and collector roads. These new pedestrian and bicycle facilities throughout the community will support and enhance pedestrian and bicycle travel, improve safety, and provide better access to a future public transportation system.

A growing economy means more trips for employers, deliveries, and customers. The build-out of the street system under the Combined Alternative provides a positive economic impact by ensuring a road system for freight hauling, employee trips, and customer trips. Such trips benefit from reduced congestion and improved accessibility provided by traffic signals and controlled turning movements.

The recommended alternative includes the implementation of a fixed-route transit system and increased reliance on walking, bicycling, carpooling and ridesharing to reduce reliance on SOV travel. These strategies, in combination with some changes in the land use plan, and the construction of new roadways, to improve connectivity and to mitigate capacity deficiencies, are the general components of the Recommended Alternative. The components of the Recommended Alternative strategy are further described as follows:

5.5.1 Land Use

Managing Growth: Managing growth and providing for urban level development is an important function of the General Plan and its Urban Growth Boundary (UGB). The Plan further stipulates policies that guide where and how growth will occur in order to foster an efficient transportation system. New development is directed to areas where infrastructure is available or where new development shall pay the cost of providing

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

urban services if it occurs ahead of planned capital improvement projects. Expansion of commercial strips (i.e., beyond what is already permitted by the General Plan) along arterial streets is also prohibited by plan policies. The City has consistently focused higher density residential and employment center developments along arterials and collectors. This will reduce the potential to generate land-consumptive retail uses along the arterial street system that often foster the continued development of auto-dependent land use designs.

Integration of Land Uses: One significant change, to the community and to the General Plan, was the recent conversion of the Old Mill area into a mixed-use development with commercial, industrial and residential development. The new Mixed-Use Riverfront (MR) Zone has replaced over 200 acres of formally industrial zoned properties with more intensive urban uses. Residential, retail and employment development, in the heart of the community, will enrich the area by providing an improved housing and jobs mix that is within walking distance of the downtown, residential and other community amenities. Another similar change advocated in the new Plan, is the establishment of approximately 100 acres of the Mixed-Use Employment (ME) Zone. This new land use category will provide more land for a mix of industrial and commercial development. Each of the areas designated for mixed-use zoning have been located centrally in the community along important arterial street systems, to minimize the need for new roadway construction and to facilitate reduced trip activity. Both zones, by design, will encourage walking activity and are (or will be) easily accessible by transit service when it becomes available in Bend.

The General Plan also calls for different types of commercial centers to reduce vehicle trips or trip lengths. Large commercial centers along the state highways or arterial streets allow for several retail and service uses to locate in one complex. Grouping businesses together can improve transportation patterns by providing for multiple stops at one location, reducing vehicle access points, sharing parking areas, and integrating pedestrian connections. The smaller existing and future Convenience Commercial centers and Neighborhood Commercial stores throughout the community offer opportunities to place shopping areas within close proximity to residential areas. These smaller commercial centers provide basic consumer retail needs within walking distance or a short drive from nearby neighborhoods. In addition to the commercial centers, the General Plan provides for multi-family zoning adjacent to these commercial centers. This change fulfills the objective of increasing densities within the urban area and thus reduces the number of trips or trip lengths.

Encouraging Compact Form and In-fill Development: In order to promote the development of a more compact urban form, there have been a number of changes to the commercial and residential elements of the General Plan. In Planned Unit Developments (PUDs), subdivisions and multi-family housing projects, allowances are now permitted for calculation of density. These calculations exclude areas that cannot be built upon, such as: open spaces, steep slope areas, wetlands, etc. This builds greater flexibility and enhances the development of potentially difficult properties. Also, accessory dwellings and a new 4,000 square foot lot size may be allowed within new residential subdivisions.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Each of these measures adds flexibility to achieve greater density requirements while encouraging more compact urban form in new residential areas.

Public Facility Siting: The General Plan provides public policy that encourages the siting of schools and parks jointly so that economies of scale can be achieved with less demand for larger tracts of land. Also, schools and parks are encouraged to locate within convenient walking distance of residential areas served by those facilities. Public buildings and facilities are also encouraged to locate conveniently to provide maximum service for the greatest economy. In this regard, government offices are encouraged to be located specifically in the downtown.

Trip Reduction: There are various General Plan policies, in addition to the many bike, pedestrian, transit and non-automobile components articulated in the Transportation System Plan, that further support planned trip reduction effort. In particular, the policies of the *Housing and Residential Lands* chapter of the General Plan reinforce the connectivity of streets, the construction of bikeways and the provision of sidewalks in residential areas.

Performance Standards: Policies in the General Plan are implemented through the City's development regulations such as the Subdivision and Zoning codes. The codes mainly rely on the traditional approach of specific uses and specific standards to support alternative transportation modes. In some circumstances, the City's codes provide more flexible performance standards as a way to meet the goal of reducing vehicle trips and encouraging other travel modes. As the urban area continues to grow and mature, there is the potential for additional performance standards in the codes that are tied to vehicle trips or trip making patterns.

Monitoring Environmental Impacts: Statewide Planning Goal 5 and the Transportation Planning Rule require that implementation of the City's Transportation System Plan be coordinated with programs to protect significant natural, cultural and historic resources. The recommended alternative includes proposed improvements that could affect Bend's identified Goal 5 resources. These resources were inventoried during Spring and Summer of 2000 (city of Bend Periodic Review Work Task No. 7), and are documented in the Goal 5 Inventory and Analysis, December 2000. This inventory identified significant riparian resources along both the Deschutes River and Tumalo Creek, as well as significant wetlands and scenic resources along portions of the Deschutes River corridor. The inventory also notes that a State Scenic Waterway designation has been applied to the South Canyon and North Canyon segments of the Deschutes River corridor.⁸

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

There were seven basic steps to the city of Bend's Goal 5 review:⁸

1. Determine the scope of work for the Goal 5 review;
2. Collect information about Goal 5 resource sites (inventory);
3. Determine the adequacy of the information;
4. Determine the significance of the resource sites;
5. Adopt a list of significant resource sites;
6. Conduct an analysis of the consequences of allowing, limiting or prohibiting conflicting uses for any significant sites (ESEE analysis) if applicable; and
7. Develop and adopt a program to achieve Goal 5.

Where significant resources are identified under Statewide Planning Goal 5, state law requires that local jurisdictions develop and adopt a program to conserve and protect those resources. Depending on the type of resource and its characteristics, it may be necessary to identify conflicting uses and activities that could adversely affect the resource. Where conflicting uses are identified, state law requires an analysis of the potential ESEE consequences of prohibiting, limiting, or permitting the conflicting use. The results of the conflicting uses/ESEE analysis form the basis for a program to provide appropriate levels of protection to the resources.⁸

The Goal 5 Inventory and Analysis, as well as a draft program to protect the inventoried resources, have been reviewed by the Bend Planning Commission, and were adopted by the City Council in Fall 2002. One specific transportation project included in the Recommended Alternative had the potential to affect resources identified along the Deschutes River corridor. That project is the Reed Market Road extension and construction of the Southern River Crossing, which was constructed in 2003. Although the City's Goal 5 program was not yet adopted, the ESEE consequences of building this project were addressed as part of the Bend Planning Commission's review and approval of the bridge proposal on February 25, 2002. It was determined that the Reed Market Road extension and the Southern River Crossing complied with the ESEE requirements.⁸

Other transportation projects included in the Recommended Alternative may also have potential impacts to Goal 5 resources. Where this occurs, coordination with Goal 5 requirements will take place as follows. The City's Goal 5 program, which was adopted in Fall 2002, includes an identification of conflicting uses and ESEE analysis for significant resources as inventoried for Goal 5 compliance. The Waterway Overlay Zone, which implements the City's Goal 5 program, will require that transportation projects affecting an inventoried resource comply with development standards that have been designed to provide appropriate levels of protection to the resource. In this way, potential adverse impacts to the resource will be addressed and avoided or minimized in a manner consistent with findings of the Goal 5 Inventory and Analysis and policies of Bend's Goal 5 program. The city of Bend will make Goal 5 findings on a project-by-project basis for all other transportation projects in the Recommended Alternative that may also have potential impacts to Goal 5 resources.⁸

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

5.5.2 Public Transportation

5.5.2.0 Recommended Alternative Analysis: In the transportation modeling of the *TSP Recommended Alternative*, a fixed-route transit system was contemplated, that would run along many of the arterial and collector streets throughout the urban area. The Kittelson Associates, Inc., Report (*TSP - Appendix F: Transportation Model Update*, KAI, June 2000) illustrated the roadways that would be served with transit (KAI Report - Figure 18). The report envisioned this transit network would serve the major travel corridors of the City in the year 2020.⁹

5.5.2.1 Transit Systems Evaluated: In 1996, the City completed a *feasibility study* of transit for the Bend urban area:^{B.4} The study evaluated alternatives that included a 3, 5 or 9-bus fixed-route system. The 5-bus (6-route) transit system, depicted in the 1996 study, is illustrated in Figure 13. This represented an example of the scale of the most likely type of “start-up” fixed-route transit system. The larger, more comprehensive 9-bus (7-route) transit system, illustrated in Figure 14, was a similar representation of the transit system envisioned in the TSP Recommended Alternative transportation modeling work. Considering the findings of this study, City Council deemed fixed-route transit service *feasible*, as required by the State Transportation Planning Rule (TPR).⁹

In 2000, a study:^{B.5} was done on Dial-a-Ride to evaluate possible changes in this system for improving and adding general public service. This study proposed a six zone-route system. This service would have had hourly headways during peak afternoon hours and two-hour headways off-peak. This route zoning system would have been a demand-responsive service that would have traveled through defined service areas according a predefined window of time. Zone-routes would have been built around key destinations such as the medical center. The Zone-Route system was not pursued.⁹

In 2006, a transit consultant provided a Service Plan analysis:^{B.5.1} of fixed-route service options that would meet City budget constraints, optimize transit related resources and meet demand for paratransit and demand response service. This work supported a recommendation that the City split allocated transit resources between operating both DAR and a fixed-route service. Various service options that included principally six fixed-routes were evaluated. The recommendations of that report supported the concept of reallocating the existing DAR funding in a manner that would provide both a limited fixed-route transit *and* paratransit service for just low income seniors and people with disabilities.⁹

5.5.2.2 Transit Service Enhancements:

Expanded Dial-a-Ride Service: In 2002, the City opened up eligibility for the general public to use the Dial-a-Ride system. This was in response largely to the growing community concern that transit service was needed for a larger population than just seniors and the disabled.⁹

Pilot Transit Project: In the fall of 2006, based on the consultant’s service plan recommendation, continued community interest in the need for general public transportation service, the fact that increased general ridership demand was now taxing

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

the available DAR resources and the increase in demand was beginning to result in a growing number of *ride refusals*; the city of Bend initiated a “Pilot (Fixed-Route Transportation) Project”. The new fixed-route service is illustrated in Figure 15. This system closely resembled the start-up system shown in Figure 13. The new fixed-route service was named; *Bend Area Transit* (BAT).⁹

This new fixed-route bus service began on September 27, 2006. The service includes seven routes with over 180 stops. Six routes are all day service and one is during peak morning and afternoon hours only. Service is provided Monday through Friday between 6:15 a.m. and 6:15 p.m. with buses running along routes on about 30-minute frequencies. Saturday service is hourly, between 7:15 a.m. and 5:15 p.m. DAR resumed service for eligible disabled riders that are unable to use the new fixed-route service and low income seniors that are not near a fixed-route. DAR service provides users with typically ‘door to door’ rides during the same hours as fixed-route transit. The fixed-route schedules are coordinated so buses would meet *on the hour* and *on the half hour* at a transit transfer station, located on NE Hawthorne Avenue between 3rd and 4th streets. This site was chosen over a downtown location due to its central location geographically and ease of accessibility by all of the bus routes.⁹

No additional funding was added to the operation and maintenance of the combination of both of these transit services; rather resources for the entirety of the new system were principally split between the two. In this manner, equipment and manpower simply shifted proportionately between DAR and BAT to cover the requirements of the new Monday through Saturday service schedules. The City did maintain Sunday DAR service.⁹

Capital Improvement Costs: The City purchased six used, larger capacity buses for use on the new fixed-route service. All the new transit stops were identified with new curb side signing. Improvements were made to the existing roadway and sidewalks at the Transit Center at Hawthorne Avenue, as well as new lighting, new bike racks, new street trees and three new passenger shelters were placed at this site. Heating elements were installed within the new transit station sidewalks to address winter ice and snow conditions.⁹

Fixed-Route Service Evaluation: City Council stipulated that when the new fixed-route service was established, an evaluation would be conducted after a period of about two years. Continuation of the service and/or expansion of the system would be contingent upon the satisfactory performance of the service and the availability of funding to dedicate to this transit service. Due to the demand on existing General Fund resources to fund transit, as well as, meeting other critical City services, there was a growing City Council and staff dialogue that a Transit District would ultimately need to be established in order to provide a stable, long-term funding stream for public transportation.⁹

5.5.2.3 Transit Service Funding: In the fall of 2000, the City placed a local option tax measure on the ballot. This local option tax was proposed to provide a modest level of funding to support three things; roadway maintenance, sidewalk construction and funding for a fixed-route transit system. The measure failed.⁹

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

In the fall of 2004, the City again placed ballot measures before the voters this time seeking support to form both a *transit district* and the establishment of a *permanent tax rate* to support a district. The transit district would have covered a geographic area that was equivalent generally to the newly formed Metropolitan Planning Organization (MPO) boundary. Both measures failed.⁹

The major issue with public transportation service continues today as to whether, or not, voters would support a transit operating funding measure (which is currently the traditional funding source for this type of public service). The 1996 Transit Feasibility Study did include a citizen survey that indicated that there was a strong community acknowledgment at the time that Bend had become large enough to have a transit system. However if the issue were put on the ballot, the survey suggested that voter support would be limited to a funding measure sufficient only to operate the 3-bus fixed-route system characterized in the report.⁹

5.5.2.4 Transit Service Phasing Strategy: The *TSP Recommended Transit Alternative* includes provision of a full-scale intra-city transportation service, available to the general public, as a part of the future transportation improvement strategy.⁹

Recognizing the fact that the City has limited funds for transit operation, the City will continue to actively seek voter approval of a funding measure sufficient to support public transportation. Also, other local partnerships, and state and federal grants will be pursued to augment transit funding.⁹

If ballot measures remain unsuccessful, the City will continue to evaluate other strategies for gaining public transit funding for transit operations. These may include; redesigning or scaling back the proposed funding measure, and resubmitting them for voter reconsideration.⁹

Assuming stable, long-term funding is established, subsequent service expansions (i.e., additional routes) would occur typically, as warranted by transit ridership. Over a twenty-year time period, a more comprehensive transit system is envisioned (achieving, if not exceeding, the transit network illustrated in Figure 14). Also, the appropriate scale of transit capital improvements (i.e., bus stop benches and shelters, transit signage, other transit user conveniences, vehicle maintenance/storage facilities, etc.) would be provided with each respective step or level of service enhancement.⁹

The City will evaluate the pilot transit project in approximately 2008. It is also anticipated that the City will pursue establishment of a Transit District – possibly in that same time frame. In either case, any service expansions would be considered at that time.⁹

The final design of a permanent fixed-route system, including the location, number and type of transit stops will continue to remain the subject of additional study or analysis as conditions and transportation system demands change, and transit routing needs and opportunities continue to evolve in Bend's ever growing community.⁹

[See: [Section 6.4 Public Transportation System](#) for more details concerning planned transit facilities.]

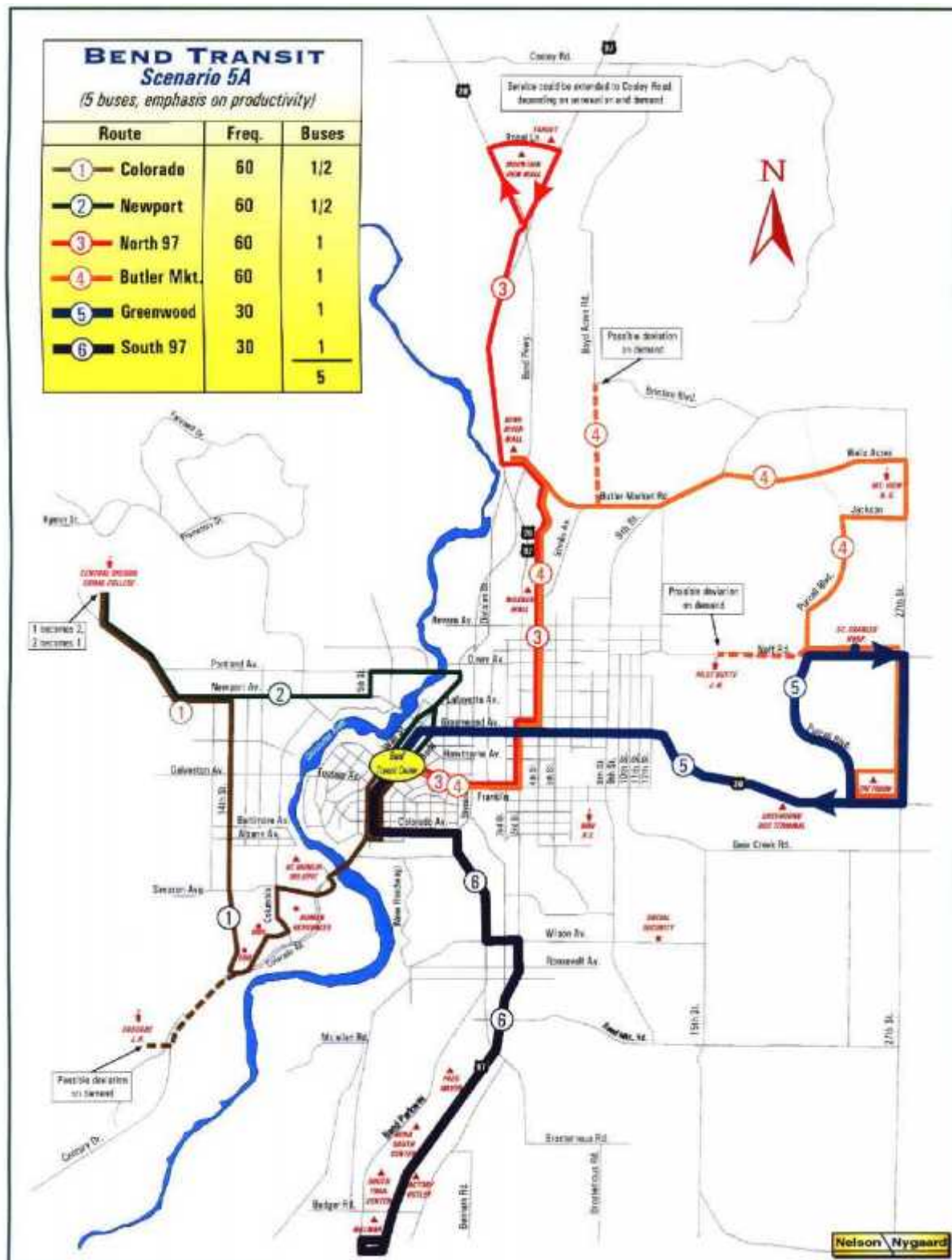
BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

5.5.2.5 Inter-city transit: The Bend urban area is the economic engine for the region; it supplies the majority of job opportunities, as well as it serves as the center of various cultural activities and services (including vital medical facilities). It is therefore important, in respect to providing regional linkages, that the Bend public transportation system will support a full-range of transportation choices and connections to the other surrounding communities in the region. Consequently, the provision of an inter-city transit system between Bend and Redmond was specifically modeled and included within the TSP Recommended Alternative.⁹

Regionally, implementation of expanded intercity service will augment the effectiveness in providing mobility for the public that goes well beyond Bend's city limits. As Bend's transit system grows, it will need to accommodate a suitable means of interfacing with future regional transit services. Currently, discussions at the regional level have supported pursuit of the establishment of a Regional Transit District. Formation of this regional district may well include the Bend urban area.⁹

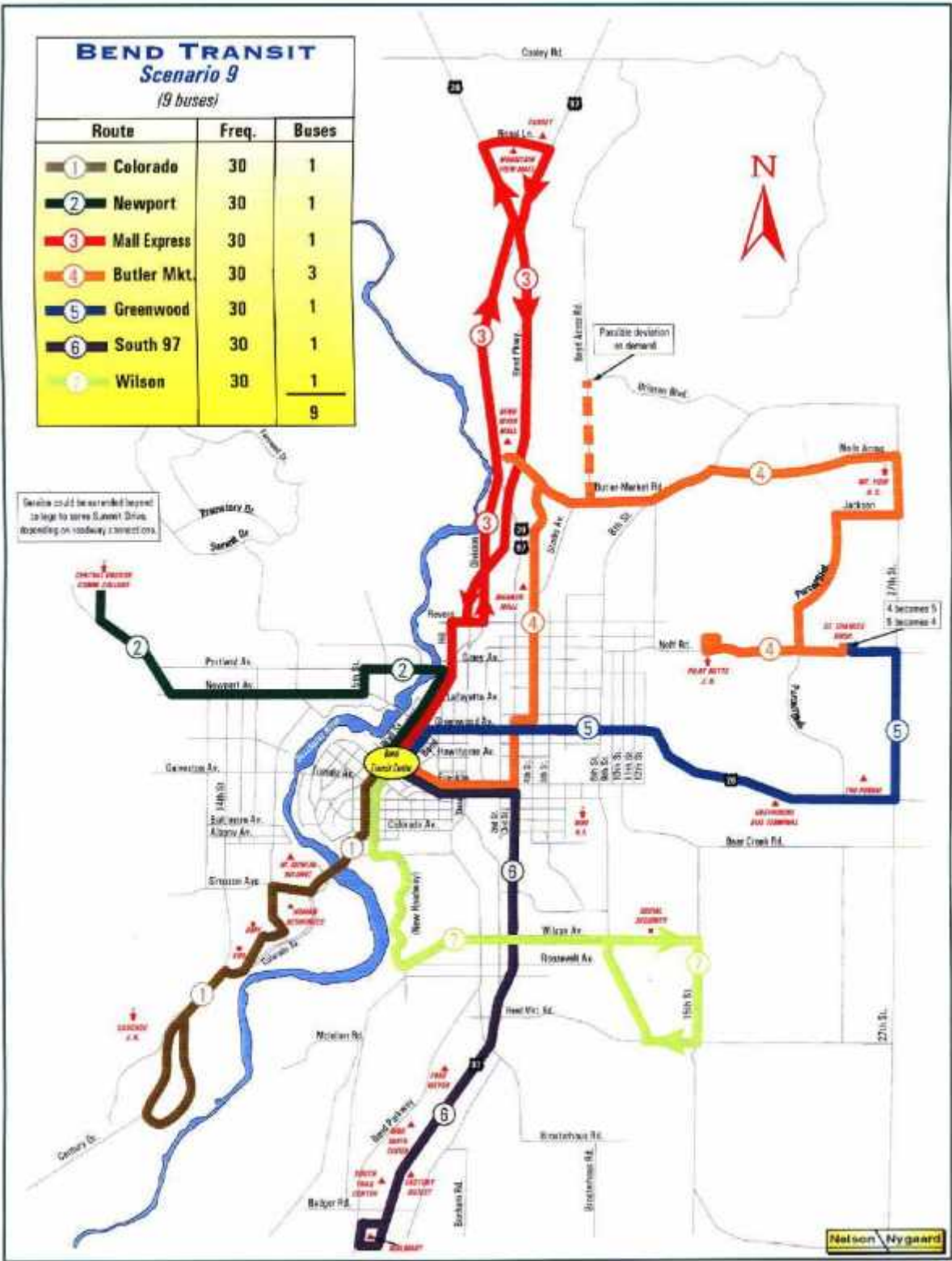
BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 13
5-Bus Route Alternative



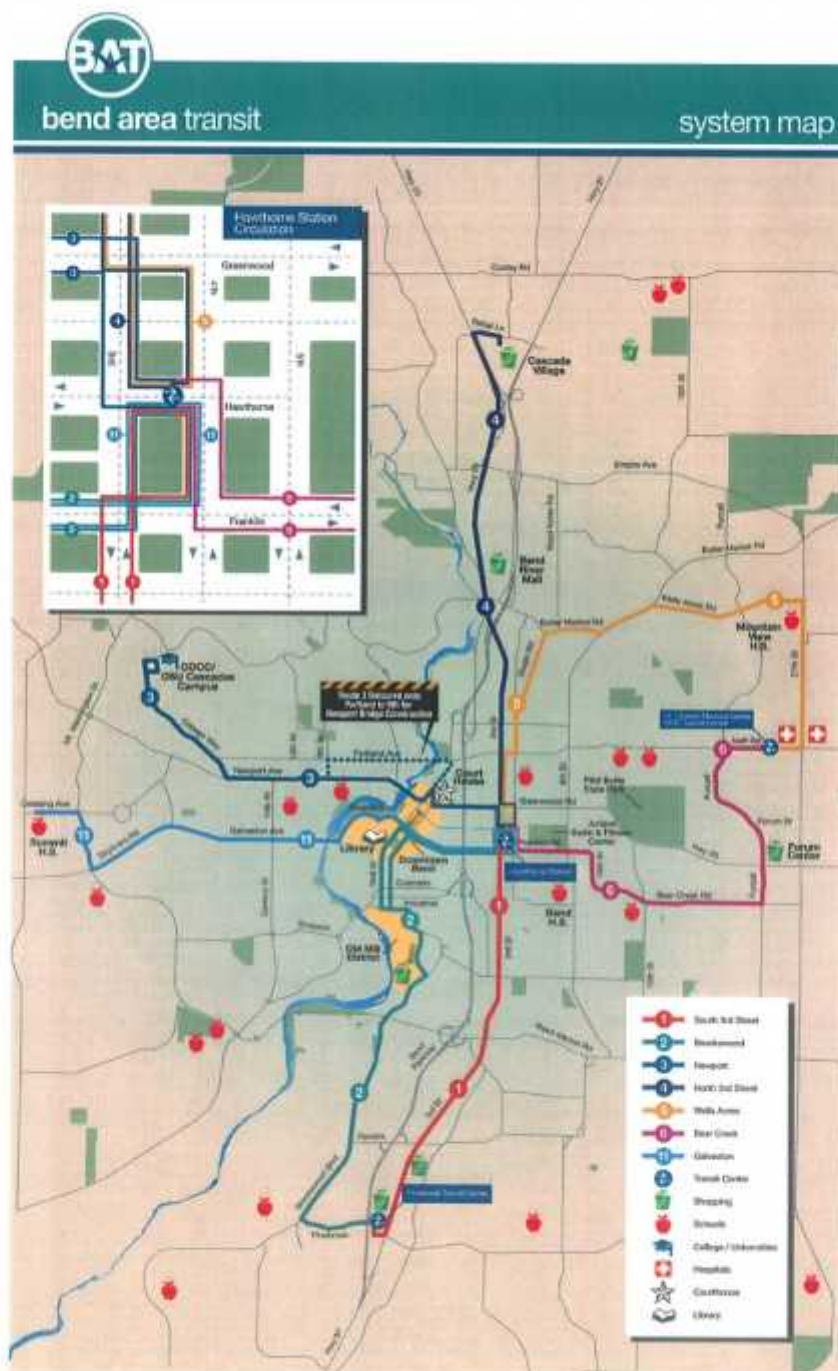
BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 14
9-Bus Route Alternative



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 15
Bend Area Transit (BAT) Route System ⁹



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Demand response transit: The Recommended Alternative includes the provision of an *expanded* demand responsive system to serve more of the elderly, disabled and transportation disadvantaged residents. The City is evaluating how the demand responsive system could be improved to be more efficient and possibly expanded to serve a wider client base.

Inter-city transit: The provision of an inter-city transit system between Bend and Redmond is also included in the Recommended Alternative. Recent efforts by the Central Oregon Intergovernmental Council (COIC) have been evaluating ways of improving para-transit services that would serve a much broader area than just an improved Bend to Redmond connection. COIC has focused on improving transportation services for getting employees to the work place as well as meeting medical needs. This is an ongoing effort of working with the various para-transit providers in the tri-county area (Deschutes, Crook and Jefferson counties). It is anticipated that this effort could result in a significantly improved (or better-coordinated) transit service for many transportation-disadvantaged travelers. If this is true, it may reap benefits (for intercity service) that may be greater than those depicted in the transportation model.

5.5.3 Travel Demand Management

TDM Trip Reduction: The TAZs along these corridors were those identified that would benefit in trip reductions associated with TDM programs. These adjustments resulted in an overall reduction of 2.2 percent in vehicle trips during the weekday P.M. peak hour. The Combined Alternative assumed a more modest trip reduction (about half) than the TDM Alternative due to the implementation of a less aggressive demand management strategy. The current adopted General Plan TDM policies are further detailed at the end of Chapter 6 of the TSP.

Parking: The Recommended Alternative includes parking strategies that are in aimed at reducing SOV travel within the urban area. These strategies involve instituting or raising parking fees, and limiting parking supply and/or providing incentives for reducing parking in the downtown and at major employers in the urban area. These strategies could be implemented in combination with the provision of public transit, park-and-ride lots, reducing the amount of employer-provided free parking, and working with major employers to establish ride-share programs and incentives.

Major employer examples of implementing parking reduction strategies include the St. Charles Medical Center and the Central Oregon Community College. St. Charles has been working with Commute Options for Central Oregon for several years now to provide commuting incentive programs to lower hospital parking demand (with a very good employee participation rate). In the case of the college, COCC has purchased and currently operates a shuttle bus to assist student transportation on the campus as well as to provide a service from Newport Avenue (to further encourage non-automobile traffic to the campus). Bike racks have also been installed on the shuttle to make the Newport

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Avenue “transit ferry” a more attractive option to bicyclists that would otherwise have to make a difficult (and sweaty) ride to the top of the steep hill.

5.5.4 Bicycle and Pedestrian Facilities

In August 2006, a report, prepared as a part of a DLCD grant, provided an assessment of Bend’s neighborhood bicycle and pedestrian needs. The study concluded that an accessway plan for a system of neighborhood bicycle and pedestrian facilities should be included within the plan that will further augment the year 2000 TSP contemplated Primary Trail system. This report, *Assessment of Bicycle and Pedestrian System Needs* ^{Resource Document B.2.3}, is included in the TSP as a Resource Document. A new plan map; *Bend Urban Area - Bicycle and Pedestrian System Plan* (TSP: Map Exhibit B) recommended by the report includes a system of accessways, primary trails and on-street bike lanes, and replaced the preexisting, 2001, TSP: Map Exhibit A, *Bend Urban Area - Bicycle and Primary Trail System Plan Map*. The referenced report and appendices, shall serve as the plan for guiding decisions of where future accessways, primary trails and bike lanes should be located. ⁶

Generally, new *local streets* and *sidewalks* will complete the system of accessways if a regular grid street pattern is developed. However, effort should be made to complete *connector trails* where they may be identified on the plan or others that may be determined needed. Development of these accessways should maintain the criteria of being safe, feasible and practical. Primary trail, sidewalk and bike lane priorities are depicted in TSP Figures 16 a, b and c. Any new accessways that are delineated in the accessway report (Resource Document B.2.3) shall be considered as a supplement to the list of projects delineated in TSP Figures 16 a, b and c. The City should consider these priorities, or modifications thereof, during yearly capital improvement project construction planning/ budgeting. ⁶

Bicycle and pedestrian facilities are the same as proposed in all of the transportation modeling alternatives *and* are proposed in the recommended alternative. Currently, bike lanes and sidewalks are typically constructed on both sides of all new arterial and major collector streets. ¹ Sidewalks on one side of the street only are allowed in steep slope areas. Bikeways may be allowed in locations where bike lanes are determined to be inconsistent with congested urban streetscapes. ¹ Existing arterials and collectors will be retrofitted with these facilities on a priority ranked schedule. Sidewalk priorities are more difficult to quantify as many new walkways come on line each year with various private developments. The City budgets funds for construction each year for sidewalks, but like the bike lane improvements, priorities are set and reevaluated each year by the CIP. The City and Park District have developed a plan that delineates planned primary trail surface types (Map C). The Plan ranges from natural surfaces to fully paved surfaces. Trail system priorities are illustrated on Figure 16a.

Proposed Trail System Changes: Since the update of the General Plan (1998) was completed, additional planning work has been conducted that has implications on the Trail Plan. This includes a recent planning effort that developed the *Lava Ridge Refinement Plan*. This work (coordinated by Deschutes County) culminated with some proposed changes in the existing Primary Trail System Plan. Two General Plan primary trails in this area are recommended for removal from the bicycle system plan (as a part of the TSP

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

adoption process). This is due to private property owner concerns over the lack of privacy and right-of-way issues (i.e., some developments had not accommodated a canal trail – thus blocking trail passage). To date, there have been no sections of these trails that have been developed, nor have rights-of-way or easements been secured for any portion of these trails. These two trails can also be described as trail numbers #1 “The Swalley Canal Trail” (north of Fred Meyers Road) and #2 “The Yeoman Trail” in the DEA, Trails Study Report^{B.2}.

Another change, advocated due to lost opportunities, is the proposed Central Oregon Irrigation District (COID) trail, located between Blakely Road and the east side of the Old Mill site (AKA: trail #9 in the DEA Report). The trail was planned to follow the abandoned COID lateral but recent development has built over the old right-of-way. An opportunity to build a continuous exclusive trail along the canal lateral was lost with the sale of the old canal property. The local street system, such as Silver Lake Boulevard, that parallels the old canal, will provide a similar on-street bike route linkage. The combination of the three trail deletions will result in about a 4.5-mile reduction in the former Trail Plan system.

Two sections of the Larkspur Trail are currently at issue. The section of the Larkspur Trail between Bear Creek Road and Highway 20 (along the irrigation lateral) is proposed to be moved farther west. The revised location would follow an alignment that is still located between Bear Creek Road and Highway 20, and would follow the east-side of the future 15th Street extension. This change is in response to privacy issues and, more importantly, a desire to locate the trail at a signalized crossing point with Highway 20. Even though the 15th Street extension will be designed with on-street bike lanes, it is not the intent of this change to replace the on-street improvements for an off-street trail. Every effort should be made to make this an exclusive trail between these two arterial streets (likely as a substitute for a sidewalk along the eastside). The east-west connection along Bear Creek Road, due to existing development and right-of-way constraints, may need to follow a sidewalk and/or utilize the on-street bike lanes to make the continuous connection to/from the trail south of Bear Creek Road.

Also, there has been a commitment to property owners along the Larkspur Trail, south of Tempest Drive, to examine trail alignment alternatives between Tempest Drive and Pinewood Park. In this situation, the current plan illustrates the trail following the canal ditch-rider road (that is presently under private ownership). Private property owners along this trail currently oppose the planned route along the canal due to various privacy issues. At least as an interim connection, a trail stub connecting to Wildcat Drive (or other future north-south streets) could provide a north-south continuation of this trail. Nearly all the other sections of the Larkspur Trail are under public ownership or easements have been dedicated for the trail use and no other changes of this trail are recommended for consideration.

These proposed trail modifications should not significantly change public decisions to opt to use non-automobile modes of travel throughout the city. Thus, they are not expected to

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

appreciably alter trip choices or travel behavior as depicted in the transportation model. In all cases, alternative local roadway routes are available to replace any lost trail route corridors.

5.5.5 Street System

The ***Recommended Alternative*** includes the construction of the arterial and major collector roadways identified in the adopted General Plan. It is assumed that, as areas develop, the supporting system of local roadways will also be constructed. By developing this planned network of roadways, it will establish the most important function of the transportation system, which is to carry motor vehicle (including transit), pedestrian and bicycle traffic. Completion of the roadway system will also fulfill the need (and Plan goals) to access land, address safety issues, and provide the community with street *connectivity* that will minimize out-of-direction travel and maximize travel choices and route options.

The primary needed roadway linkages identified in the plan are:

- ▶ The completion of Mt. Washington Dr. from Shevlin Park Rd. to Century Drive,
- ▶ The extension of Reed Market Road from the Parkway to Century Drive,
- ▶ The extension of Olney Avenue from the downtown to 8th Street,
- ▶ The extension of Empire Avenue from Boyd Acres Road to 27th Street,
- ▶ The completion of the Purcell/Pettigrew corridor from Butler Market to Reed Market roads

The Recommended Alternative also includes the eventual widening of some of the more important arterial roadways to five lanes (or completion to 5 lane facilities) to mitigate roadway capacity needs. Included in the list of probable roadway segments that will fit this need are:

- ▶ 27th Street between Neff and Reed Market roads,
- ▶ Reed Market Road from the Parkway to 27th Street,
- ▶ US Highways 20 and 97, and 3rd Street

All other city roadways in the urban area, at this time, are assumed to be 2 or 3-lane facilities. Although, there may be other “spot” improvements on these roadways (e.g., at intersections) that may exceed a 3-lane design. In addition, transportation system management (TSM) measures, such as access management and signal system coordination, are planned on the city and state arterial street system to optimize traffic flow, address safety issues and to maximize roadway system capacity.

Based on all of the modifications described above, PM peak hour forecasts and a level-of-service analysis were developed in the transportation model. The resulting level-of-service is shown in Figure 17. As shown in the figures, with the implementation of land use and TDM strategies, the introduction of transit, and roadway improvements, many of the No-Build Alternative deficiencies were mitigated. However, capacity deficiencies still appear along roadways such as Neff Road, Newport Avenue and the Portland and Galveston crossings of the Deschutes River. ***These arterial roadways pass through the center of well-defined neighborhoods, including public places such as parks and***

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

schools. The suitability of widening these roads, given the primary residential character of these areas, will need to be carefully evaluated by the City. The City and community impacted may have to weigh the implications of roadway widening and impacts to the neighborhood against accepting poorer levels-of-service than are experienced today.

Another issue is the question of safety. Both for motor vehicles trying to gain access to these arterial roadways and non-motorized traffic trying to cross these roadways. Also yet another issue is “cut-through” traffic on local streets that may be seeking to avoid congestion on the arterial/collector roadways. In fact, the March 2000 neighborhood design workshop for Newport Avenue concluded that the participants would be willing to accept greater travel delays rather than have the street expanded to five lanes with signalized intersections.

Proposed Roadway System Changes:⁹

Another recent community transportation issue was the plan and design of the South River Crossing. To supplement the transportation system the developer of the Old Mill Site has constructed a local bridge across the Deschutes River that will connect both halves of the mill development. Since this *private roadway* will be open to public travel and connected to other city streets, City Council stipulated in the update of the General Plan (Fall 1998) that the “Southern River” crossing arterial be limited a 2-travel lane roadway. The General Plan currently contains the following text concerning the river crossing:

*“ **Southern River Crossing:** The concept of extending a new arterial street across the Deschutes River, south of the mill, can be traced back to the 1950s. This alignment appears on the early city zoning plans of the 1960s and was later incorporated in the Bend Urban Area General Plan, in the late 1970s. The historic selection of Reed Market Road alignment as the planned south river crossing was based on a number of factors:*

- 1. The alignment skirted the area occupied by Bend’s last lumber mill. This was the edge of the industrial zoned properties where large equipment created noise and dust impacts.*
- 2. The alignment was a continuation of the major roadway system serving the entire urban area, and the bridge would complete this east-west roadway linkage across the river.*
- 3. Ease of roadway construction. This is attributed to the narrow river crossing width, the fact that it follows preexisting roadway grades to Century Drive on the west side of the river, and it crossed an already disturbed log deck area on the east side.*
- 4. The alignment was largely undeveloped except for the mill activities.*

Over the course of the preparation of the Plan update, City Council has held extensive discussions on the subject of alternative river crossing locations and designs. In 1998, in response to these deliberations on a bridge location, Council made a decision that the extension of Reed Market Road should remain as shown on the plan. Stating further that it should be constructed as a two-lane roadway (i.e., the roadway should provide one travel lane in each direction, plus bike lanes and sidewalks, with raised medians and turn lanes permitted where necessary).”

One final change to the Transportation Plan in the TSP is a realignment of the east-west collector now shown as a westward extension of Summit Drive, west of Mt. Washington Drive. This realignment is due to the fact that existing development (i.e., Awbrey Glen) prevents the new collector from making a four-way intersection with Mt. Washington Drive and existing Summit (to the east). Rather than create three offset “tee” intersections (with Summit–east, Summit–west, and Regency Street) the plan has been changed to

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

realign the new collector farther to the south to meet Mt. Washington Drive at a new westward extension of Regency Street. This extension of Regency Street (which is classified as a local street) will improve access to the C.O.C.C. campus from the north and the west. This new street configuration is illustrated in Figure 19.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 16a
Primary Trail System Priorities

Trail Number*	Trail*	Rating/Score*		Construction Cost Estimates ¹	
				Low (unpaved)	High (paved)
#7d	Deschutes River Trail	HIGH	24	**	**
#11b	Larkspur Trail (south)	²	22	\$13,932	\$47,541
#7b opt.1	Deschutes River Trail	³	22	[<i>\$75,524</i>]	[<i>\$101,005</i>]
#7b opt.2	Deschutes River Trail	³	22	[<i>\$4,818</i>]	[<i>\$28,416</i>]
#7b opt.3 (1+2)	Deschutes River Trail		22	\$80,342	\$129,421
#7a	Deschutes River Trail	⁴	20	\$481,440	\$497,567
#8	Old Brooks Resources Trail		20	**	**
#7c	Deschutes River Trail		19	\$3,854	\$21,773
#11a	Larkspur Trail (north)	MED	18	\$17,378	\$49,839
#5	PP&L Transmission Line Trail		18	\$10,611	\$83,390
#10	Coyner Trail		18	\$9,845	\$82,512
#4	Pilot Butte N. Unit Trail		16	\$28,716	\$112,377
#3	Bend Parkway Trail		15	\$29,390	\$138,558
#12c	Central Oregon Canal Trail	LOW	15	\$7,977	\$26,164
#6	West Bend Trail		14	**	**
#12d	Central Oregon Canal Trail		14	\$21,250	\$79,449
#14	C.O.I.D. - "A-11" Lateral Trail		14	\$22,215	\$79,831
#12b	Central Oregon Canal Trail		14	\$7,722	\$24,090
#1	Swalley Main Canal Trail		13		
#12a	Central Oregon Canal Trail		12	\$23,866	\$92,977
#9	C.O.I.D. Old Pilot Butte Canal		12		
#2	Yeoman Trail		12		

Totals = \$758,539 \$1,465,489

Notes:

- a) List does not include a #13
b) "Strike-out" indicates proposed Trail Plan deletion

* Trail #, Score & Original Cost Estimates from DEA Report, 1995,
High, Medium & Low rating categories by City staff

** To be constructed by land development

Footnotes:

- Estimates* are adjusted (for inflation) from 1995 @ 5%/year
and **DO NOT** include right-of-way costs
- This project estimate EXCLUDES the cost for a bridge
over Bear Creek Road
- Option costs are indicated in *italics*
- Estimates INCLUDE a bridge over the
Deschutes River

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 16b
Sidewalk System Improvement Priorities

(SORTED BY STREET SECTION) *[Timing: Near to Intermediate Term depending on funding availability]*

Street Section	Side of St. *	St. Func. Class.	School Route	Approx. Length	Est. Cost**	Other comments
Awbrey, Steidl to Wilmington	W or E	C		1,600	\$48,000	
Bear Creek, 15th to Craven	S	A	Y	1,500	\$45,000	
Bear Creek, Craven to Dean Swift	S	A	Y	2,100	\$63,000	
Bear Creek, Dean Swift to 27th	S	A	Y	1,500	\$45,000	
Boyd Acres Rd, Butler to Empire	E	A		4,000	\$120,000	
Broadway, Colorado to Georgia	E	L	Y	900	\$27,000	
Brookswood Blvd.: Elk Mdw Sch - Powers	W	A	Y	7,500	\$225,000	
Brosterhaus, American Lane to Murphy	E	C	Y	3,900	\$117,000	
Brosterhaus, Chase to American Lane	N	C		2,000	\$60,000	
Brosterhaus, Hwy 97 to Parrell Rd.	N	C		400	\$12,000	
Brosterhaus, Murphy to Knott	E	C	Y	3,100	\$93,000	
Brosterhaus, Parrell to Chase	N/E	C		2,400	\$72,000	
Butler Market Rd: 8th - 27th	S	A	Y	7,300	\$219,000	Use S. Side, Curb tight
Colorado, Bond to Wall	N	A		300	\$9,000	
Cooley Rd, Hwy 97 to 18th (the school)	S	A	Y	2,900	\$87,000	
Country Club Rd, Knott to railroad xing	W	C		1,800	\$54,000	
Cumberland, 14th to Columbia	N or S	L		1,300	\$39,000	
Division & Hwy 97, Xerxes to River Mall	E	A/PA		3,900	\$117,000	
Ferguson Rd, 15th to 27th	N	C	Y	5,800	\$174,000	
Galveston (Skyliners), 17th to Mt. Washington	N	A	Y	4,000	\$120,000	(trail constr. on north side may impact priority)
Galveston, 17th to 14th	N	A	Y	1,800	\$54,000	
Harmon: Galveston - Harmon Park	E	C	Y	900	\$27,000	
Hwy 20, Dean Swift to Purcell	N	PA		700	\$21,000	
Hwy 97, Empire to River Mall	E	PA		2,100	\$63,000	Infill
Hwy 97, Mt. Wash Dr to Revere (Thurston)	W	PA		3,100	\$93,000	
Hwy 97, Powers to Murphy Rd	B	PA		1,900	\$57,000	Infill
Hwy 97, Reed Lane to Powers	B	PA		2,900	\$87,000	Infill
Hwy 97, River Mall to Mt. Wash	W	PA		1,500	\$45,000	
Hwy 97, Robal to Empire	W	E		4,200	\$126,000	
Hwy 97, S. Division to Reed Lane	B	PA		500	\$75,000	(extra cost at the Canal xings = \$60K?)
Kansas, Riverside to Wall	S	L		500	\$15,000	
Knott Rd, China Hat - Rickard	(note)	A		varies	\$30,000	@ School bus stop locations (\$30K?)
Milwaukie, 14th to Harmon	N	L		1,900	\$57,000	
Mt. Washington, Simpson to Cascade Lks.	W	A	Y	3,300	\$99,000	
Murphy Rd, Country Club Dr. to Brosterhaus	N	C	Y	400	\$12,000	short segment
Murphy Rd, Hwy 97 to Parrell Rd	N	C	Y	800	\$24,000	
Murphy Rd, Parrell to Country Club	N	C	Y	2,400	\$72,000	
NE 12th/Jones, Thompson to Butler	E	L	Y	1,000	\$30,000	Plus Jones Rd. to Park
NE 15th, Bearcreek to Wilson	W	A	Y	2,400	\$72,000	
NE 18th, Empire Blvd. to the north	W	A	Y	1,400	\$42,000	
NE 27th St., Butler Market to Neff Rd	W	AA	Y	1,400	\$42,000	2 locations to Infill
NE 27th, Hwy 20 to Bear Creek	W	AA		800	\$24,000	
NE 27th, Neff to Hwy 20 (Forum Dr)	W	AA		2,200	\$66,000	
NE 4th Street, Greenwood to Seward	B?	A		1,200	\$36,000	Various infill locations on both sides (1200?)
NE 8th Street, Revere to Butler Market	E	A		3,100	\$93,000	
NE 9th Street, Reed Market to Wilson	E	A		2,700	\$81,000	
Neff Rd, 27th to Providence	S	A	Y	1,200	\$36,000	
Neff Rd, Eastwood to SCMC	N	A	Y	2,600	\$78,000	
Newport, 12th to 14th	S	A	Y	700	\$21,000	
Newport, 14th to College Way	S	A		600	\$18,000	
NW 11th, Newport to Quincy	E or W	L	Y	900	\$27,000	
NW 12th, Galveston to Milwaukie	E	L	Y	1,600	\$48,000	
NW 13th, Galveston to Newport	E	L	Y	1,900	\$57,000	

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 16b (continued)
Sidewalk System Improvement Priorities

NW 14th St, Galveston to Commerce	E	A	Y	1,800	\$54,000	
NW 14th St, Galveston to Newport	W	A	Y	1,900	\$57,000	
NW 14th Street, Colorado to Commerce	E	A		2,900	\$87,000	
Ponderosa: Granite Dr. - Lodgepole	S	L	Y	2,800	\$84,000	
Portland, Bridge to Awbrey	S	C		800	\$24,000	
Quincy, 11th to West Hills	N or S	L	Y	3,000	\$90,000	
Reed Market, 15th to Fargo	N	AA		2,700	\$81,000	
Reed Market, Fargo to 27th	N	AA		2,200	\$66,000	
Riverfront, Tumalo to Mueller	W	L		600	\$18,000	
Riverside, Congress to Shasta Pl	E	L		400	\$12,000	Fill-in to Gilchrist
Roanoke, 11th to 9th	N or S	L		700	\$21,000	
Scott & 2nd, Wilson to Division	W	C		2,800	\$84,000	
Shepard, Drost to Wells Acres	W	L	Y	1,300	\$39,000	
Simpson, Mt. Washington to 14th	N	A	Y	2,900	\$87,000	
SW Lodgepole, Poplar to Mahogany	W	C		1,300	\$39,000	
SW Pinebook Ave, Walmart to Brookwood	N	L		1,800	\$54,000	
Trenton, 9th to 5th	N/W	L	Y	1,600	\$48,000	
Wells Acres, Butler to Daggett	B	C	Y	1,400	\$42,000	
Yeoman Rd, Empire to Butler Mkt.	W	C	Y	700	\$81,000	(extra cost at the Canal xings = \$60K?)
Total = \$4,542,000						

St. Func. Class = Functional Classification:

PA=Prin. Arterial, **AA**=Major Arterial

A=Minor Arterial, **C**=Major Collector, **L**=Local

* Side of Street = N, S, E, W, B=Both,

**Estimated Cost @ \$30/LF - one side of street (5 foot wide walkway)

Y=Yes

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 16c
On-Street Bike Lane System Improvement Priorities

[Timing: Near to Intermediate Term depending on funding availability]

(SORTED BY STREET SECTION)

Street Section	Str. F.C.	Section LF	Needed LF	Side of Units Street	Est. Cost*
15th Street: Knott to Ferguson	A	6,700	6,700	LF B	\$402,000
27th Street: Bear Creek - Reed Mkt. (near RM intersect)	AA	1,200	1,200	LF B	\$72,000
27th Street: Ferguson - Rickard	A	5,700	5,700	LF B	\$342,000
27th Street: Hwy 20 - Bear Ck (curb S. of Cinema D/W)	AA	1,300	100	LF O	\$3,000
27th Street: Neff - Hwy 20 (sect. near Forum Dr)	AA	5,280	5,280	LF B	\$316,800
27th Street: Reed Mkt. - Ferguson	A	5,000	5,000	LF B	\$300,000
3rd St.: Various missing B/L segments	E/PA	varies	varies	LF B	**
4th Street: Revere - Greenwood	A	3,000	3,000	LF B	\$180,000
9th Street: Wilson - Reed Mkt.	A	2,900	2,900	LF B	\$174,000
Archie Briggs: Trail Xing - O.B. Riley	C	3,400	3,400	LF B	\$204,000
Bear Crk: Craven - 27th St.	A	3,800	3,800	LF B	\$228,000
Blakely Road: Canal - Chamberlain	A/L	2,900	2,900	LF B	\$174,000
Blakely Road: Powers - Canal	L	2,500	2,500	LF B	\$150,000
Boyd Acres: at the Canal Bridges	A	500	500	LF B	\$30,000
Brosterhous: Hwy 97 - Murphy	C	8,400	8,400	LF B	\$504,000
Brosterhous: RR Xing to Knott	C	1,000	1,000	LF B	\$60,000
Colorado: 14th - Simpson	C	3,000	3,000	LF B	\$180,000
Colorado: Broadway - Simpson (incl. bridge)	A	2,000	2,000	LF B	\$120,000
Country Club: RR Xing to Knott	C	1,500	1,500	LF B	\$90,000
Franklin Blvd: 3rd - 4th	A	500	500	LF B	\$30,000
Galveston: 17th - 14th	A	1,900	1,900	LF B	\$114,000
Hwy 97: Greenwood to Bend River Mall	PA	9,000	9,000	LF B	\$540,000
Knott Rd: Rickard - 15th	A	7,000	7,000	LF B	\$420,000
Neff Road: (end of signal impr) - Covington	A	1,100	1,100	LF B	\$66,000
Portland: Awbrey - Hill	C	1,300	1,300	LF B	\$78,000
Reed Mkt.: Newberry - 27th	AA	4,600	4,600	LF B	\$276,000
Revere Ave.: 3rd - 4th	A	500	500	LF B	\$30,000
Riverside/Franklin: Tumalo - Parkway	A	4,200	4,200	LF B	\$252,000
Simpson: Mt. Washington - 14th St.	C	3,000	3,000	LF B	\$180,000
Well Acres: Butler Mkt. - 27th St.	C	5,000	5,000	LF B	\$300,000
Yeoman (n/s): (N. of) Purser - Canal	C	2,200	2,200	LF B	\$132,000

Side of Street: B=Both, O=One Side

LF=Linear Feet

Str. F.C. = Street Functional Classification:

E=Expressway

PA=PRIN. ARTERIAL, AA=MAJOR ARTERIAL

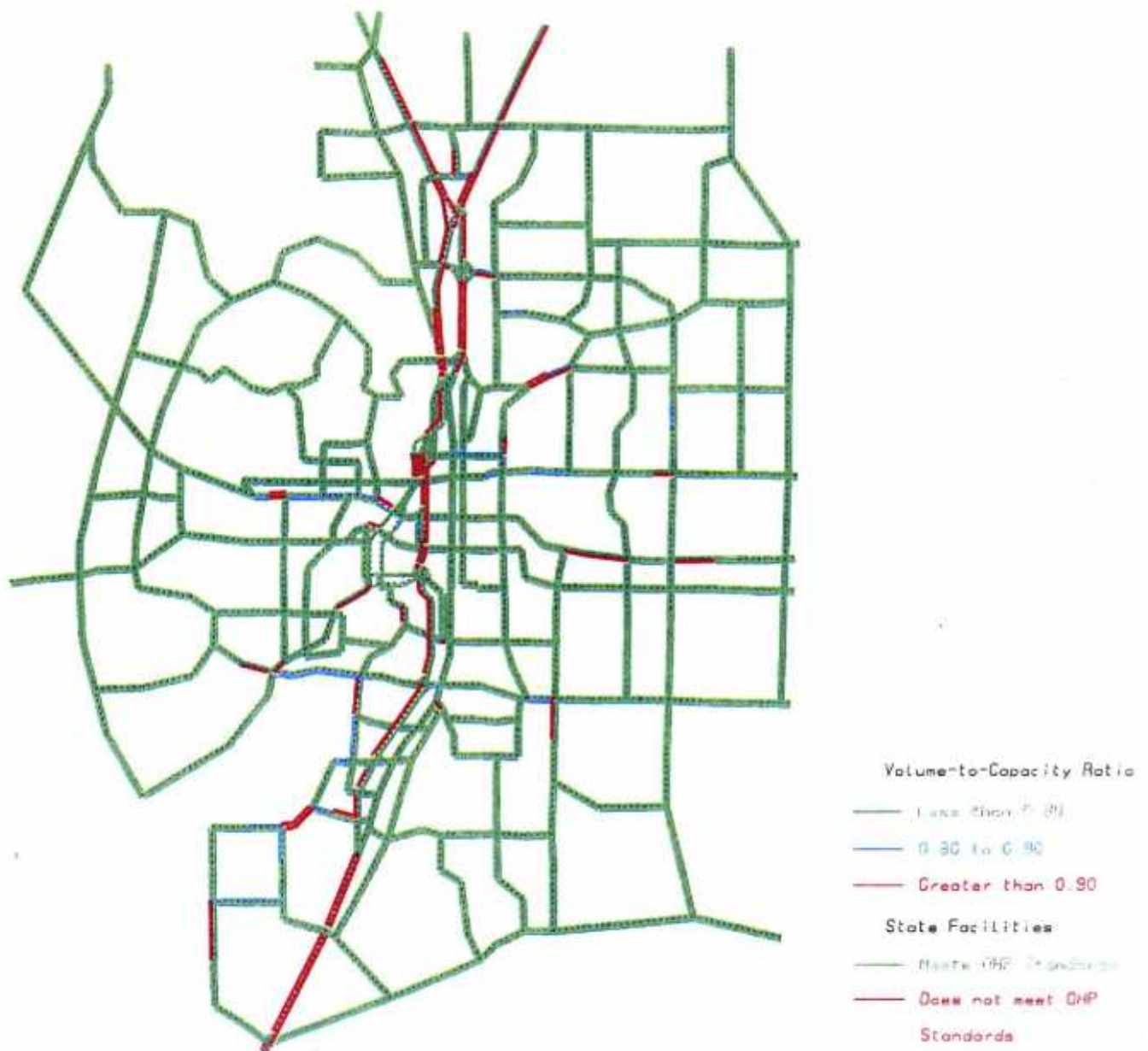
A=MINOR ARTERIAL, C=MAJOR COLLECTOR, L=LOCAL

* Cost @ \$60/LF (Total for both sides)

** Cost to be determined

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 17
Recommended Alternative - Level-of-Service (2020)
Combined Alternative (iteration 2)



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

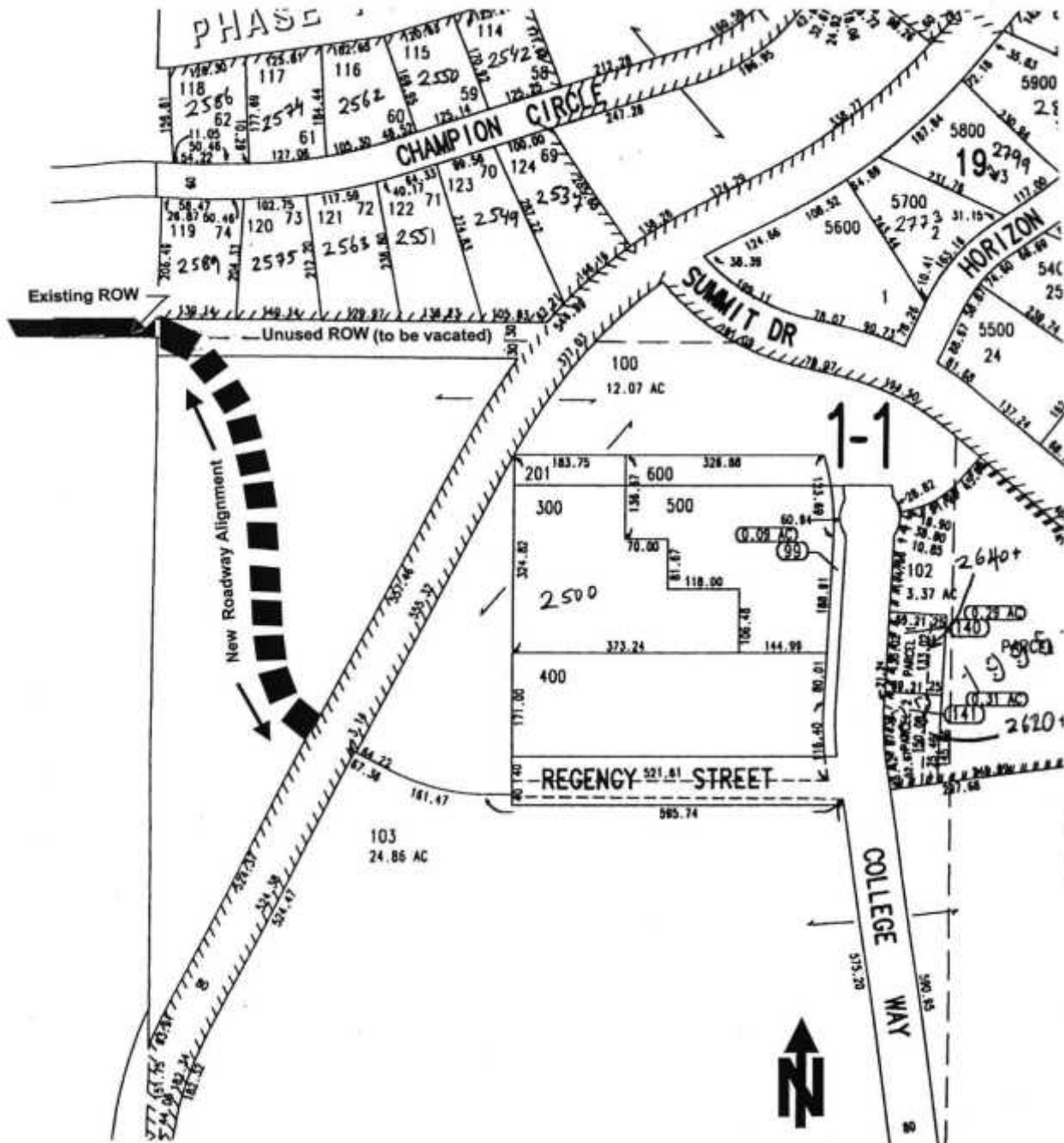
Figure 18 ⁹

~~Wall/Bond/Colorado/Arizona One-Way Pair (Couplet) System~~

[NOTE: Figure 18 was DELETED by TSP Amendment, Ordinance NS-2043]

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 19
Proposed Realignment of East-West Collector
At Regency Street (C.O.C.C.) & Mt. Washington Drive



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.0 TRANSPORTATION SYSTEM PLAN

The improvement components of the Bend Urban Area Transportation System Plan shall be as articulated in TSP Section 5.5 Recommended Alternative. ⁶

The following sections describe strategies, approaches and standards designed to meet community transportation system needs of the next twenty years. For each respective component, pertinent objectives and policies are included at the end of this chapter.

6.1 TRANSPORTATION SYSTEM MANAGEMENT

Transportation System Management (TSM) improvements are intended to optimize the carrying capacity of roadways. TSM improvements can alleviate congestion and reduce crashes by minimizing the number of access points and turning movements, and by creating separate turning and merging lanes. Other TSM measures include controlling the location of driveways, constructing raised medians, prohibiting on-street parking, timing and synchronizing traffic signals, constructing roundabouts and signals, and improving intersection corners to facilitate easier turning movements for large vehicles.

By focusing improvements on congested intersections or areas that otherwise disrupt the flow of traffic, TSM improvements can provide a lower cost alternative to widening roadways (between intersections) and protect the function of roadways. TSM strategies are easiest to implement where they can be constructed along new or developing transportation corridors (e.g., along the East 27th Street corridor). Conversely, creating turn limitations and access control along fully developed transportation corridors requires a significant adjustment by the motoring public and businesses affected by these changes. It is important that public agencies work cooperatively with impacted businesses to fully evaluate access alternatives and to minimize economic hardships that may be created by new circulation patterns. It is important that TSM improvements account for the needs of all modes of travel, particularly that pedestrian, bike and transit movements, and safety are not compromised in exchange for improving roadway capacity.

6.2 TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) strategies focus on altering driver behavior and mode choice to lower the demand on the street system especially during peak travel times. Common measures to reduce the number or alter the timing of peak hour vehicle trips include: compressed or flexible work schedules, ridesharing, use of transit, bicycle or pedestrian commuting, parking management, or actions that reduce the need to travel, such as working at home and “teleworking.”

TDM programs complement other transportation planning strategies and goals that are aimed at preserving livability and reducing single occupant vehicle travel. Successful programs can be measured by an increase in vehicle occupancy rates and reduced vehicle miles traveled.

Demand management strategies often involve an education and promotion effort to encourage changes from single-occupant driving behavior. Local government and other groups can help to

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

educate the public regarding the actual costs of travel on the transportation system and encourage TDM programs to reduce system demand. Community-wide events can also encourage employees to participate in TDM efforts by promoting alternatives to driving alone. Together, these efforts can make important strides toward improving public awareness regarding travel alternatives.

Demand management programs work best where there are heavily congested corridors, clear work trip travel patterns, limited parking, and the provision of viable alternatives to driving. Experience from successful demand management programs indicates that other important factors include development of quantifiable goals and periodic evaluation, demand management coordination, industry involvement, parking management, employee and employer incentive programs, and strong public support. Thus, transportation demand management strategies require a concerted community effort and commitment in order to fulfill the greatest trip reduction potential.

6.3 PEDESTRIAN AND BICYCLE SYSTEM

Pedestrian and bicycle facilities are integral elements of the transportation system and valuable components in the strategy to reduce reliance on automobiles. The community benefits in many ways from adequate pedestrian and bicycle facilities including reducing traffic congestion, supporting tourism, and providing accessibility to all parts of the community. Further, the segment of the population without access to a car benefits from quality pedestrian and bicycle facilities. The year 2000 US Census data will help to quantify this group of non-drivers.

In 2002, a consultant for the Bend Metropolitan Park and Recreation District prepared an implementation strategy called the *Deschutes River Trail - Action Plan* ^{Resource Document B.2.2}. This plan provided the District with important detail to assist in guiding the development of future Capital Improvement Project planning for the river trail system and as an important background document for seeking supplemental funding resources including grants, donations and in-kind contributions. ⁶

The planned network for this system shall also include the elements defined by the August 2006, *Assessment of Bicycle and Pedestrian System Needs* Report for accessway and Primary Trail improvement recommendations. Improvement recommendations of this report shall have priority where (and if) conflicts exist between the 2000 TSP and the 2006 TSP amendments, unless otherwise stipulated in the TSP or directed by the Bend City Council. ⁶

6.3.0.1 Trip Potential

Travel by bicycle and foot has tremendous potential in the Bend urban area. A large part of this is attributable to Central Oregon's predominantly sunny weather and relatively flat terrain. In addition, the outdoor spirit of the citizenry, the desire to engage in healthy exercise and the interest in alternative modes of travel provide a strong population base for generating non-automobile trips. The visibility of pedestrian and bicycle traffic throughout the year confirms the importance of these travel options.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Bend's relatively small size makes travel by bicycle or foot fairly feasible. Depending on the type of trip, studies indicate a willingness of people to walk between a quarter and a half mile, and bicycle upwards to a few miles. According to the 1990 National Personal Transportation Survey, 27 percent of all trips are one mile or less, 40 percent are two miles or less and 63 percent are five miles or less.

The 1990 census data shows walking and bicycling accounted for about seven-percent of Bend's trips to work. Travel time to work for all trips was less than five minutes for six-percent of the workers, less than ten minutes for 31 percent and less than 15 minutes for 63 percent. A short trip length and travel time is part of the equation for encouraging non-auto trips. A complete and safe network of trails, sidewalks and bicycle facilities will further encourage these trips.

Other Benefits: In addition to reducing traffic, non-motorized trips conserve fossil fuels, reduce noise, protect air and water quality, and reduce the demand for parking spaces. The air quality issue is particularly important to Central Oregonians, as the pristine mountain views and clean air are cherished resources of the community. A concerted effort to reduce automobile trips and the resultant exhaust emissions can be valuable in diminishing the impact on air quality.

Community and Site Design: An adequate bike and pedestrian system requires a complete network of walkways and bikeways that connect parks, schools and activity centers. Orienting buildings to the street and providing safe and easy connections from stores to the sidewalk, and providing convenient bike parking all help make bicycling and walking more desirable trip choices.

Maintenance and Repair

Maintenance and repair of the bicycle and pedestrian system are critical to the use of these transportation modes. Timely snow removal, sweeping, cinder removal, patching, surface repair and striping are all necessary to maximize the use of bike lanes and sidewalks as alternative transportation modes. Property-tight sidewalks may require less maintenance than curb-tight sidewalks because the landscape strip provides a place to pile snow and separates the sidewalk from road debris accumulation.

The City currently assigns responsibility for sidewalk maintenance and repair to the adjacent property owners. The current system does not adequately assure timely maintenance and repair of the sidewalk network. The City shall develop a program to ensure timely maintenance and repair of all sidewalks.

The current use of cinders negatively impacts the bicycle lane and pedestrian system. The City should consider alternatives to cinders. The City's elimination of the use of chip sealing has had a positive impact on bicycle safety and chip sealing should not be reinstated.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.3.1 THE PEDESTRIAN SYSTEM

Walking is the most basic form of transportation, undertaken by virtually every citizen. Sidewalks are an essential element of the transportation system since every trip involves at least one walking segment. Because the primary function of sidewalks is to provide a safe place for pedestrians, facilities need to be designed accordingly.

Since the late 1980s sidewalk construction has been required in all new residential and commercial developments. Sidewalks will normally be located on both sides of the street and separated from the street by a curb and a landscape strip. In steep topography or unusual topography, sidewalks may be allowed on only one side of the street and may be curb-tight. Sidewalks are normally constructed with a concrete material although special paver blocks may be utilized in high-use pedestrian areas, such as the downtown, to enhance surface aesthetics. Sidewalks vary in width depending on anticipated pedestrian volumes but have certain minimum widths established to meet Americans with Disabilities Act (ADA) requirements. Minimum sidewalk widths are established in the implementing ordinances of the city.

6.3.1.1 The Landscape Strip

The area located between a sidewalk and the curb serves many important functions and is commonly referred to as the planting or landscape strip (Figure 20). The landscape strip creates space for a variety of underground utilities such as telephone, cable television, fiber optic cables, etc. The landscape strip is also beneficial for locating utility poles, fire hydrants, benches, bus shelters and other features that might otherwise block or obstruct pedestrian travel along sidewalks.



Figure 20. Landscape buffered sidewalk on Colorado Avenue

Photo by: City of Bend

Landscaping helps to soften the hard edge created by pavement and curbs.

Large trees can also provide cooling summer shade for parked cars and pedestrians. A canopy of street trees can help to slow traffic and enhance the beauty of the community. The physical separation from the street also improves the design of sidewalks by maintaining a constant grade without dipping at driveways, and makes American with Disabilities Act compliance easier. During winter months, snow can be plowed into these areas from the street and not block sidewalks. The landscape strip provides a physical separation from the adjacent roadway, providing enhanced pedestrian comfort and improved walking experience.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.3.1.2 Street Crossings

Crossing local street intersections is normally not difficult because of lower traffic volumes and because the distances are relatively short. Crossing arterial streets is much more challenging because of street widths, high traffic volumes and speeds. Minimizing crossing distances required for pedestrians is important to reduce the psychological barrier created by wide streets and to increase pedestrian safety.

Construction of **curb extensions** is one method to improve the visibility of pedestrians and reduce the crossing distance of the street (Figure 21). These extended “bulb-outs” add valuable pedestrian space and can help facilitate a quicker movement of pedestrians across busily traveled roadways. The additional space can also provide a location for bike parking or other sidewalk amenities. Downtown Bend is an excellent example of where this type of design has been used very successfully.



Figure 21. Example of curb extension retrofit
Source: Oregon Bicycle & Pedestrian Plan

Another solution to addressing conditions where traffic volume is high, or roadways are wide, is the **construction of raised medians**, islands or refuges. Medians can significantly improve pedestrian visibility and provide a place to wait for safe gaps in the traffic stream while crossing busy roadways (Figure 22). Medians can also improve the aesthetics of a community with added landscaping. Islands and refuges are especially important at large intersections to reduce the crossing distance and improve pedestrian comfort by minimizing exposure to motor vehicles.



Figure 22. Median allows pedestrian to cross one direction of traffic at a time
Source: Oregon Bicycle & Pedestrian Program

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

One important function of **traffic signals** is providing for the movement of pedestrians across busy intersections. Where large radius corners have been constructed at the intersection to accommodate higher speed turn or truck movements, building a dedicated turn lane with a raised island for pedestrians is important (Figure 23). This significantly improves the comfort of pedestrians by reducing the amount of uninterrupted pavement to cross.

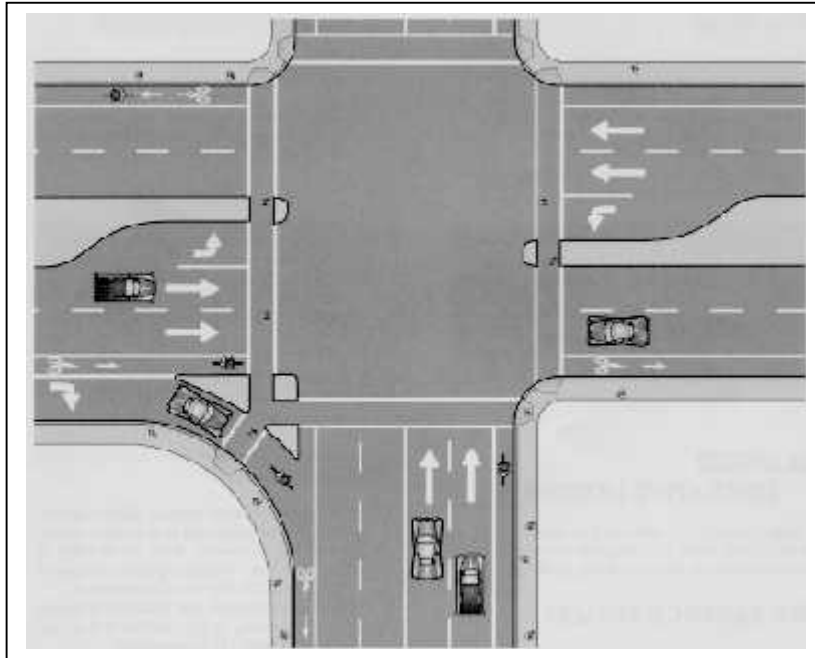


Figure 23. Pedestrian refuges at a signalized intersection
Source: Oregon Bicycle & Pedestrian Plan

6.3.1.3 Multi-Use Trails

Trails provide important transportation connections and shortcuts to destination points that make travel by foot or bicycle safe, pleasant and convenient. Recreational activity is also a common use of the trail system, with scores of residents and tourists using these areas for walking, jogging, bicycling and other activities.

Trails also provide citizens and visitors with links to the natural environment. One special quality of a trail is the opportunity they provide to escape the bustle of the city - while remaining within the city. This is particularly evident along the



Figure 24. Deschutes River Trail
Photo by: City of Bend

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Deschutes River trail system (Figure 24). Public opinion supports this sentiment, as people cite the ability to depart from traffic congestion, noise and exhaust as a prime factor in their enjoyment of trails.

The first trail plan was established with the adoption of the Bend Area General Plan in 1981. This has been the policy tool that has provided some protection of trail corridors and has promoted the construction of the current limited system. In 1995, consultants for the City studied Bend's off road trail network to evaluate the original trail plan^{B.2}. As a result, several additions were adopted by the City and County and incorporated into the General Plan in 1996. The current "primary" trail plan is illustrated on the Bicycle and Trail System Map (Exhibit A). The City and the Bend Metro Park and Recreation District are working together in the planning and development of a trail system to meet the recreational and transportation needs of the community.

Neighborhood Accessways: As indicated in Chapter 5 of the TSP, an August, 2006, report, provided an assessment of Bend's neighborhood accessways. The neighborhood accessway system is comprised of a wide range of facilities that include; a variety of trail types and on-street facilities, that are collectively referred to as "accessways". [Note: The City Development Code (2006) also calls for "accessways" and/or "access corridors" – that are defined as separate travel ways for pedestrians and bicyclists that may either be within specific dedicated right-of-ways or easements for that purpose.]⁶

The purpose of these facilities is; to minimize travel distances within and between residential areas and commercial centers, major employment areas, transit stops, or within and between nearby neighborhood activity centers such as schools and parks. The greater system of proposed accessways will provide transportation and recreation mobility opportunities for non-automobile travel through out the community. This accessway plan for the City generally uses a geographic spacing for accessways on an interval of approximately every *quarter-mile*.⁶

The Primary Trail plan is delineated on the *Bend Urban Area - Bicycle and Pedestrian System Plan – TSP: Map Exhibit B*. The alignments depicted as proposed should be considered general in nature. Flexibility should be permitted during the development and design of private lands to locate these planned primary 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, or consider any other topographic or geographic barriers or issues, etc. Also, while it may be suitable to locate a trail next to a street due to existing difficult to resolve issues for trail location, it is the intent of the plan to locate trails - *as much as possible* - away from streets to minimize conflicts with other types of conflicting traffic. It is also the intent of the trail system (both connector and primary) to provide direct and convenient walking and bicycling connections to parks, schools, open spaces, employment areas, shopping destinations, and the like. Balancing these trail design criteria may require a concerted coordination effort between the City, the Park District and the new development to satisfactorily locate these trails to ensure that the intent of the plan will be fulfilled.⁶

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Railroad Right-of-way Trails: There has been a growing interest nationwide in developing both “abandoned” and “active” railroad right-of-ways as part of local trail systems. One recent study examined these special trail corridors in detail; *Rails-with-Trails - Lessons Learned* ^{Resource Document B.2.1}, 2002. This report was prepared for the U.S. Department of Transportation and provides a comprehensive analysis and evaluation of current *rails with trails* (RWT) development practices. The report illustrates how trails can be successfully developed along railroad right-of-ways and provides valuable guidance concerning trail design and development that help to address important issues such as safety, liability and aesthetics.⁶

The Springwater Trail in the Portland area (Figure 24 b) is an excellent example of this type of trail development that is located along an active railroad right-of-way within the State of Oregon.⁶



Figure 24 b. Springwater Trail, Portland, Oregon
Photo by: City of Portland

A trail within/parallel to the Burlington Northern-Santa Fe Railroad corridor in the Bend area could provide a substantial enhancement of the Primary Trail system. The *Bend Urban Area - Bicycle and Pedestrian System Plan* (TSP: Map Exhibit B) illustrates the alignment of this “Rails-with-Trails” concept. It should be acknowledged that, due to site specific railroad operational requirements, alternative parallel accessway/roadway corridors may be more suitable for avoiding problematic sections of this rail-trail corridor. Also, grade-separated rail-roadway crossings may be difficult to retrofit or may be operationally unsuitable for joint trail and rail operation and parallel alternative routes should be considered. Typically, these alternative routes, if used, should not deviate physically too far from the intended corridor alignment (i.e., follow the nearest parallel alternative corridor). Further planning and discussion with the railroad representatives, adjacent property owners and field investigations are required to determine the feasibility of this concept.⁶

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

*Trail-Major Roadway Grade-Separations:*¹³ Multi-use trails often intersect the major roadway system at difficult to cross locations. This is typically the result of the local trail system following the irrigation system of the city (i.e., many of the ditch-rider roads along the irrigation canal network) and/or other situations where a bicycling and walking corridor may emerge mid-block. Even at roadway intersections with major highways, conditions may also be adverse for non-motorized crossing of the roadway. The result is; bicycle and pedestrian traffic seeking to cross a major roadway corridor where the combination of automobile speeds and traffic volumes make crossing difficult, if not unsafe, for many conditions. Given alternative routes for bicycling and walking may be significantly out-of-direction, the temptation is often too inviting for non-automobile traffic to make the most direct roadway crossing to access their desired destination.

The TSP has identified a series of crossing points or zones where it is desired to provide grade-separated facilities, when possible. The map indicates the general conceptual locations but further detailed analysis will be needed to determine the specific location and type of the facility. The plan recognizes that grade-separation is typically an expensive construction option and is difficult to estimate without a fully developed plan and construction design. For these reasons, it is the intent of the plan to identify these crossing points so that as opportunities arise, either a major roadway improvement project and/or other grant opportunities can be identified to facilitate their construction.

By the very nature of the traffic conditions, the Oregon Department of Transportation (ODOT) highway system through the community represents the most common location for these desired grade-separated crossings. Two trail-highway crossings have already been constructed with grade-separated designs; one is on Highway 20, located at the southeastern foot of Pilot Butte, and the other is the Central Oregon Irrigation District canal crossing of Highway 97 (the Parkway). Both of these grade-separations are examples where the trail crossing was completed as a part of a companion highway project. Both are also examples of “undercrossings” versus “overcrossings”.

For user security reasons, overcrossings are often cited as the more preferred design. However, in the case of the two existing structures, undercrossings were chosen as the most practical means of fitting within the landscape, meeting American with Disabilities Act (ADA) grade requirements and/or other important design considerations. Future said crossings should carefully evaluate what design, over- versus under-crossing, might best meet the objectives of the facility. In either case, careful analysis should be given to determining the preferred design. Undercrossing design should include meaningful consideration of options that maximize the visibility of the user (i.e., provide an “open” area – typically described as a trapezoidal cross section - as opposed to a simple culvert, “tube-like” cross section). Illumination of the facility is another equally important design element, (even daytime illumination for longer and/or skewed alignment undercrossings). Cost should not become the sole criteria for selecting preferred crossing structures but equal weight should be provided to balancing other design considerations, such as maintaining user safety, in the evaluation of design options.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The following is a list of planned trail-major roadway grade-separated crossing locations:

1. The northern end of town:
 - (a) This includes both the crossing of US Highways 20 and 97 facilitating connectivity to neighborhoods to the west and east, respectively. Also (a third grade-separation), to provide continuation of the north-south trail that parallels Highway 97. In the case of the Hwy 97 east-west crossing, a grade-separation with the railroad would also be required.
 - (b) The crossing of the North Unit Canal and the future roadway connection of Empire Avenue to 27th Street, north of Butler Market Road.
2. The southern end of town: The replacement of the two existing Rectangular Rapid Flashing Beacons (RRFBs) with grade-separated alternatives on Highway 97.
 - (a) The existing RRFB at Reed Lane: Provide trail connections from the sidewalk system on both sides of Highway 97 (the Parkway) to the existing undercrossing of the COID canal, if possible. If trail connections are not possible, consider other new grade-separation options.
 - (b) The existing RRFB at Badger Road: Due to the disconnection of Pinebrook Road and the removal of the existing traffic signal from the Parkway (i.e., both elements of the Murphy Road extension improvements), seek grade-separation options at, or near, Pinebrook Road. This includes alternative locations that may be between Badger and Pinebrook roads.

Both existing and proposed Trail-Major Roadway grade-separations are illustrated on the Bicycle and Pedestrian System Plan map. As the community grows, other grade-separations may be identified and added to the plan*. A careful consideration of all contributing factors should be included in this evaluation and just evidence of random crossings and/or barrier fence climbing behavior should not be sole determinants for the selection of a proposed grade-separation location, rather careful evaluation of user safety and the potential for use are more justifiable reasons to seek the higher grade crossing facility.

* See also: TSP Resource Document B.2.3, Assessment of Bicycle and Pedestrian System Needs, Figure 3, page 17, for other planned bridges or other local roadway grade-separations.

6.3.2 THE BICYCLE SYSTEM

Residents and tourists of all ages enjoy bicycling for both transportation and recreational use. Bend's relatively small size and short distances encourage travel by bicycle. The majority of the current bike system is found on arterial and collector streets as bike lanes. The network of multi-use trails also serves as an important part of the planned bike system.

6.3.2.1 Bike lanes

A **bike lane** is a space on the road shoulder that is delineated from the adjacent vehicle travel lane by a solid white striped line. Bike lanes are provided on both sides of the street and promote travel in the same direction as the adjacent lane of traffic. This practice provides a safer place for bicycles and requires a cyclist to conform to the laws of motor vehicle travel.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

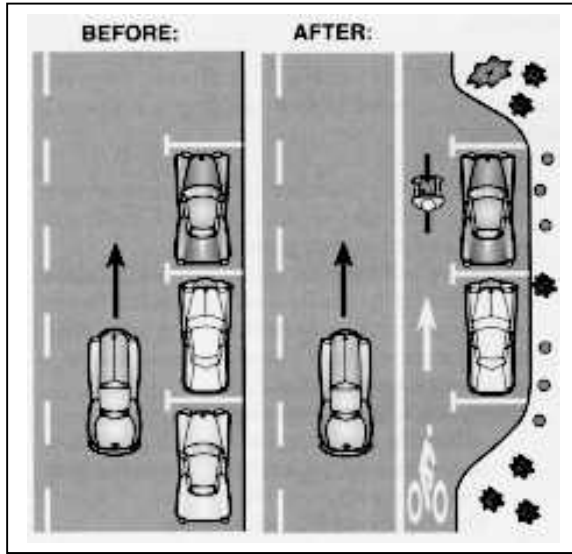


Figure 25. Example of retrofitting street to accommodate bike lanes and on-street parking
Source: Oregon Bicycle & Pedestrian Plan

Bike lanes are intended to provide a convenient and safe location for bicycles on collectors and arterials. Bike lanes provide a clear and distinctive location on the road for bikes to travel at their own speed. They improve driver expectation of bike movements and they reduce bike and auto conflicts. Bike lanes provide a benefit to all modes of travel. For pedestrians, they help separate bike movements from the sidewalk and they increase walking comfort due to the increased sidewalk separation from adjacent auto traffic. For motor vehicle traffic, the lanes add buffer space from roadside obstacles, they improve driveway and intersection sight distances and they provide a temporary place for disabled vehicles to pull out of the travel stream.

It is preferable not to permit on-street parking next to a bike lane due to the hazard of opening car doors and the conflict of cars moving in and out of the parking stalls. However, there may be locations where it is necessary to provide both parking and bike lanes. Where space is limited, one design solution is the construction of recessed parking bays to better accommodate the space requirements for both needs (Figure 25). In other cases, such as the commercial downtown core area where a large inventory of on-street parking is essential, the need to provide vehicle parking may take priority over the delineation of bike lanes. In that case, where lower traffic speeds can be maintained, bikes can better mix with traffic without causing significant problems.

6.3.2.2 Bike Parking Facilities

For a bikeway network to be used to its full potential, secure bicycle parking should be provided at likely destination points. Bicycle thefts are common and lack of secure parking is often cited as a reason people hesitate to ride a bicycle to certain destinations. Bicycle parking should also be convenient, easy to access and provide suitable protection from the weather. Bike parking needs to be designed for both short- and long-term use depending on site conditions and demands. The city of Bend has provided a number of short-term bike racks throughout the central business area as part of the city's downtown redevelopment effort. These racks have helped reduce some of the automobile parking demand in this activity center. When public transportation service is provided in the urban area, bike-parking facilities will need to be provided at all park and ride lots, major transit stops and transit center facilities. Adequate bike parking facilities need to be provided where other public facilities such as libraries, parks, recreation centers and schools are constructed.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.4 PUBLIC TRANSPORTATION SYSTEM ⁹

6.4.1 TRANSIT SYSTEM STUDY ⁹

The feasibility of transit within the Bend urban area has been the subject of two separate studies. In 1994:^{B.3}, the City studied Bend's demographic, employment, travel and transportation system characteristics in relation to how they might support transit use. In 1996:^{B.4}, the City hired a transit consultant to further evaluate how transit could be implemented in the community. This study augmented the previous analysis of transit feasibility by analyzing transit systems from similar sized cities, developing system evaluation criteria, conducting a public opinion survey on transit attitudes and financing methods, and evaluating capital needs and financing strategies.⁹

In 1997, based on this comprehensive evaluation of transit feasibility, the City Council declared that transit was feasible at build-out for the city of Bend. ⁹

In 2000:^{B.5}, an additional study evaluated possible expansions and improvements to the existing Dial-a-Ride system. The report recommended that the City pursue this strategy as an initial method of providing public transportation for the general public. This strategy was not pursued.⁹

In 2006, a review of service plan proposals for new fixed-route service was completed. This work focused on an evaluation of fixed-route design options that would meet City budget constraints, optimize resources and meet the demand for paratransit and demand response service.⁹

6.4.2 MULTI-MODAL STRATEGIES ⁹

Public transportation is an important element of multi-modal transportation planning. It provides a valuable transportation alternative for high volume travel corridors. Public transportation can improve the efficiency of arterial streets because fewer vehicles are required on the road to serve the same number of trips. When faced with costly road improvement or construction difficulties, concerted trip reduction programs can add years of life to a roadway's capacity. Improvements to air quality can also be achieved by the net reduction of motor vehicle emissions. Public transportation can also play an important role in reducing congestion and parking requirements in high demand areas such as the downtown.⁹

6.4.3 COMMUNITY MOBILITY ⁹

Public transportation improves mobility for a wide range of the traveling public. School age children can use public transportation for trips to school, after-school activities, or recreational pursuits. Likewise, there are many other segments of the population that either don't have a car (many for financial reasons), are unable to drive or would simply prefer to let someone else do the driving. Seniors who need to make unscheduled trips for shopping, medical or other trips have added flexibility to augment their Dial-a-Ride activity. Workers of all ages can get to their jobs without owning or relying on a car. Thus, public transportation is a valuable service that fills a much broader function than solely trip reduction. It provides mobility for those without cars as well as being an alternative to the automobile for many travel needs of the community. ⁹

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.4.4 PUBLIC TRANSPORTATION FACILITY DESIGN ⁹

6.4.4.1 Transit Centers ⁹

Transit centers are locations where several transit vehicles converge for the purpose of passenger transfer. This creates a very efficient, convenient and safe method of exchanging people between transit vehicles. This can also provide a location and opportunity where several inter- and intracity transportation services can meet to exchange passengers. It is desirable to coordinate public transportation operations such that all vehicles meet at a transit center at close to the same scheduled time. This allows passengers to make easy transfers without a long wait. ⁹

The existing transit center on NE Hawthorne Avenue, between 3rd and 4th streets, is currently the *interim* transit center location. Further evaluation of the effectiveness of this site should be conducted to determine whether it will meet longer-term Transit Center needs. A transit center located in the downtown can also provide a convenient connection to the many governmental, banking and shopping activities that are located in this focused business district as well as provide a good location for a central point of operation. Thus, a transit center is planned to be located in the downtown area to serve this function. ⁹

In designing a transit center, the location of the facility should provide for orderly circulation and accessibility of all types of transit vehicles, while minimizing the conflict with other traffic flow. The center should be located to minimize the number of pedestrian and vehicle conflicts, and be easy to access by walking or bicycling. Bicycle parking facilities should be designed and located for safe and convenient use, and provided in adequate supply to meet demand. More study will be required to determine the best long-term candidate location(s) and spatial requirements of facilities necessary to serve this important transportation system function. ⁹

6.4.4.2 Major Transit Stops ⁹

Major transit stops are locations along the transit system that are important to the functioning of the system and provide a high level, volume or frequency of transit service. Additional transit related amenities and pedestrian facilities should be provided to accommodate the differing types of demand. Adjoining developments should be encouraged to provide transit-friendly design elements that facilitate bus movements and convenient pedestrian access to the major transit stop. ⁹

At the present, the following are proposed as major transit stops; the downtown transit center, St. Charles Medical Center and Central Oregon Community College. Also as the system grows, evaluation of major transit stops in the northern and southern reaches of the Bend urban area should be conducted. Consideration should also be given to planning for a functional regional inter-modal facility where an efficient connection between local and regional trip activity can occur (See: TSP 5.5.2 *Inter-city Transit*). Additional major transit stops may be defined as the system matures and other destinations with high transit ridership potential are identified. ⁹

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.4.4.3 Transit Friendly Design⁹

Transit friendly design is an important element in the encouragement of transit trips. Access to transit stops must feel safe and be convenient. The construction of sidewalks and accessways helps to assure that the walking link of the transit trip is a safe and pleasant experience. The Bend Urban Area TSP was recently amended⁶ (by Ordinance NS 2026) to ensure development of walking and bicycling corridors on approximately a one-quarter mile transportation system grid.⁹

As routes are planned and local transit stops are located throughout the system, pullout lanes should be considered for bus stops to permit buses to pull-out of the traffic flow on heavier traveled arterial streets. Constructing suitable and convenient bike parking and providing buses equipped with bike racks will also encourage longer distance inter-modal trips to connect with transit. Providing benches, shelters and lighting at bus stops can also increase the comfort of transit users.⁹

6.4.4.4 Land Use Organization (transit oriented)⁹

Land use organization that situates high-density residential, mixed-use, entertainment and employment concentrations along transit routes is an important strategy that supports transit use. Additionally, site design elements such as building layout that sites structures in close proximity to the street and provides convenient pedestrian corridors, will also help to promote transit trip activity. Bend's General Plan typically designates the types of land uses; high-density, mixed-use and commercial activities, along the arterial and collector street system that is likely to have future transit service.⁹

The city of Bend also adopted a new Development Code (Ordinance No. 2016), in 2006, that has incorporated the transit friendly site design (for all land use development) objectives of the State Transportation Planning Rule (OAR 660-012).⁹

6.4.4.5 Park and Ride Lots⁹

Park and ride lots, when strategically located, can support both public transportation and rideshare activities. If park and ride lots are located on the edge of the city, they can conveniently serve both directions of travel into and out of the urban area. Park and ride lots also provide a meeting place for car pools and a location for motorists to access a public transportation system. Park and ride lots can either be publicly constructed facilities, or more commonly, a partnership between public and private property interests, typically requiring a cooperative use agreement with the landowner. Shopping centers, churches, or the like, commonly have large parking lots that are underutilized during the day, making park and ride activity complementary with the business demands of the property owner. Van or shuttle systems can also incorporate park and ride lots into a parking management plan by shuttling employees to the work place. This can help to minimize localized parking demand or impacts generated by employee traffic.⁹

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Bend currently has two existing designated Park and Ride lots and coordination effort is continuing between the City and the Commute Options Working Group to identify and secure other facilities for this function [See also: Section 3.4.2]. Work continues to identify, locate and secure other candidate park and ride lots through out the Bend area. The highest priority areas are at the north and south entries to the City along or near Highways 97 and 20.⁹

6.4.4.6 Transit Trunk Routes and Transitways⁹

Trunk routes are transit routes that normally maintain a higher level of transit service. Greater service levels are achieved by providing more frequent headways (times between buses) either by designating overlapping bus routes down the same street or by running a greater number of, or larger buses along the trunk route. In larger cities, trunk routes also deliver riders from outlying areas to *activity centers* where riders may need to transfer to a feeder bus that continues on to the core area. These larger urbanized areas may also have lesser trunk routes that travel exclusively *between* these outlying activity centers. Trunk routes typically provide transit service for specific high ridership demand hours of the day/days of the week. As trunk route stops or stations typically have more ridership activity, they often have greater waiting capacity (i.e., larger shelters) and other rider amenities (i.e., pay phones, drinking fountains, route information/maps, ticketing equipment, scheduling monitors, etc.).⁹

Transitways are very specialized trunk routes that provide very high levels of transit service. Transit is normally given a very high priority along transitways to enhance transit service levels. This is often accomplished by making improvements for transit travel that will optimize travel speeds and/or reduce travel delay/times. Examples of typical transitway features are; exclusive transit travel lanes or shared use of High Occupancy Vehicle (HOV) lanes with other multi-passenger vehicle traffic (commonly found in large metropolitan areas in conjunction with freeway systems), bus rapid transit systems (typically buses running along “bus only” lanes that are often located within separate right-of-ways, traffic signal/queue-bus bypass lanes and/or other transit preferential treatments).⁹

The Bend urban area, for the most part, is not geographically large enough or experiencing the type of traffic delays or congestion points that will likely warrant the designation and/or improvement of transit trunk or transitway routes within the planning period. Should conditions warrant this form of transit operation, the most likely candidate corridors for consideration of this type of express transit service would possibly be the main east-west route between C.O.C.C. and St. Charles M.C. and a north-south route in the center of the city.⁹

6.4.4.7 Transit System Implementation⁹

The city of Bend is currently providing an active pilot fixed-route transit system along seven routes through-out the City and a companion paratransit, Dial-a-Ride (DAR) service. Federal law requires the paratransit service provide coverage within a 3/4 mile of any fixed-route. The City has chosen to continue to serve the entirety of the City with DAR service in order to better accommodate the needs of its low income senior citizens and the disabled population.⁹

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Expansions to this public transportation system will be considered by the City based on an evaluation of the pilot transit project and subject to the availability of funding necessary to support transit service. An alternative to a City funded public transportation system would be the successful formation of a local or regional transit district. To date, the affected taxing district area has not provided the necessary voter support to establish this alternative service provider and the requisite funding mechanisms.⁹

The current strategy of implementing public transportation service shall be as depicted in the *Transit Service Phasing Strategy* that is articulated in TSP Chapter 5.5.2.4.⁹

6.5 STREET SYSTEM

The street network is the basis of the transportation system. It provides the framework for serving most anticipated modes of transportation and the planned land uses. Bend's transportation system has been planned and developed to meet the goals and objectives of the General Plan.

The street system is composed of a wide range of arterial, collector and local streets. The major street system consists of multi-modal transportation corridors providing space for sidewalks, bike lanes, transit routes, and a wide range of other motorized vehicles. This functional classification system provides a basis for the location and function of roadways shown in the Bend Urban Area Roadway System Plan (Map Exhibit B). This Plan is based on an evaluation of needs for a 20-year planning horizon (*Bend Transportation Model Update*, June 2000, Appendix F). The Plan also accounts for system needs beyond the planning period and the need to preserve certain corridors for the future.

The circulation plan designates a system of major streets that are necessary to move people and goods safely and conveniently within the urban area. The system is depicted on the Roadway System Plan Map as expressways, principal arterials, major and minor arterials, and major collector streets. In many instances, the alignments depict a generalized corridor, and precise alignments of future streets will be determined after further study and engineering analysis, or during the development of vacant properties.

The road system is based generally on a spacing of one mile for arterials and one-half mile for collectors. The precise alignment for new streets must be defined as development occurs. In some areas, additional collector or arterial streets beyond those shown on the plan map may need to be established as the community grows. The City would establish the location of additional streets as part of the land development process and Street System Plan amendments made as necessary. It is extremely important that adequate rights-of-way are secured as development or redevelopment occurs along these designated corridors to protect these future roadways.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.5.1 ROADWAY CLASSIFICATIONS

6.5.1.1 Expressways

Expressways are roadways designed to carry large volumes of traffic at moderate to high speeds with limited traffic flow interruption. As currently defined, expressways limit direct property access. In the situation of the urban sections of Highway 20 and 97 designated as expressways, established driveway access points are presently permitted on a case by case basis until alternative access becomes available. The Bend Parkway, including the North Corridor extension, is designed by ODOT with limited roadway access to preserve capacity and provide improved safety, and to accommodate the travel needs of the public. Grade separations, interchanges (at major intersections) and raised medians (along much of its length) are being included in the preferred alternative project to ensure that the capacity and safety of the route is maintained well into the future. Expressways will provide for both through trips and trips within the urban area.¹²

The Expressway classification may change or be modified pending the outcomes of the Transportation Reinvestment Innovation and Planning for US 97 in Central Oregon Study (TRIP 97) phase I. TRIP 97 may include performance measures that could lead the Oregon Transportation Commission or the Oregon Legislature to amend the Oregon Highway Plan (OHP) policies, including the Expressway classification for Highway 97 in the City. These changes could also influence the planning concept and future design of the Parkway Extension.¹²

When a final land use or limited land use decision determines that a right-turn lane will improve, maintain or prevent further degradation of an applicable performance standard for the intersection of an arterial with another arterial or the intersection of an arterial with an expressway, the right-turn lane shall be considered allowed by the TSP at the appropriate location, provided that if the need for the right-turn lane is caused by a specific application, the applicant shall be responsible for full payment of the costs associated with construction of the right-turn lane.²

Expressways in the Bend urban area include U.S. Highway 20 north of the intersection with U.S. Highway 97 (the “wyé” on the north end of town)¹³ and all of U.S. Highway 97 (including the Parkway). [The “old” portions of Highway 97, (pre-Parkway era) are principal arterials (this includes Highway 20, between the north “wyé” and the east city limits¹³, and Third Street, between Greenwood and the south Parkway intersection.)]

Expressway Descriptions:

The Bend Parkway is a part of the National Highway System and also classified as a Freight Route in the Oregon Highway Plan. The goal of this system is to provide for the economic growth of Oregon by moving traffic safely and efficiently between geographic areas within Oregon and between Oregon and adjacent states. Also, the Parkway is an integral part of the Bend urban area transportation grid. The Bend Parkway provides connectivity to the largest employment and population centers in Central Oregon.¹²

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The existing Parkway alignment begins northeasterly of the “Sisters” (Highway 20/97) interchange. It extends southward immediately west of the Burlington-Northern Santa Fe railroad, then crosses East 3rd Street south of Butler Market Road. It then follows Second Street to Thurston Avenue where it crosses over Division Street. From that point, it continues west of, and parallel to, Highway 97. The Parkway re-connects with Highway 97 south of Murphy Road. When the Parkway was completed, the U.S. Highway 97 designation moved from the existing East 3rd Street corridor to the Parkway (3rd Street retained the “U. S. Highway 20” designation south to Greenwood Avenue. All of Third Street retained a Business 97 designation).¹²

The City, County, and the State adopted an access management agreement and policy for the existing Parkway corridor. The plan and policy provide for protection of the capacity of the new route, protection for east-west arterial traffic movements and the overall safety of the traveling public.¹²

Future planned improvements will extend the Parkway to the northern Urban Growth Boundary (UGB), along a new U.S. 97 alignment parallel with the BNSF Railway line and connected to 3rd Street at the UGB with a signalized intersection.¹²

Grade separations are planned on the Parkway at all intersections with the arterial street system between the junction of U.S. Highways 97 and 20, on the north, and Reed Market Road on the south. For that portion of the Parkway, only the Revere Avenue, Colorado Avenue, and Reed Market Road interchanges provide Parkway access and egress in all directions. The Revere Avenue-Hill Street route will become the main north arterial-street connection to the downtown. An exception to the grade separated design occurs near Greenwood and Franklin avenues. While these arterial streets pass under the Parkway, Lafayette and Hawthorne avenues will serve as the secondary access streets to the downtown and are connected at-grade on the western side of the Parkway. These streets will be limited to right in/out (i.e., no left turns) with the Parkway. If future capacity or safety issues occur related to these intersections, ODOT may choose to disconnect them from the Parkway. These access streets also serve as connections to Greenwood and Franklin avenues. This deviation from the normal expressway design is due to the limitations created by the Burlington Northern Santa Fe (BNSF) Railroad that is located immediately to the east of the Parkway, as well as to provide access to the downtown.¹²

In the autumn of 2001, the southern section of the Bend Parkway opened to traffic. Unlike the northern and central sections, most of the intersections were built at-grade instead of interchanges.^{7,12} The original plan for the Bend Parkway assumed that the at-grade connections would either be grade-separated or closed when capacity or safety problems warranted.⁷ South of Colorado Avenue, Powers Road, Pinebrook Boulevard, and the south intersection with old Highway 97 intersect the Parkway with at-grade signalized intersections. Other intersections include various combinations of turn restrictions. The west leg of Truman Avenue, the east leg of Reed Lane and Badger Road (on both sides) intersect the Parkway at grade but are limited to right-in and right-out turn conditions (raised medians prohibit lefts).⁷ Longer-term strategies include the grade separation and/or elimination of street connections to the Parkway as

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

conditions may warrant and resources are dedicated to the development and implementation of local traffic circulation and as Parkway access alternatives are developed.

In the summer of 2001, the South Bend Parkway Refinement Study was started to explore future options for replacing the at-grade intersections. The purpose of the refinement study was to help develop a detailed improvement and management plan for the southern section of the Bend Parkway from Powers Road to Bend's southern urban growth boundary. The South Bend Parkway Refinement Study encompassed City of Bend and State of Oregon transportation facilities. The study area extended from just north of Powers Road to just south of the Baker Road interchange with US Highway 97. The study area also extended from Brookwood Boulevard on the west to Parrell Road on the east. A joint ODOT and City of Bend project development team evaluated thirteen long-term alternatives, including a no-build, for the study. Of the twelve build alternatives, three were selected (Alternatives A, H and H-Modified) by the project development team to forward as alternatives to be further analyzed. All of the build alternatives included these features:⁷

- Construct an interchange at Powers Road;
- Close the Badger Road connection to the Parkway;
- Restrict or close the Pinebrook Boulevard connection;
- Murphy Road realigned to the south and connected to Brookwood Boulevard;
- Ponderosa Avenue / China Hat Road intersection converted to right-in/right-out with acceleration lanes;
- Brookwood Boulevard widened to four lanes through the study area; and
- Powers Road widened to four lanes between Brookwood Boulevard and Third Street.

The recommended alternative was H-Modified with Option 1, and includes the features listed above, plus the following:⁷

- Directional fly-over from southbound Third Street to southbound US Highway 97;
- Southbound off-ramp from the Bend Parkway to the frontage road; and
- Northbound loop on-ramp from Third Street to the Bend Parkway.

The final alternative selected by the Oregon Transportation Commission (OTC) and the Bend City Council will be amended into the City of Bend Transportation System Plan (TSP). It is the desire of the OTC and ODOT that all future projects need to be identified in acknowledged TSPs to begin the traditional project development process. Once the preferred alternative is in Bend's TSP, the project development process can start to fully design and construct the alternative as funding becomes available.⁷

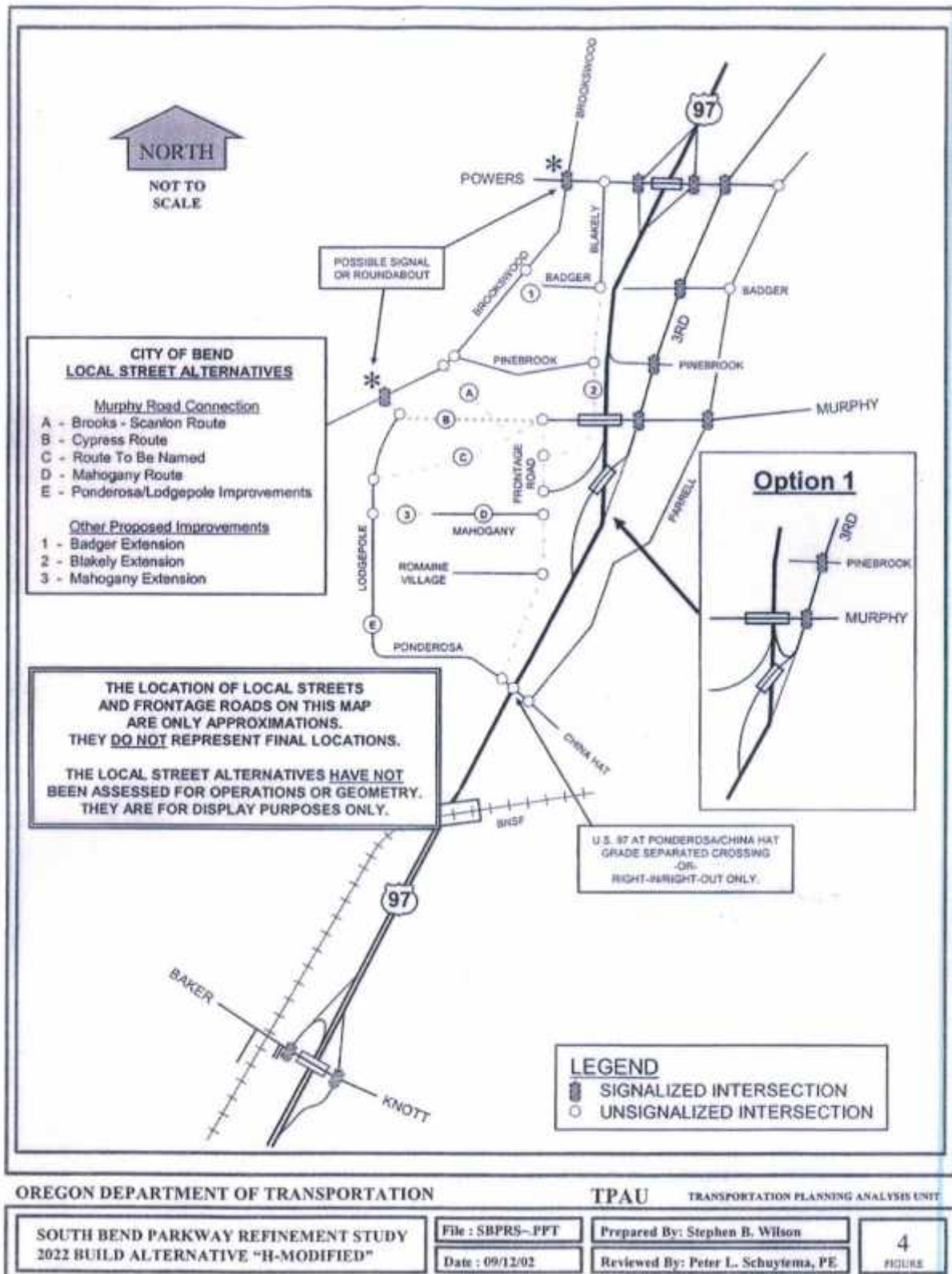
In 2003, following years of public meetings, the OTC and the City of Bend selected Alternative H-Modified with Option 1 for the South Parkway Refinement. Alternative H-Modified with Option 1 is shown in Figure 26A. The selection of this alternative came with several conditions that needed to be satisfied prior to implementing the plan. Below are the conditions:⁷

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- Select the alignment for the realigned Murphy Road to extend west to Brookwood Boulevard;
- Select the alignment for the frontage road west of the Parkway to connect Powers Road to Ponderosa Drive;
- Identify the timing of the right-in/right-out configuration for Ponderosa Drive / China Hat Road and US Highway 97;
- Identify the improvements needed on Powers Road between Third Street and Brookwood Boulevard;
- Identify the improvements needed on Brookwood Boulevard from Murphy Road to Powers Road;
- Identify the improvements needed on Parrell Road between Powers Road and China Hat Road; and
- Select the alignment for the frontage road from Ponderosa Drive south to Baker Road.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 26 a
South Bend Parkway Refinement Study
2022 Build Alternative “H-Modified”⁷



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

To meet those conditions, in March 2005, the City of Bend initiated the Murphy Crossing Refinement Plan. Over a three month period of time, stakeholder and property owner interviews plus two public meetings took place. From this public process a preferred design alternative emerged. The preferred plan proposes a local street plan consistent with the OTC conditions and a land use plan that will require new zoning designations within the study area. Based on the preferred alternative plan that came out of the Murphy Crossing Refinement Plan, the City Council authorized staff to proceed with the initiation and adoption of a refinement plan for the Murphy Crossing area in August 2005. Several adjoining properties expressed interest in becoming part of the refinement plan area. These properties complement the refinement plan area and have been incorporated into the plan. Staff is proposing to create a refinement plan overlay for approximately 102.75 acres. The plan will include Zoning Map and General Plan Map amendments to re-designate the existing Urban Low Density Residential (RL), Urban Standard Density Residential (RS) and Highway Commercial (CH) zoning to Urban Standard Density Residential (RS), Urban Medium Density Residential (RM), Mixed Employment (ME) and General Commercial (CG). The proposal will also require a Text Amendment to the Zoning Ordinance to add the new Murphy Crossing Refinement Plan, an amendment to the City's Transportation System Plan text and the Transportation System Plan Map to locate the Murphy Road over-crossing alignment and the frontage road alignment.⁷

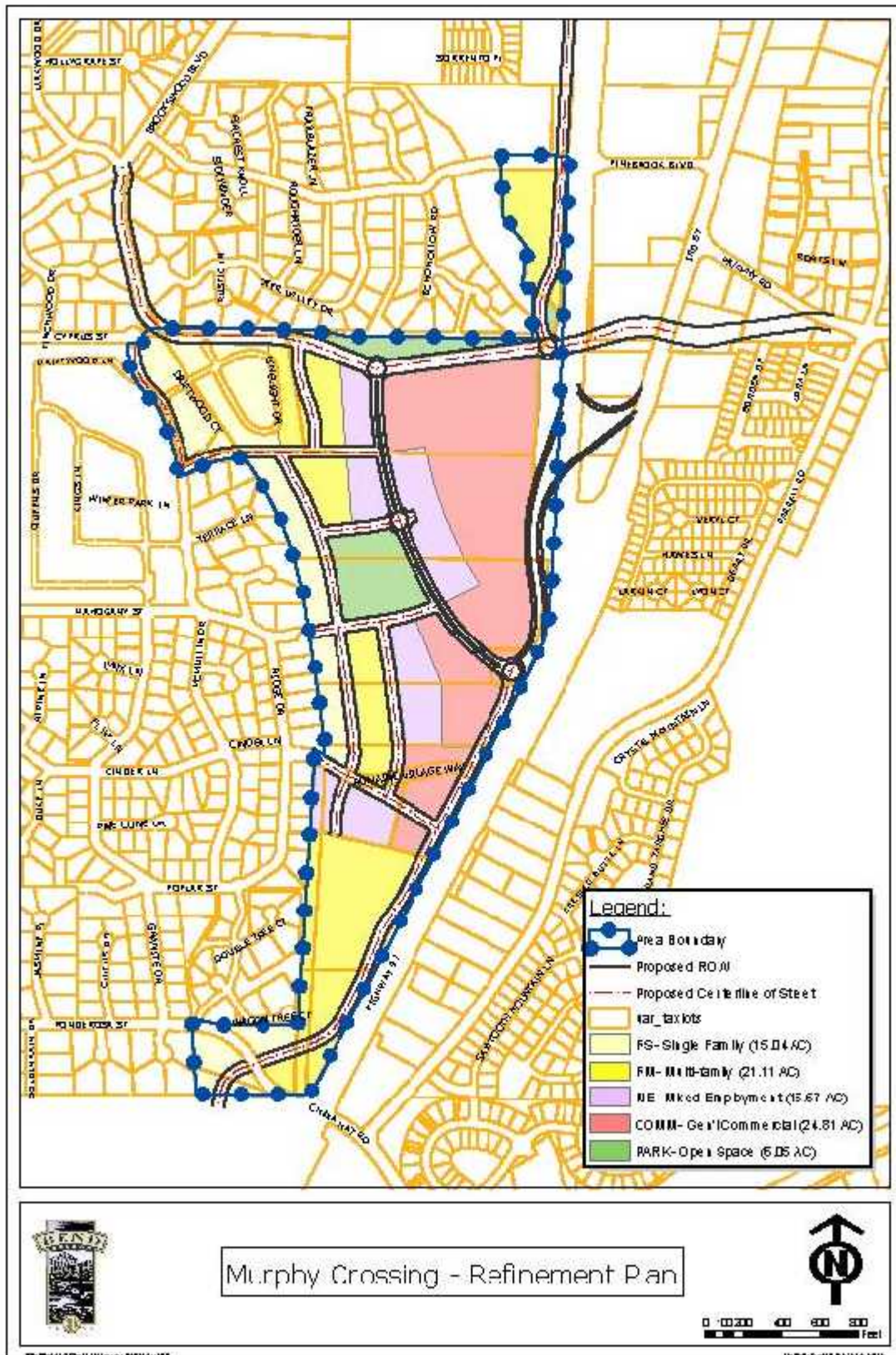
Staff has continued to meet with the area property owners to refine the preferred plan to address access issues raised by ODOT. The State and local street system in the Murphy Crossing Preferred Plan is shown in Figure 26B.⁷

Concurrent with the Murphy Crossing project is a project lead by ODOT called the Interchange Area Management Plan (IAMP). The State will adopt a management plan for the south end of the Bend Parkway that will incorporate the land use designation identified by the Murphy Crossing Refinement Plan. As part of the IAMP, access within the planned area will be evaluated to determine if capacity and function will affect the level of service of the Bend Parkway. Ultimately the Murphy Crossing plan will be acknowledged by the OTC as part of the IAMP.⁷

The City has also initiated a corridor study for Murphy Road. The corridor study, which extends from 15th Street west to Brookwood Boulevard, will occur concurrently with the Murphy Crossing Overlay refinement plan. The corridor study will assist in determining the appropriate road design for future build-out in the area.⁷

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 26 b
Murphy Crossing – Preferred Plan⁷



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

One of the decisions made regarding the initial Parkway design was **not** to provide a full interchange with Greenwood Avenue as a direct connection between Highway 97 and Highway 20 East. This was due to a number of considerations that included cost, business displacement, aesthetics and interchange spacing, not to mention the difficulty in meeting the design constraints caused by the proximity of the railroad. Since that time, community discussion has continued that has supported this location as a better connection of the Parkway to Highway 20 – rather than to direct Highway 20 traffic down Third Street per the existing design. In the *Oregon Highway Plan*, “refinement plans” have been identified as a means of studying or resolving issues of this nature. If there is a desire in the future by local officials to pursue a more detailed discussion of highway-to-highway connection alternatives, ODOT has indicated a willingness to address this concern through the refinement plan process.

Bend Parkway North Corridor¹²

Since 2004, the Oregon Department of Transportation (ODOT) has been working with the City of Bend and Deschutes County to develop a long-range plan to reduce traffic congestion, improve traffic flow, and enhance public safety on US 97 between the Deschutes Market Road/Tumalo Junction interchange and the Empire Avenue interchange. The findings of the US 97 and US 20 Refinement Plan, completed in 2007, led ODOT and the Federal Highway Administration (FHWA) to embark on an Environmental Impact Statement (EIS) for the US 97 Bend North Corridor Project. Through the development of a Draft EIS (published in July 2011) and its extensive public and local agency involvement effort, a wide range of alternative solutions considered as part of the US 97 Bend North Corridor Project was narrowed to two alternatives. Reflecting public feedback and some modifications from this earlier work, there is now one preferred alternative under consideration (East DS2 Modified).¹²

ODOT and FHWA propose to improve a segment of US 97 between the Deschutes Market Road/Tumalo Junction interchange and the Empire Avenue interchange by functionally extending the Bend Parkway to the northern UGB. The project area impacts an approximate six-mile corridor. The preferred alternative for the project would reroute US 97, from just north of the current intersection of US 97 at Grandview Drive to approximately Empire Avenue, east of its current alignment and adjacent to the existing railroad tracks. For this segment, the current US 97 roadway would become an extension of 3rd Street and would have the future designation of principal arterial. A new at-grade signalized intersection would be constructed in the northern portion of the corridor, just south of Deschutes Memorial Gardens and Chapel. The estimated cost for the preferred alternative is \$120–\$180 million, which includes right of way acquisition and construction costs.¹²

The following are elements of the preferred alternative:¹²

- New US 97 alignment extends Bend Parkway north from US 97/Empire interchange to the 2013 UGB.
- A left northbound ramp from US 97 to 3rd Street and US 20 Sisters Loop Ramp.
- Grade separate Cooley Road from US 97 and the railroad.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- Current US 97 roadway becomes an extension of 3rd Street; future jurisdictional transfer to City of Bend once new US 97 is built. New 3rd Street is extended to intersect with US 97.
- New at-grade signal at 3rd Street and US 97 intersection on the north end of the project.
- Disconnect Loco Road and Grandview Drive from US 97 and connect to 3rd Street.
- Extend Britta Street north to Robal Road, west of US 20.
- New northbound auxiliary lane on US 97 between Butler Market Road and Empire Avenue, within the existing ODOT right of way.
- Intersection improvement at 3rd Street and Mervin Sampels Road.
- Improvements to Empire Avenue and the intersection of US20 and Empire Avenue.
- New signal at Empire and US 97 southbound on-ramp.
- Improvements to Mervin Sampels Road east and west of US 20.
- Improvements to the connection of Sherman Road and Nels Anderson Road.
- New local industrial street between NE Industrial Park Blvd to Nels Anderson north of Empire Ave.
- Intersection improvements at OB Riley Road and Empire Ave.
- New roundabout at 3rd Street and Loco Road.
- Intersection Improvement at Empire and Sherman Road
- Improvements to US 20 and the intersections at US20/Robal Road and US 20/ Cooley Road.
- Intersection Improvement at Cooley Road and Hunnell Road.
- Improvements to Cooley Road between Hunnell Road and Hunters Circle.

This preferred alternative provides a safe, affordable, long-term traffic solution for US 97 at the north end of Bend without significantly impacting rural lands west of Robal Road or north of the UGB. It also is a cost effective solution; the preferred alternative can be constructed incrementally (phased) to capture available funding. The final approved alternative will be constructed in phases to reflect limits on funding. The preferred alternative does not preclude local “midterm” solutions for traffic circulation and improvements to Cooley Road at US 97 and at Robal Lane.¹²

The City will coordinate with ODOT to conduct two project development and design studies: Robal Road corridor, and the Empire interchange area.¹²

The City will coordinate with ODOT to conduct a project development plan and design for the Robal Road area that includes but is not limited to public involvement and the study and analysis of the costs and benefits of a Robal Road connection to the preferred alternative. Future project costs, right of way impacts, local trip displacement impacts, land development, EIS updates, and TRIP 97 plan outcomes will greatly influence whether Robal Road is connected to the preferred alternative.¹²

The City will also coordinate with ODOT concerning the project development and design for the improvements at, and around the Empire interchange, to determine project phasing, costs, access, local trip displacement impacts, and road modifications. The Mervin Sampels

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

intersection improvements and connecting road improvements should be the first phase of the improvements in the Empire interchange area¹².

As the preferred alternative will be a phased project, future updates of traffic demand and other factors will allow the project to revisit the details of later phases of the project to ensure that it is cost effective and addresses both the regional and local circulation needs of the area.¹²

Key benefits to the transportation system include:¹²

- Additional capacity to accommodate future growth at Bend's north end.
- Additional direct connectivity for local trips into commercial areas and local city street network through the new 3rd Street/US 97 north intersection.
- Better Emergency Services access at Britta/Robal for the Bend Fire Department North Station & Training Center and also the Sheriff's Department.
- Added safety and efficient traffic management 3rd St & Mervin Sampels Road.
- Improved connectivity with local bike, pedestrian and transit plans.

ODOT anticipates that the Final EIS will be published in spring 2014. As a condition of securing FHWA's signature on the Final EIS for the project, the preferred alternative for the US 97 Bend North Corridor Project must be consistent with locally adopted plans.¹²

Several city street segments will be critical to the efficient function of the Parkway and careful review of development proposals and the regulation of access points along these streets is essential to protect the integrity of the expressway. Initial project construction may include the placement of raised medians along the first block of some of these streets to ensure safe and efficient operation of the Parkway. Also, as properties redevelop along these corridors, site access will be sought to re-orient to the adjacent alleys or side streets and not directly to the Parkway access streets, as much as practical.

These sensitive street segments for Parkway access include the following:

1. Empire Avenue between East 3rd Street and Boyd Acres Road,
2. Butler Market Road from East 3rd Street to the Parkway,
3. Revere Avenue from west of the Parkway/Hill St. signal for one block
4. Hill Street between Revere Avenue and Wall Street,
5. Lafayette and Hawthorne avenues between the Parkway and Hill Street*,
6. Colorado Avenue between Harriman and Hill streets,
7. Truman Avenue between Pelton Place and the Parkway*,
8. Reed Lane between the Parkway and East 3rd Street*,
9. Powers Road between Blakely Road and East 3rd Street*,
10. Badger Road between the Parkway and East 3rd Street*,
11. Pinebrook Boulevard between the Parkway and East 3rd Street*, and
12. Empire Avenue, between Third Street and US 97 South Bound ramp.¹²

*Note: These access restrictions would be rescinded if the street is disconnected from the Parkway.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Highway 20 - north of the Sisters interchange The portion of Highway 20, that enters the urban area from the northwest (from the town of Sisters), and intersects with U.S. Highway 97 at the northern intersection “wyé” (also the location of the Sisters-Parkway interchange).

Highway 20, from the northern UGB to the Sisters interchange, has two Westbound lanes and one Eastbound lane. In addition to the three-lane configuration there are left turn, acceleration and deceleration lanes at intersections. Ultimate roadway improvements will widen most sections of this highway to four and five lanes, as warranted. The only at-grade intersections planned for this section of roadway are at Cooley Road and Robal Lane. New driveway connections will not be permitted along this section of the highway. The two intersections will most likely meet traffic signal warrants during the 20-year planning period, depending upon the amount of growth that occurs within the immediate area. The State has asked that grade separation alternatives also be examined for future design solutions at these intersections. Access management and the consideration of frontage road development is needed on many portions of Highway 20. A frontage road system is currently shown on the transportation (roadway system) plan map between Cooley Road and Empire Avenue to the west of Highway 20.

Highway 97 - north of the Sisters interchange. The section of the highway, north of the Sisters interchange to the UGB, is five lanes with bike lanes. This portion of highway will continue to experience high traffic demands and TSM measures such as the construction of raised medians will be necessary to assure the carrying capacity and safe operation of the highway for both local and through trips.¹² Cooley Road will need to be grade-separated in the future.^{3,12} A frontage road has been constructed along the eastern side of the highway between Cooley Road and Robal Lane. This frontage road connects with Highway 97 at Robal Lane.¹²

An extension of 3rd Street is also planned to serve the area on the western side of the highway, within the UGB, to be located north of Cooley Road. This 3rd Street extension will provide a parallel arterial between Cooley Road and the UGB and will replace the north-south portion of the Clausen Road backage road, when completed. In order to maintain capacity and safety for this highway segment, a raised median is planned between the Parkway and the north UGB. The construction of a raised median will likely take place concurrent with the final phase of the northern Parkway improvements.¹²

Between Grandview Drive and Empire Avenue, US 97 would shift east to be immediately adjacent to the railroad tracks; the northbound and southbound travel lanes would be separated by a median barrier. US 97 would be grade-separated at Cooley Road. An undercrossing would be constructed for Cooley Road to pass under US 97 and the railroad tracks. There would be no connection to US 97 at Cooley Road. Third Street would extend north with the appropriate number of travel lanes to meet safety and mobility objectives with a median that would also serve as a turn lane. The new extension of 3rd Street would terminate at US 97, at an at-grade signalized intersection on the southeast side of the Deschutes Memorial Gardens and Chapel.¹²

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

No on- or off-ramp connections are planned between Cooley Road and the new US97 adjacent to the Railroad. However, interim (or shorter-term) improvements at Cooley Road may include connections to existing Highway 97.¹²

The section of old Highway 97, Third Street, between the new intersection located north of Cooley Road and Empire Avenue will be classified as a principal arterial when the full Parkway improvements are completed. Similar to the southern section of Third Street, this section of roadway will become designated as Business Route 97.¹²

Highway 97 - south of the Parkway The portion of Highway 97 south of the Parkway is a five-lane improvement with wide shoulders. This portion of highway will experience increased traffic volumes and TSM measures may be necessary to assure the carrying capacity and safe operation of the highway in the future. These TSM measures may include the construction of a raised median with channelization breaks (for left turns) to address these concerns. Land development adjacent to the highway should dedicate right of way, develop and direct access to an adjacent roadway or a frontage road system.⁷ As noted in the description of the Bend Parkway, ODOT and the City of Bend have evaluated alternatives that would extend Murphy Road to a point west of the Parkway (including grade separation) to meet a future frontage road (on the west side of the Parkway).⁷ Once this system is in place (see Figures 26A and 26B), the Parkway traffic signals at Pinebrook Blvd. and the south Highway 97 intersection should be removed.⁷ As a part of these system changes, the former street intersections should also be disconnected from the Parkway. Also, a grade separation of China Hat at Highway 97 may eventually be warranted. Development along this part of the highway should be monitored as it occurs. Further study of appropriate transportation system solutions should be conducted concurrent with new land development to ensure that the safety and capacity of the facility is maintained. Sidewalks will also need to be constructed along this section of highway as adjacent properties develop.

6.5.1.2 Principal Arterials

The principal arterials in the Bend urban area include all the non-expressway portions of the state highway system, except Century Drive (a minor arterial). The principal arterial roadways include 3rd Street and Highway 20 south of the Highway 97 and 20 intersection “wyé” to the east city limits¹³. These are primary highways, in addition to the expressways, that provide important roadway transportation linkages to (and through) the Bend area. The principal arterial system also carries high levels of truck traffic. Most of the trips (motorist and trucks from outside of the area) on the principal arterial system are destined to, or have stopovers in Bend. However, a small portion of the trips traveling these corridors has a regional or statewide destination and may pass through the community on these arterials without stopping.

The principal arterial system serves a statewide role and there are specific design, access management, and level of service requirements established by the Oregon Department of Transportation. These requirements are articulated in the *Oregon Highway Plan*^{B.17}. The Plan emphasizes the need to meet the functional criteria of the state system and the principal arterial system will also need to fulfill the city’s need to maintain a functional street grid network for the urban area.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

When a final land use or limited land use decision determines that a right-turn lane will improve, maintain or prevent further degradation of an applicable performance standard for the intersection of an arterial with another arterial or the intersection of an arterial with an expressway, the right-turn lane shall be considered allowed by the TSP at the appropriate location, provided that if the need for the right-turn lane is caused by a specific application, the applicant shall be responsible for full payment of the costs associated with construction of the right-turn lane.²

Principal Arterial Street Descriptions:

The principal arterial section of ***Highway 20*** begins at, and is south of, the Sisters interchange. It currently runs coincident with Highway 20 and turns east, following Greenwood Avenue to the east Bend city limits.¹³ Upon completion, the Parkway will be designated as *Highway 97* south of the Sisters interchange, and the existing route (following Third Street) will remain *Highway 20*.

From 12th Street eastward, the existing highway is five lanes around Pilot Butte to a point east of 27th Street.⁸ The roadway transitions back to a two-lane facility as it heads east outside of the UGB. No other intersections, between 15th Street and Purcell Boulevard, on Highway 20, are planned to have traffic signals. However, if subsequent refinement plans demonstrate an additional signal would improve the highway's function and safety, then another signal might be added consistent with the requirements of the Oregon Highway Plan (OHP) for signal spacing. Along portions of Highway 20, in particular east of Pilot Butte, access management and some frontage road construction should be sought in conjunction with adjacent land development and redevelopment.¹³

As a part of the Oregon Transportation Investment Act (OTIA) Program improvements implemented along this portion of Highway 20 (in the early 2000s), the City agreed to conduct a refinement level study of access management with affected businesses and property owners. It is envisioned that a plan would be adopted that would focus on a reduction/consolidation of access points and thus improve the capacity and safety factors along this portion of the highway and better fulfill the Mobility Standards of the OHP.⁸

Highway 20, from the Sisters interchange to Greenwood Avenue, is a four- and five-lane facility. This portion of highway currently carries the highest traffic volumes within the urban area near the Mt. Washington Drive/Butler Market Road intersection. The most common type of future roadway improvement along this section of Highway 20 will be the construction of turn lanes at intersections, or raised medians and acceleration/deceleration lanes at major driveways. This section of highway also has large gaps in the sidewalk system. Bike lanes are also absent and are needed along many roadway segments.

Highway 20 has traffic signals controlling most of the major intersections along its length. An additional traffic signal is planned at the intersection of Olney Avenue to improve local east-west traffic circulation. Also, transportation modeling of the intersection of Butler Market Road/Mt. Washington Drive at Highway 20 indicates that this intersection may continue to be a

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

source of congestion problems into the future, particularly as traffic volumes continue to grow over the next 20-years. Some improvements are planned on the west (the Mt. Washington Drive approach) of the intersection including a reconstructed bridge over the Deschutes River. In addition, *The Rivers Edge* development has been required to provide a corridor for a future local street bridge crossing below the irrigation diversion dam, in conjunction with future site development, but this exact location has not been determined. The location of this future bridge should be examined as a part of a comprehensive evaluation of traffic circulation solutions necessary to address the longer-term capacity needs for this section of the highway. From East 3rd eastward to 12th Street, Highway 20 is a five-lane facility. No specific capacity improvements are planned along this section of highway except the possible signalization of the intersection at NE Fourth Street and the implementation of other TSM strategies.

Access management and the consideration of frontage road development is needed on many portions of Highway 20. However, on most portions along the length of Highway 20, the opportunity to construct frontage roads is extremely limited due to the existing development patterns and limited available public right-of-way. The potential of restricting or closing individual accesses along the more urbanized portions of the highway, due to the abundance of existing driveways, is limited, too. Over the longer term, redevelopment of properties will provide opportunities to close and combine driveways, or to provide access via adjacent side streets. A raised median should be considered for installation on a principal arterial when any of the following occur (per ODOT recommendations):

1. Daily traffic counts exceed 28,000 vehicles per day,
2. In conjunction with reconstruction or modification projects, or
3. When operational, safety, or pedestrian needs warrant it.

East 3rd Street - south of Greenwood Avenue The section of East 3rd Street Avenue (also commonly known as: “South” 3rd Street), south of Greenwood, will remain a principal arterial after the Parkway is constructed. The jurisdiction of this street may be transferred to the City by the State - although more discussion is necessary to determine “how and when” this would occur. Third Street will remain a major business corridor within the urban area and traffic growth is expected to continue along the length of this principal arterial street.

The BNSF Railroad underpass on 3rd Street, located south of Burnside Street, is currently limited to two travel lanes. With the completion of the Parkway, the new roadway will provide immediate traffic congestion relief to this portion of 3rd Street. However, future traffic loading and the need for bike and pedestrian improvements to this section of 3rd Street will likely generate the need to provide other underpass improvements.

Third Street, south of Greenwood also has numerous gaps in the sidewalk and bike lane system, which will need to be completed. Furthermore, all of 3rd Street has been contemplated for other beautification and TSM improvements, after the Parkway is completed, to improve the appearance and performance of the roadway.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Principal Arterial - Transportation System Management Strategies

Highway access Access management, specifically the type that restricts driveway access points, is a technique that can bolster system capacity and improve highway safety. However, the construction of improvements that will limit left turn movements must be sensitive to existing development that relies on the convenience of roadway system access. Thus, the City and State should work cooperatively with businesses along the principal arterial street corridors to develop access management plans that will achieve the desired transportation system results and still fulfill business needs.

Signal Spacing Traffic signals and coordinated timing plans can improve or optimize traffic flow by providing a better grouping or “platooning” of traffic along arterial street corridors. Traffic signals can also improve gaps in traffic flow that facilitate access to the arterial system at intersecting streets and driveways between the signalized locations. It is therefore important that the location of traffic signals follow consistent spacing standards in order to fulfill the greatest system benefit. Traffic signals should not be utilized as a tool to facilitate access to selected land uses, such as high-volume, commercial land use trip generators, but as a part of an overall coordinated transportation system planning tool. In most cases, this will limit the location of traffic signals to intersecting arterial and collector streets.

6.5.1.3 Major Arterials

Major arterials are intended to serve as routes for travel between areas of major traffic generation and major activity centers, and residential and commercial areas. Trip lengths are commonly longer in nature along the major arterial street system. To fulfill this function, major arterial streets are normally spaced at 1-2 mile intervals. A greater emphasis on access control, than along minor arterials, will be sought on these facilities. Effort will be made to limit left turn movements on these roadways to controlled locations through the construction of raised medians.

Some segments of the major arterial street system may be constructed to four- or five-lane street widths, particularly at intersections to provide dedicated turn lanes, and sufficient right-of-way corridors (i.e., 100 feet wide) should be acquired to ensure that this type of future street design is feasible. Major arterials in the Bend urban area system include the following: Reed Market Road (east of Blakely Road), Empire Avenue (east of Highway 20/97) and East 27th Street (north of Reed Market Road).

When a final land use or limited land use decision determines that a right-turn lane will improve, maintain or prevent further degradation of an applicable performance standard for the intersection of an arterial with another arterial or the intersection of an arterial with an expressway, the right-turn lane shall be considered allowed by the TSP at the appropriate location, provided that if the need for the right-turn lane is caused by a specific application, the applicant shall be responsible for full payment of the costs associated with construction of the right-turn lane.²

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Major Arterial Street Descriptions

Reed Market Road, between Silver Lake Boulevard and East 3rd Street, will be improved in coordination with the Parkway project. This improvement will construct a new arterial roadway from Silver Lake Boulevard to the Parkway (depending on other timing circumstances with private development, this roadway improvement could be extended farther west to meet the Bond/Blakely Road corridor). Between East 3rd and 27th streets, Reed Market Road will ultimately be improved as a three to five-lane arterial with limited driveway access. Currently, there are some turn lane and bike lane improvements between East 3rd and 15th streets, but sidewalks are missing and are needed throughout most of this two-mile section of roadway. [Reed Market Road, east of 27th Street is designated as a major collector, for both the future and existing sections.]

The **East 27th Avenue** corridor, between Reed Market and Butler Market roads, is the north-south component of the major arterial system on the eastern side of town. The roadway is currently improved with two travel lanes, and some additional five-lane widening near Highway 20. There are discontinuous sections of sidewalk and bike lane improvements constructed between Neff and Butler Market roads. Additional roadway capacity, and the completion of pedestrian and bikeway improvements will be needed to fulfill the transportation system needs along the corridor. Significant portions of the “major arterial” segment of the 27th Street corridor will ultimately be improved to a five-lane roadway section. A final determination of the number of lanes required (and for what segments) will be determined during the roadway design process.

The extension of **NE Empire Avenue**, between Boyd Acres Road and East 27th Street, will help to complete the arterial street system on the eastern side of Bend and provide a valuable east-west roadway connection to the Parkway. The Empire Avenue grade separation, over the Parkway, has been built to accommodate a future five-lane roadway. Other sections of Empire Avenue, east of Highway 97, are currently improved with two and three-lane roadway sections. This includes the short segment of Empire Avenue that has recently been constructed between NE 18th Street and Yeoman Avenue. Sidewalks and bike lanes are also missing and needed along most of this corridor. Significant portions of the “major arterial” segment of the Empire Avenue corridor will ultimately be improved to a five-lane roadway section. A final determination of the number of lanes required (and for what segments) will be determined during the roadway design process.

6.5.1.4 Minor Arterials⁹

The minor arterial street linkages planned for the urban area are illustrated on the Roadway System Plan Map (and are also listed in Table 11). As the community grows beyond the planning period or there are other changes in land use, additional arterial streets may be determined necessary. The alignments of new arterial streets on the Plan map are general in nature and refinements may occur through the land development process, or as otherwise determined by the City.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The minor arterial street network interconnects and augments the principal and major arterial street system. Trip lengths are normally of moderate distances. Minor arterials often border and establish the edge of neighborhoods. Minor arterials often support local or neighborhood commercial areas. Pedestrian and bicycle traffic is frequent on these streets. Minor arterials are generally spaced at about one-mile intervals, although in the more dense areas of the community minor arterials are commonly located at a greater frequency. Under ideal circumstances, access to the minor arterial street should be limited to prescribed spacing intervals and direct driveway access points should be limited as much as practical.

The minor arterial street system will need to be improved to address a wide range of transportation system demands, including pedestrians, bikes, transit vehicles and motor vehicles. Minor arterial streets range in width from two to four-travel lane roadways. New or reconstructed minor arterial street widths will be based on the determination of the improvement needs of all modes of travel.

Because minor arterial streets usually serve neighborhoods and support high levels of pedestrian and bicycle traffic, the addition of lanes to serve motor vehicles must be carefully balanced against the impacts to other forms of travel and the environment that they pass through. In the event that alternatives to street widening have been exhausted and additional lanes are necessary, all appropriate measures should be taken to consider design alternatives and solutions to mitigate the impacts created on the adjoining neighborhood or the abutting businesses. Landscaped center medians, access management, pedestrian refuges, and the provision of street trees, among others, are examples of measures that can be taken to mitigate the impacts of road widening.

When a final land use or limited land use decision determines that a right-turn lane will improve, maintain or prevent further degradation of an applicable performance standard for the intersection of an arterial with another arterial or the intersection of an arterial with an expressway, the right-turn lane shall be considered allowed by the TSP at the appropriate location, provided that if the need for the right-turn lane is caused by a specific application, the applicant shall be responsible for full payment of the costs associated with construction of the right-turn lane.²

Central City - Minor Arterial Street Widening Limitation⁴

Recent transportation and land use studies and reports, such as; the *Newport Avenue Corridor Study*, 2000, and the *Use of Land for Transportation Alternatives (ULTRA)*, 2003, [although neither have been officially adopted by the City] have supported the concept of minimizing roadway widening in exchange for preserving specific community qualities. Thus, the studies have advocated the development of transportation corridor improvements that emphasize community and streetscape design that will continue to foster and enable non automobile modes of travel. Simply stated, these studies have concluded that this alternative transportation/land use development scenario may be a more prudent strategy and may actually help reduce the demand on roadway capacity and therefore overcome a need to widen these particular arterial street corridors.⁴

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Widening arterial streets, although it may provide important added roadway capacity to serve automobile demand, can have too detrimental of an impact on the neighborhoods that are impacted by the roadway widening. One result of street widening is that it can develop an environment that may be counterproductive to fully developing and realizing the benefits of non automobile alternatives for a specific corridor. Many citizens that have actively participated in public workshops, related to these previously mentioned studies, have indicated that they prefer placing a higher value on preserving the existing character of these neighborhoods and are, for the most part, willing to endure higher roadway congestion levels and travel delay in exchange for preservation of the affected neighborhoods.⁴

For these reasons, the Bend Transportation System Plan (TSP) seeks to acknowledge specific corridors within unique areas of the central city where the combination of existing land uses; residential, commercial and institutional, and the presence of a well-connected system of local streets and accessways, that provide a diverse range of travel options and mode choices, may make minor arterial roadway widening unnecessary and/or less desirable. Thus, the following minor arterial corridors are identified by the Plan as “*not being authorized for lane expansion*” (unless subsequent study has been supported by an amendment to the Plan to permit the roadway widening, an existing safety issue has been identified and approved by the City Council that will be resolved by a widening project, or the improvement is otherwise exempted by TSP Street Policy 21):⁴

West Central City:

- NW 14th Street, between Newport and Galveston avenues
- NW Newport Avenue, between 14th Street and Wall Street
- NW Galveston Avenue, between 14th Street and Riverside Avenue

Downtown Central City:

- NW Greenwood Avenue, between Wall Street and the Parkway
- NW Riverside Avenue, between Tumalo and Franklin avenues & NW Franklin Avenue, between Wall Street and the Parkway
- NW Wall Street, between Greenwood and Franklin avenues & NW Bond Street, between Greenwood and Franklin avenues

East Central City:

- NE 8th Street, between Olney/Penn and Franklin avenues
- NE Olney Avenue, between 4th and 8th streets
- NE Franklin Avenue, between 4th and 11th streets & NE Bear Creek Road (including the 11th St. extension), between Franklin Avenue and 15th Street

Minor Arterial Street Descriptions

Southern River Crossing Reed Market Road, between Century Drive and **Brookwood Blvd/Bond Avenue** is designated as a minor arterial street. The alignment generally extends along the old log deck extending westerly to a narrow point on the river and continues along an old logging road grade to the intersection of Mt. Washington and Century drives.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The concept of extending a new arterial street across the Deschutes River, south of the mill, can be traced back to the 1950s. This alignment appears on the early City zoning plans of the 1960s and was later incorporated in the Bend Urban Area General Plan, in the late 1970s. The historic selection of the Reed Market Road alignment as the planned southern river crossing was based on a number of factors:

1. The alignment skirted the area occupied by Bend's last lumber mill. This was the edge of the industrial zoned properties where large equipment generated loud noise and dust impacts.
2. The alignment was a continuation of the major roadway system serving the entire urban area, and the bridge would complete this east-west roadway linkage across the river.
3. Ease of roadway construction. This is attributed to the narrow river crossing width, the fact that it follows preexisting roadway grades to Century Drive on the western side of the river, and it crossed an already disturbed log deck area on the eastern side.
4. The alignment was largely undeveloped except for the mill activities.

Over the course of the preparation of the General Plan update, City Council held extensive discussions on the subject of alternative river crossing locations and designs. In 1998, in response to these deliberations on a bridge location, Council made a decision that the extension of Reed Market Road should remain as shown on the plan. Stating further that it should be constructed as a two-lane roadway (i.e., the roadway should provide one travel lane in each direction, plus bike lanes and sidewalks, with raised medians and turn lanes permitted where necessary).

City Council's direction also supported the development of another "local" street bridge to be constructed within the Old Mill site at a location further downstream from the planned arterial bridge. The intent of this local bridge was to accommodate the traffic generated by the Old Mill development and to reduce the burden on adjoining arterial river crossings. The City shall involve the public, the Park District and other governmental agencies in developing a roadway design for the southern river crossing that complements the natural features of the river area.

Cooley Road will provide east-west circulation from Highway 20 east to Deschutes Market Road. Safe, efficient traffic movement on Cooley Road is vital in order to accommodate on-going development in the vicinity, as well as future industrial uses on UGB expansion sites.^{3, 12} It will eventually become a major access route to the City's industrial park reserve area. The existing road now terminates at the southern boundary of the industrial reserve property (City owned) and will need to be extended to the east as future development occurs. Long-term plans include grade separating Cooley Road from US 97 and the railroad tracks.¹² Sidewalk and bike lane facilities are missing along most portions of Cooley Road and will be needed as other roadway improvements are made. Development along this part of Cooley Road should be carefully managed to ensure that the function of the Cooley/Highway 97 intersection is not compromised.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Located immediately north of Cascade Village, **Robal Lane** provides an arterial connection between Highway 20 and existing Highway 97. In addition, **Hunnel Road** is planned to extend north from Robal Lane to Cooley Road. The combination of the two arterials will provide a grid of streets that will help reduce demands on the two state highways, so long as there remains viable access between the highways and the commercial center.¹² These arterial streets will serve as frontage roads for the developing commercial properties situated between Cooley Road and the two highways.

Empire Avenue, between O.B. Riley Road and Highway 20, is a minor arterial. This roadway will be improved to a three-lane road width with some additional turn lane improvements necessary; at Highway 20, to accommodate vehicle turn movement demand. The close proximity of the Jamison Street (i.e., the frontage road paralleling Highway 20, to the west) intersection to the Highway 20/Empire Avenue intersection could be the source of future safety or capacity issues. If these problems materialize, then a raised median on Empire Avenue may be needed to eliminate problem vehicle turns to/from Jamison Street.

Butler Market Road has been improved with three lanes from Highway 97 to East 27th Street. The improvements include bike lanes, but sidewalks are missing and needed along many segments. Portions of Butler Market Road may need to be widened to five lanes in the future.

Revere Avenue, between Hill and 8th streets, will experience significant traffic increases due to the fact it will be one of the few full access interchanges to the Parkway. Widening improvements are needed to complete the arterial to a five-lane road width and to provide sidewalk and bike-lane facilities. Another future issue on Revere is the at-grade crossing of the BNSF Railroad. Revere is one of the few remaining at-grade railroad crossings in Bend and the close proximity of the Parkway; Division and 3rd streets will make a future grade separation very difficult. This problem location is further compounded by the recent merger of the Burlington Northern and Santa Fe railroads, which reportedly will result eventually in more trains being routed through the Central Oregon area. This will likely create a greater incidence of train-induced traffic delays. The combined impact of increased train and traffic loads will likely generate capacity problems for this crossing in the future.

Hill and Wall streets, from Revere to Lafayette, will also see significant traffic impact after the Parkway is completed. This will be a major northern entry into the downtown from the Parkway. There will be a need for additional road capacity, bikeway and pedestrian improvements. The route passes by Pioneer Park and impacts on the park must be minimized.

The **Portland/Olney/Penn/Neff** corridor will provide an improved east-west route across the entire community and will enhance access to St. Charles Medical Center from the west side of town. This route passes by Pilot Butte Middle School and near Juniper Elementary schools. Sidewalk and bike lane improvements are needed on many portions of the corridor.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Franklin Avenue needs to be improved to four and five lanes from the railroad underpass to NE Fourth or Fifth streets. Some sections of sidewalk are also missing. Franklin Avenue is also proposed to connect to a (future) southern extension of **NE 11th Street**. This new road extension would follow along the west edge of the cemetery to Bear Creek Road. This new roadway would replace the current use of 10th Street as an arterial roadway between Franklin Avenue and Bear Creek Road.

The need to widen the Franklin Avenue underpass of the Parkway/BNSF Railroad should be monitored as traffic growth occurs in the City. Provided other east-west transportation improvements occur in the City, widening this under crossing may not be necessary within the 20-year planning horizon. However, alternatives should be evaluated for improving bicycle travel through this area. Hawthorne Avenue, between Hill and East 3rd streets, is included within the Plan as an under crossing route alternative to the widening of the Franklin Avenue under crossing and effort should be made to preserve this corridor for this purpose. Due to the expense to construct grade separations and the disruption that this type of construction causes, the Hawthorne Avenue alternative may be economically and practically a more achievable improvement than widening the Franklin Avenue/Parkway/RR structure. A comprehensive study should be conducted of the under crossing and alternatives to determine the timing and need for these potential future improvements, and to resolve any conflicts with the existing downtown connection to the Parkway (via Hawthorne).

Newport Avenue is currently improved with two travel lanes and a center median (turn lane) between College Way and West 3rd Street. Bike lanes are striped from College Way to Awbrey Road. Concrete sidewalks are missing west of NW 12th Street on Newport Avenue. Future improvements to the Newport bridge crossing should provide adequate bike, pedestrian and trail (i.e., a trail under crossing on the eastern side of the river) improvements. Future improvements to Newport Avenue, from Wall Street to College Way, should consider the specific design recommendations included in the Newport Avenue Corridor Study, dated March 2000. West of College Way, **Shevlin Park Road** is improved with two lanes, wide shoulders, and no curbs or sidewalks. Sidewalks, bike lanes and turn lanes need to be constructed considering the same design recommendations as the area continues to develop and needs increase.

Galveston Avenue is currently improved with two travel lanes and bike lanes from NW 14th Street to Riverside Avenue. Some sidewalks have been improved along this segment of roadway. West of NW 14th Avenue, Galveston Avenue is a curbed, two-lane roadway with no sidewalks or bike lanes. Sidewalks will be constructed and bike lanes striped as the area develops and these needs are identified. West of Lindsay Court, **Skyliners Road** is improved with two travel lanes, no curbs, sidewalks or bike lanes. Sidewalks, curbs, bike lanes and turn lanes will be completed with future development along this section of Skyliners Road.

Greenwood Avenue, from Newport Avenue to Third Street, is currently improved with two travel lanes, in each direction. Separate left-turn pockets are currently located on the eastbound approach to Third Street and between Wall and Bond streets for both directions of traffic, otherwise an exclusive center turn lane is absent and needed along the rest of this section of

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Greenwood. A raised median has been constructed to prevent left-turn movements at NE 2nd Street. This was constructed to optimize traffic flows, improve arterial efficiency and as a safety improvement measure. Sidewalks have been completed along this arterial street but bike lanes are absent. In 1994, Greenwood Avenue between Wall and the Parkway, was the subject of a lengthy community discussion and evaluation of possible bike lane improvements^{B.6}. One of the issues, with adjacent businesses, was the possibility of losing on-street parking in order to accommodate the bike lane. There were a number of travel lane reconfiguration alternatives discussed, but City Council chose to wait until the TSP was completed and the Parkway was opened before taking up this matter again. [The portion of Greenwood east of Third Street is designated as a principal arterial and an expressway and is part of the state's highway system.]

A substantial amount of residential and commercial growth is planned on the west side of Bend. This will increase the traffic demand on **Portland, Newport and Galveston avenues**. It is important to note that the traveling public will seek solutions to the capacity problems that will result along these corridors. This will include alternatives to widen these roadways and their respective bridges as this new development pressure materializes. This need and desire to widen these roadways may be accentuated if alternatives are not in place to reduce this longer-term system demand.

Colorado Avenue extends from Division Street to West 14th Street. It is a part of the Oregon Department of Transportation's (ODOT) Century Drive corridor. This ODOT *district highway* provides the key connection between the Mt. Bachelor ski area and the Bend community. This district highway classification is quite similar to the City's minor arterial classification, and as such the administration of access points will be treated according to the General Plan minor arterial design criteria. When the new Reed Market Road extension (southern river crossing) is completed across the river, it is recommended that the City and State evaluate designation of the new linkage between Colorado Avenue and the Parkway as a part of the Century Drive corridor.

Arizona/Colorado one way pair (couplet) system:⁹ The conversion of Arizona and Colorado streets to a one way pair "couplet" system, between Broadway and the Parkway, was planned as a method of increasing east-west arterial road capacity without the need to widen existing Colorado Avenue.⁹ This was also planned as a strategy to improve downtown access to and from the Parkway.⁹ Both roadways are designated as minor arterials, with Colorado carrying the westbound traffic, and Arizona Avenue the respective eastbound movements.⁹ Companion transportation improvements were the extension of Wall and Bond streets south to Industrial Way as one way roadways.⁹

Century Drive, south of West 14th Avenue, is a *district highway* under ODOT's classification of roadways. This district highway classification is quite similar to the City's minor arterial classification, and as such the administration of access points will be treated according to the General Plan minor arterial design criteria. A *roundabout* has been constructed at the intersection of 14th Street and other intersection improvements (to be designed) are contemplated at, or near, the Mt. Washington Drive intersection.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Wilson Avenue, between Bond Street and East 3rd Street, is designated as a minor arterial roadway. This section of Wilson Avenue will need roadway capacity, sidewalk and bike lane improvements. Some of these improvements have been completed as a part of the grade separation construction over the Parkway. However, completion of the full street standard (sidewalks, bike lanes and turn lanes) will still be necessary from 2nd to 3rd streets. [Wilson Avenue is designated as a *major collector* roadway east of East 3rd Street but completion of sidewalk and bike lane facilities will still be necessary along this section of roadway.]

Powers Road, between Brookwood and 3rd Street is designated as a minor arterial roadway. Currently, this section of Powers Road is a 2 to 3 lane roadway with bike lanes and some sidewalks constructed. Powers Road currently intersects the Parkway at an at-grade intersection with a system of “jug-handle” on- and off-ramps. There are turn restrictions at the actual signalized intersection. The future improvement of Powers Road may require additional widening with some areas potentially requiring more than 3-lane improvements, plus, the roadway needs completion of the sidewalk system. Longer-term, a grade-separated structure is envisioned with the Parkway. More analysis will be required by the city and ODOT to determine the exact type, location and cost estimate for this future structure over the Parkway. Some additional driveway or intersection turn restrictions may be required on Powers Road in the interim. [Powers Road is designated as a major collector roadway east of 3rd Street but completion of sidewalk and bike lane facilities will still be necessary along that section of roadway.]¹³

Knott Road is the southernmost east-west arterial in the urban area. It provides a connection between Highway 97 and East 27th Street south of the Burlington Northern-Santa Fe Railroad at the Baker Road interchange. This arterial will not experience as heavy a traffic demand as other arterial streets in the community, but intersection improvements such as left turn lanes at the major intersections will likely be warranted to enhance safety and to ensure satisfactory roadway operation. Bike lanes are needed along many sections of the roadway and sidewalk construction should be provided as pedestrian activity along the roadway warrants the improvements.

Mt. Washington Drive currently begins, on the north, at its intersection with Highway 20/97. It extends around the northern side of Awbrey Butte wrapping around the mountain until it heads south near the Valhalla Subdivision. It is planned to extend south of Shevlin Park Road in conjunction with the development of the new grade and high schools and other property development between Shevlin and Skyliners roads. It will continue southerly, crossing Skyliners Road and will be extended to connect to the existing roadway that now terminates at the intersection of Century Drive. Mt. Washington Drive will provide an important arterial street on the western side of Bend. This will provide a continuation of the companion Reed Market/East 27th/Empire loop that serves a similar function on the eastern side of the river. Mt. Washington Drive, for most of its length, will be improved to a two and three-lane wide roadway, with bike lanes and sidewalks (although variances have been granted in the steep slope areas to construct a sidewalk on only one side). Also, portions of Mt. Washington, south of Shevlin Park Road, may need to be widened to five lanes in the future. Special design treatments may be considered

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

through the planned west side commercial and industrial areas north of Skyliners Road that includes roundabouts at key intersections.

Division Street currently extends from Highway 20/97 (just south of the Butler Market Road intersection with the highway) on the north, to Brosterhous Road on the south. Division Street is a major north-south route that parallels Highway 97 and has provided significant relief for East 3rd Street/Highway 97 traffic. After the Parkway is built, the remaining north segment of Division Street, from Highway 20 south to Revere Street, will continue to serve as a minor arterial. The short segment of Division Street between Cleveland Avenue and Reed Market Road will become a local street and provide northbound access to the Parkway. Division Street currently has bike lanes the full length although some sections will continue to need sidewalk improvements.

West 14th Street south of Newport Avenue, is a minor arterial street in the Plan. Bike lane improvements have been striped along its length but some sections of this arterial are missing sidewalks. The need for additional turn lanes should be evaluated at major intersections as traffic volumes increase on Bend's western side.

In northeast Bend, north-south minor arterial streets include; **4th Street** (north of Franklin), **Boyd Acres Road** and the **8th/9th street** corridor. Bike lane improvements are provided on the 8th/9th street corridor but are missing on most of Boyd Acres Road and 4th Street. Sidewalks are also missing and needed along all of these arterials.

North-south arterials, in the southern part of Bend, include **Brookwood/Blakely Boulevard**, which extends from Wilson Avenue (on the north) and parallels Highway 97 south to Baker Road. Brookwood Boulevard is planned to extend north of Powers Road, across the canals, and join Blakely Road near McClellan Avenue. It will then follow an old Brooks-Scanlon logging road, west of Blakely Road, down into the Old Mill site where it will intersect the Blakely/Bond street extension. Improvements will include construction of a two and three-lane wide roadway, with bike lanes and sidewalks.

Another north-south arterial is **15th Street**, which currently extends from Bear Creek to Knott roads. Fifteenth Street is planned to extend between Highway 20 and Bear Creek Road with a redesigned (Highway 20) intersection on the south flank of Pilot Butte. The grade on Highway 20 will need to be lowered to accommodate this future intersection. Bike lanes are currently striped on 15th Street south of Bear Creek Road but many sections of the roadway are missing sidewalks.

NE 18th Street, between Cooley Road and Empire Avenue, is currently improved with a two and three-lane roadway, bike lanes and a sidewalk (along most of the west side of the road). Other sidewalk improvements will be completed with future development in the area. The section of NE 18th Street, between Brinson Road and Empire Avenue, will be completed with future area development as an industrial collector street.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Murphy Road is proposed as a new Minor Arterial between Brookwood Boulevard and Parrell Road at the south end of the city. This project was a recommendation in both the South Bend Parkway Refinement Study and the Murphy Crossing Refinement Plan (see Figures 26A and 26B). Murphy Road between Business 97 and Parrell Road will be realigned slightly to the south and reclassified from a Major Collector to a Minor Arterial. The traffic signal at the intersection of the existing Murphy Road and Business 97 will be relocated to the new intersection of Murphy Road and Business 97. Murphy Road will then cross over the Bend Parkway with no direct access to the highway. Special roadway cross section standards for Murphy Road were developed in the Murphy Crossing Refinement Plan. From Parrell Road west to the new frontage road west of the Parkway, Murphy Road will have a three-lane cross section with raised center medians and center turn lanes within a 100-foot right-of-way. The wide right-of-way is needed to accommodate auxiliary turn lanes at the intersection of Business 97. West of the frontage road and through the commercial zones, Murphy Road will have a three-lane cross section with raised center medians and center turn lanes within an 80-foot right-of-way. Murphy Road will then transition to a two-lane cross section within a 60-foot right-of-way in the residential zones to where it intersects Brookwood Boulevard. This new section of Murphy Road between Brookwood Boulevard and Parrell Road will have bicycle lanes and sidewalks on both sides of the roadway. The intersections of Murphy Road with Brookwood Boulevard, the south frontage road and the north frontage road and the intersection of the southbound Parkway off-ramp and the south frontage road will be controlled by roundabouts. The intersection of Murphy Road and Parrell Road will be controlled by a traffic signal. All other new intersections will be controlled by stop signs. See Chapter 2.7 of the Bend Development Code for schematics of these special roadway cross section standards.⁷

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Table 11
Minor Arterials within the Urban Area

Minor Arterial Streets	From	To
Arizona (future: <i>eastbound</i> only)	Colorado (near Broadway)	Parkway
Bear Creek Rd. (also: 11 th St. ext.)	Franklin Avenue	27 th Street
Blakely Road	Brookwood Blvd.	Wilson Avenue
Bond Street	Wall Street	Franklin Avenue
Boyd Acres Road	Empire Avenue	Butler Market Road
Brookwood Blvd.	(Beyond) South UGB	Blakely Road
Butler Market Road	Highway 97	(Beyond) East UGB
Century Drive	(Beyond) South UGB	Colorado Avenue
Colorado Avenue (2-way)	Century Drive	Arizona
Colorado (future: <i>westbound</i> only)	Arizona	Parkway
Cooley Road	Highway 20	Deschutes Market Road
Division Street	Highway 97 (north)	Revere Avenue
East 15 th Street	Highway 20	Knott Road
East 18 th Street	Cooley Road	Empire Avenue
East 27 th Street	Reed Market Road	Knott Road
East 4 th Street	Butler Market Road	Franklin Avenue
East 8 th /9 th streets	Butler Market Road	Reed Market Road
Empire Avenue	O.B. Riley Road	Highway 20
Franklin Avenue	Wall Street	Bear Creek Rd. ext. (11 th St.)
Galveston Avenue	Skyliners Road	Riverside/Tumalo
Greenwood Avenue	Newport Avenue	East 3 rd Street
Hill Street	Revere Avenue	Wall Street
Hunnel Road	Robal Lane	Cooley Road
Knott Road	Beyond south UGB	Beyond east UGB
Mt. Washington Drive	Century Drive	Highway 97 (Butler Mkt.Rd)
Murphy Road ⁷	Brookwood Blvd	Parrell Road
Neff Road	8 th Street	Beyond east UGB
Newport Avenue	Shevlin Park Market Rd.	Greenwood Avenue
Olney Avenue	Hill Street	8 th Street
Powers Road ¹³	Brookwood Blvd.	3 rd Street
Reed Market Road	Century Drive	Blakely Road
Revere Avenue	Hill Street	8 th Street
Riverside Blvd.	Galveston Avenue	Wall Street
Robal Lane	Highway 20	Highway 97
Shevlin Park Mkt. Road	West UGB	Newport Avenue
Simpson Avenue	Mt. Washington Drive	Colorado Avenue
Skyliners Road	West City limits	Galveston Avenue
Wall Street	Hill St./Portland Ave.	Franklin Avenue
West 14 th Street	Newport Avenue	Colorado Avenue
Wilson Avenue	Blakely/Bond	East 3 rd Street

6.5.1.5 Arterial - Frontage Roads

In some areas along the arterial street system, it will be desirable to construct frontage roads. A number of frontage roads have been predetermined and are illustrated on the Roadway System Plan (Map Exhibit B). Frontage roads may be located, as determined necessary, by the State and City, as properties develop along other arterial corridors. The intent of a frontage road is to collect traffic from properties that abut the arterial roadway and channel this traffic to an intersecting street or controlled intersection with the arterial. The objective of this design is to control the random turning movements that would otherwise compromise the safety or diminish

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

the capacity of the arterial street. In many cases, the frontage road may parallel the arterial for some distance before it makes a connection. The design of frontage roads shall be treated like any other public street, in terms of the location of sidewalks, planter strips and the structural section of the pavement. The width of the frontage road should be based on the forecast traffic expected to use the facility. For example, frontage roads anticipated to handle truck traffic should be built to the minimum Industrial Street Standard.

When a final land use or limited land use decision determines that a right-turn lane will improve, maintain or prevent further degradation of an applicable performance standard for the intersection of an arterial with another arterial or the intersection of an arterial with an expressway, the right-turn lane shall be considered allowed by the TSP at the appropriate location, provided that if the need for the right-turn lane is caused by a specific application, the applicant shall be responsible for full payment of the costs associated with construction of the right-turn lane.²

6.5.1.6 Major Collectors

The major collector street linkages planned for the urban area are illustrated on the Roadway System Plan (Map Exhibit B). Collector streets are normally located at about every half mile. Additional collector streets may be determined necessary as vacant lands are developed or there are other changes in land use. The alignments of new collector streets on the Plan Map are general in nature and refinements may occur through the land development process, or as otherwise determined by the City.

The major collector street system provides both land access service and traffic circulation between the higher order arterial streets. The collector street system provides a connection between neighborhoods and the arterial street system. The majority of collector traffic is normally generated from the area that it passes through, but additional through trips can be anticipated in the collector volume totals.

The collector street system, like the arterial system, places a greater emphasis on mobility over access to land use. As such, access control measures should be maintained along major collector streets. Driveways should be combined and alternative connections to side streets or alleys should be provided.

Major collector street function and design is a careful balance between the movement of vehicles and minimizing impacts caused by traffic volume, speed and noise. Major collectors may include three-lane street sections to accommodate high turning-movement activity. "Traffic calming" devices may be considered where traffic impacts become adverse to residential livability and community walkability. The City's on-street bike lane system includes use of major collectors. When bike lanes are striped, adjacent parking should be discouraged (as discussed in Section 6.3 of this chapter).

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.5.1.7 Residential Local Streets

A residential local street provides the basic function of direct access to abutting residential properties. Thus, each parcel is normally permitted driveway access to the local street. Through traffic movements should be discouraged, although some traffic from other local streets in the same neighborhood may be expected. The overall objective is to minimize the traffic volumes on each local street by distributing the neighborhood traffic to several local streets. To achieve this end, local streets should be developed in a grid-like street pattern with a distance of about 300-600 feet between blocks.

Trip lengths on local streets are normally short and traffic volumes are lower, and the collected traffic from local streets is directed to major collectors. Street standards should be developed to provide adequate space that will accommodate parking on both sides, provide for sufficient room for the passage of cars, emergency vehicles and snow plowing equipment.

Local streets are a strong element in the character and quality of residential areas. They should recognize the character of the natural landscape through which they pass through, and modification of the design standards should be possible when necessary to preserve this character. In addition, variations to a standard residential street should be considered as a means of relieving visual monotony in residential areas. However, any design modification must accomplish the same result, as would a standard street design. Changes in design standards should not be permitted simply as a means of reducing right-of-way or paving requirements.

The Bend Development Code also advocates flexibility in street design while accommodating emergency service access.⁶ It has been recognized that skinnier streets may reduce traffic speeds and thereby improve livability. The State (DLCD) has developed guidelines that also strive to improve livability through the use of narrower streets.⁶ The City's Development Code is consistent with that objective.⁶ The City will continue to explore local street designs that balance this goal with the unique public safety characteristics of the Bend urban area.⁶

The location of residential streets will largely be identified through the development review process and streets shall be located according to the standards established by the functional classification system and City Ordinances. The City may assist in this street location effort with the development of circulation concept plans to assure that an acceptable frequency of residential street grids is achieved within developing neighborhoods.

The *Bend Urban Area - Bicycle and Pedestrian System Plan* (TSP: Map Exhibit B) provides plan guidance on where and how frequent local roadways should be developed. While this plan only depicts a grid on roughly a quarter-mile interval of the *main* local streets, further coordination should occur between the City and new development to satisfactorily locate other intervening local streets. This coordination of the full local street network should consider local land use, existing abutting development street connections and patterns, and other topographic and/or geographic barriers or issues. This more complete local roadway system should fulfill the street grid and connectivity objectives of other City plans and ordinances.⁶

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.5.1.8 Industrial Streets

Industrial areas are located near the arterial and state highway street system, and as a result of this proximity, local industrial streets provide a fairly direct transportation system linkage from the arterial streets to industrial zoned properties. This provides a convenient connection to industrial areas that generate a substantial number of truck trips in the movement of products and raw materials. Historically, the high truck volume has required that industrial streets be constructed with extra pavement and base rock and wide enough to accommodate the large vehicle turning, backing and maneuvering activities. On-street parking is sometimes restricted to further facilitate turn movements and to permit trucks to occasionally queue up on the street. Thus, these roadways are built to a specific roadway design to accommodate the needs of this type of vehicle movement, including broad curb radii and wider curb-to-curb widths.

In recent years, due to changes in technology and a dramatic turn away from lumber products in this community, use of industrial areas has changed in some areas. In those examples, use of the industrial lands has taken on more of a business or office park image and truck traffic volumes are significantly lighter. In these instances, there is less of a demand for expansive street widths to accommodate truck traffic. With this in mind, a smaller street standard can be considered to handle this lower truck freight demand in those less intensive types of industrial development. Parking restrictions are less of a concern, but may be necessary to accommodate some nominal truck activity. Thus, a narrower street standard can accommodate the lighter industrial area needs of the business park type environment. New industrial developments should match the appropriate street width requirements associated with the truck movements that are anticipated with the build-out of these areas.

Industrial streets are normally not striped with turn lanes, except at major intersections, and occasionally they may be striped with a centerline to improve lane delineation. Bike lanes are not necessary on these types of streets, unless they are a part of a major collector, arterial street or otherwise part of the on-street bikeway system.

6.5.1.9 Alleys

Alleys are a street design element that has been utilized in the Bend urban area for many decades. While their use was far more common in street construction and land development prior to the mid-1940s, the concept has come in vogue as a part of the “traditional neighborhood design” (TND) movement. Use of alleyways, as a rear property access point, has always been a means of reducing scattered turning movements along public streets and an advantageous way of making sidewalks more “friendly” and safer for pedestrians. Alleys also provide additional options for utilities.

6.5.2 OTHER ROADWAY ELEMENTS

6.5.2.1 Intersections

Where arterial streets intersect other arterials, or in some cases where they intersect some of the more significant major collector streets, installation of traffic signals will, in most cases, be warranted. Another intersection treatment, now gaining greater acceptance in this country, is the use of a roundabout. Roundabouts have shown promising results in other communities, including

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

reduced intersection improvement costs, improved capacities, reductions in roadway widening needs, and have proven to be a suitable alternative to some traffic signal installations. It is important that the City develop standards for the location and design of traffic signals, roundabouts and other transportation system management techniques to provide guidance and consistency in the application of these improvements.

At all major intersections, where streets classified as a major collector or arterial meet, additional right-of-way needs to be preserved to accommodate turn lanes or alternative design treatments such as roundabout construction. This additional right-of-way, plus transition from the normal street section, should be delineated in the street standards.

Modern urban roundabouts:

The modern urban roundabout (Figure 27) provides intersection control by circulating traffic movements counter-clockwise around a central intersection island. Vehicles entering the roundabout yield to pedestrians at approach crosswalks and to other vehicles that have already entered the central circulating lane. For pedestrians, roundabouts reduce the amount of pavement required to cross, reduce wait times and minimize auto conflicts to a single direction of travel. There are also fewer vehicle accidents in roundabouts due to slower speeds and the elimination of cross turning movements.

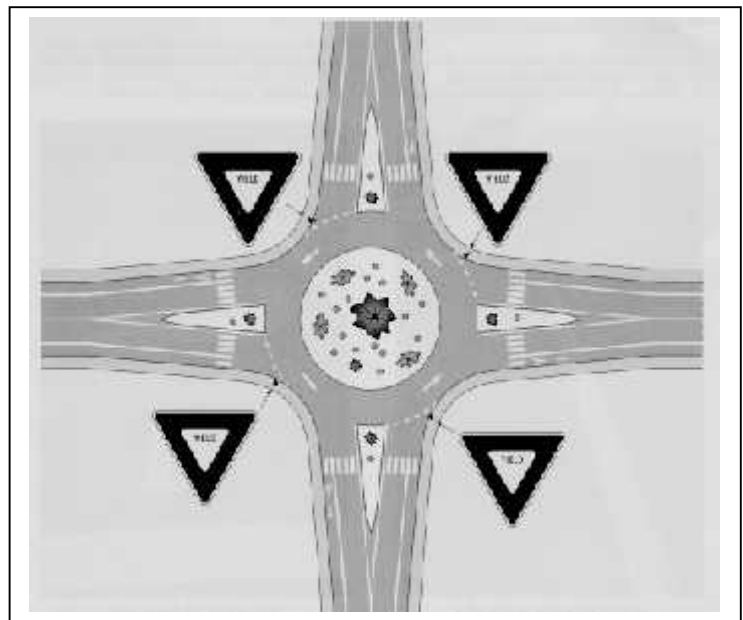


Figure 27. A typical Modern Urban Roundabout
Source: Oregon Bicycle & Pedestrian Plan

6.5.2.2 Access Management (Median Control)

Access management along arterial streets is an important system management tool that can enhance roadway carrying capacity by minimizing conflicts caused by vehicle turning movements. The most common technique of access control is the management of private driveway locations. The higher the functional classification - the more restrictive the access control. The City, County and ODOT have adopted management agreements to the Parkway and have adopted policies that control access on all types of arterials within the urban planning area.

Another technique of providing access control is the construction of raised medians. The City has a policy of installing medians in new construction or modernization of arterials and collectors. Where raised medians are constructed for the full length of a street, driveways and intersections are precluded from left-turn movements. A less restrictive condition to full median control is the construction of partial medians. In this case, breaks are permitted in the median at

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

predefined intervals to accommodate left turn movements. Breaks in the median may be allowed where the City determines that no deterioration in the roadway operation will occur.

6.5.2.3 Community Appearance

Roads should complement the environment that they pass through and should be attractive as well as safe for all modes. This will require good street design as well as control of access wherever possible, and development should be designed to minimize unnecessary intersections and other turning movements. The installation of landscape medians and traffic islands on new and existing arterials can provide both safety and beauty, and can improve the function of the street (Figure 28). As an example, a landscaped median within East 3rd Street and Greenwood Avenue could considerably improve the appearance of both these facilities and of the City of Bend. This technique should be considered wherever a continuous left turn lane exists along an arterial street.

6.5.2.4 Steep Slope Areas

Hillside areas require special consideration in street design. Arterial or collector streets with controlled access can reduce the number of lanes and parking areas required, and thereby reduce the width of the street that must be constructed on the hillside. Small one-way loop streets providing service to a limited number of houses will also minimize cuts and fills on hillsides. Awbrey Butte represents a major topographic feature in the community. Due to the uniqueness of this hill, several master plans for the development of Awbrey Butte have been approved that have reduced street standard requirements.*

{* Special street standards for portions of Awbrey Butte have been approved by City of Bend Resolution numbers 1679 and 2067 :A.4.}

6.5.2.5 Traffic Calming

The volume or speed of traffic that travels on residential streets can often be a source of discomfort to residents. In some cases, high volume or speeding traffic can erode neighborhood livability. Where traffic conditions are excessive, there are a number of techniques that can be used to “calm” driving behavior. These include: narrowing the street, constructing neighborhood traffic circles, speed humps, curb extensions, islands, turn restrictions, street chicanes (i.e., converting a straight street to a meandering road with curb extensions), and combinations of these devices. Traffic calming strategies often require an area wide treatment to ensure that the solution to one street does not shift the problem to an adjacent street or neighborhood. Also, proper initial street design can minimize the need for future traffic calming. Narrower roadways can also help to reduce neighborhood traffic speeds, and the combination of reduced road width and smaller corner curb return radii can improve crossing conditions for pedestrians. The street standards of the Ordinance will be modified to account for this design philosophy and to better balance pedestrian needs with the needs of automobiles.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.5.2.6 Truck Routes⁹

Truck traffic in the urban area is largely confined to roadways adjacent to industrial, commercial and surface mining zoned properties. Most of this traffic uses the nearest adjoining arterial street for access to and from its destinations. The Bend urban area also experiences a large volume of through trucks on the state highway system.

The state highway system serves the major flow of truck traffic in the Bend urban area. These facilities should continue to be designated as the desired through truck routes in the community (i.e., Highways 97 and 20, Century Drive and the Parkway). No other designated truck routes are delineated on the Bend urban area plan.

6.5.2.7 Eastside Bypass

The discussion regarding the need for an “eastside bypass” can be traced as far back as the 1950s. This idea was also incorporated into the first draft of the General Plan in the mid 1970s. In that early draft of the Plan, an expressway facility was described that would skirt the southern and eastern edge of the urban area as a possibility for meeting the future transportation needs of the community. While the document acknowledged that the need for the facility might not be achieved within the time frame of the plan, it did urge that the corridor be preserved for some type of future facility. In subsequent drafts of the General Plan, and in the adopted Plan approved by the state, the eastside bypass was eliminated from the circulation element of the plan and hence no right-of-way was preserved for this expressway.

In the study of the Bend Parkway, one of several alternatives considered was another version of the eastside bypass. This one deviated from the original plan by connecting to Highway 97 on the north, near Cooley Road. One key issue that led to the rejection of the Eastside Bypass alternative was the traffic data forecasts. The bypass was projected to pull away only 10,200 of the 75,000+ vehicles expected to travel Bend’s central corridor by the year 2015. In addition, other traffic impact and land use issues were related to a bypass. Many of the landowners on the eastern side objected to the intrusion of a major roadway into a rural area. This applied not only to the bypass itself, but also to the east-west arterials that would have to be upgraded to connect to the bypass. Another concern was the potential of the bypass to foster development pressures outside of the Urban Growth Boundary. This would have been inconsistent with the road planning requirements recently defined by the State Transportation Planning Rule.

Some public sentiment for the idea of an east-side bypass has remained even though the decision was made to build the Parkway. In light of this interest, the City has pledged to continue to evaluate the need for the bypass as the community grows. In recent transportation modeling, conducted as a part of the latest General Plan update, the north-south travel needs of the community remain satisfied by the present proposed system of arterials and collectors. Therefore, the need for a new major transportation facility, such as an expressway or bypass, has yet to be demonstrated within the Bend urban area.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

In 2000, the citizens' advisory committee (BTAC) was approached by citizens of the 27th Street corridor with the suggestion of connecting Deschutes Market Road to Powell Butte Highway – as a proposal to alleviate Highway 20 through trip traffic (Salem to points east of Bend). However, the suggested new street connection falls outside of the jurisdiction of the city of Bend and examination and implementation of this new roadway alternative would require the support of, and action by Deschutes County.

6.5.2.8 Safety

One goal of the Plan is to enhance travel safety for all modes on the transportation system. To meet this goal, there are a variety of strategies that include focusing on travel behavior and improving transportation system design. Educating the traveling public regarding potential travel hazards and reinforcing the need to travel cautiously is one valuable accident countermeasure. Another technique involves evaluating transportation system deficiencies and implementing corrective measures to reduce travel hazards. Constructing new transportation facilities with sound design principles will also help to maximize travel safety.

It is important that public agencies monitor the transportation system as it relates to travel safety. One important step is the periodic review of crash locations and the development of projects to correct these problems. These projects need to be further prioritized to ensure that resources can be directed to problem locations in a timely fashion.

6.5.2.9 Railroad Grade Crossings

Historically, train delays at road/railroad crossings have not been a major traffic problem in Bend. However since the merger of the Burlington Northern and Santa Fe railroads, it is anticipated that train crossing caused traffic interruptions may increase over time. If this does materialize in the future, the city of Bend should contact the appropriate railroad authorities and discuss possible solutions. A first choice should be making possible changes in train schedules to limit crossings during peak driving periods. If train schedule changes prove impractical or impossible, then the City should evaluate other solutions including grade separation.

There are nine, existing at-grade road/railroad crossings in Bend. Major Collector crossings are located at China Hat and Country Club roads, Scott/2nd Street and Wilson Avenue. Arterial street intersections with the railroad are located at Cooley, Butler Market and Reed Market roads, and Revere and Olney avenues. Future planned improvements will grade-separate Cooley Road from the railroad.^{3,12} One future crossing, proposed in the plan, is an eastward extension of Murphy Road (a collector) to 15th Street. This new road/railroad crossing should be grade separated. Another proposed railroad “under crossing” is shown on the Plan at Hawthorne Avenue. A detailed analysis (for the future need of the Hawthorne connection) should be evaluated when it is necessary to improve east-west capacity in the downtown to Third Street transportation corridors. The decision to construct this connection should be made as a part of a study of Franklin/RR/Parkway under crossing (widening) alternatives (see: section 6.5.1.4 text under “Franklin Boulevard”).¹²

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

If the Reed Market Road/railroad crossing is contemplated for grade separation, consideration should be given to improving the (direct) connection between 9th Street (to the north) and American Lane (to the south). This may include a system of frontage roads.

6.5.2.10 Freight System

US Highway 97 and US Highway 20 will continue to serve as the freight truck routes through Bend. Improvement access controls along Highway 20 and widening to five lanes along the parts of Highway 20 that have currently two or three lanes will improve both through and local truck movement on this route.

The completion of the City's arterial street system will improve the local movement of goods to retail firms in the City and provide an efficient system of roads to ship products from Bend. The completion of Empire Avenue and planned improvements to the Reed Market Road and Colorado/Arizona couplet will particularly benefit the major industrial areas in the City.

6.6 AIRPORT PLAN

6.6.1 Local Air Service: The Bend Municipal Airport is located approximately five miles northeast of the Bend urban area. The airport is owned and operated by the City of Bend and is located in an unincorporated portion of Deschutes County. Development of the Bend Airport dates back to 1942 when the land was deeded to the City in an effort to establish a municipally owned and operated landing strip in the Bend area. The airport is classified as a General Aviation/General Utility airport. There is no regular scheduled commercial passenger service at this airport. Due to the location of this airport outside of the UGB area of Bend, Deschutes County regulations and County TSP policy govern land use issues that are associated with the use and operation of this airport.

6.6.2 Regional Air Service: Daily air passenger service is provided to the Central Oregon area at the Redmond Municipal Airport, which is located approximately sixteen miles north of Bend. The Redmond airport is classified as a Primary Service/Transport Airport. It provides scheduled passenger service, and it accommodates larger and higher performance aircraft than the Bend facility. The Redmond airport is currently occupied by two commercial carriers, Horizon Air and United Express. This airport is outside the jurisdiction of Bend.

6.7 RAIL PLAN

6.7.1 Freight Rail Service: There is no planned change to the existing pattern of short spur rail lines that serve local rail users. Changes required as part of the Parkway construction have been completed.

The main purpose of the Burlington Northern Santa Fe Railroad line in town will continue to be to haul freight through the area. The existing railroad switching yard, depot, weigh station and sidings are expected to remain unchanged during the 20-year planning period.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.7.2 Passenger Rail Service: There is currently no passenger rail service in Bend. The feasibility of extending AMTRAK service to the Bend area was analyzed during the development of the 1992 Oregon Rail Passenger Policy Plan. The study concluded it would be impractical to provide passenger service to Bend. As an alternative to extending AMTRAK service, ODOT in 2000, funded two “throughway” bus connections with AMTRAK that will pass through Bend. One will travel from Portland to Boise, Idaho, and the other will connect the Chemult rail station with the Bend area.

6.8 TRANSMISSION PIPELINE PLAN

Two major natural gas transmission lines, operated by PG&E Gas Transmission- Northwest, serve Bend. These transmission pipelines extend north-south through the state and are located approximately 1 to 2 miles east of the Bend urban area. Cascade Natural Gas provides the natural gas service to the city of Bend. No other major utility pipelines serve, pass or are currently planned through the Bend urban area.

6.9 TRANSPORTATION SYSTEM PLAN OBJECTIVES, POLICIES, BENCHMARKS AND IMPLEMENTATION

6.9.1 TRANSPORTATION AND LAND USE

Objectives:

- To promote land use patterns that support fewer vehicle trips and shorter trip lengths
- To ensure that future development, including re-development will not interfere with the completion of Bend’s transportation system

Policies:

1. Medium and high-density residential development shall be located where they have good access to arterial streets and be near commercial services, employment and public open space to provide the maximum convenience to high concentrations of population.

2. The City shall continue to use and develop performance standards and guidelines that can reduce vehicle trip lengths and/or promote non-vehicle transportation modes.

3. The City shall consider potential land needs for long-range transportation system corridor improvements and related facilities including transit during the review of subdivisions, partitions, and individual site applications.

4. Developments at the edge of the urban area shall be designed to provide connectivity to existing and future development adjacent to the urban area.

5. The Zoning Ordinance shall be revised so that building design, building orientation and site plans for commercial and public facilities promote pedestrian and bicycle access to and from nearby neighborhoods.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6. The City shall continue to explore mixed use zoning as one of the land use patterns that will promote fewer vehicle trips and shorter trip lengths.
7. The City should be receptive to innovative development proposals, including zone changes, plan amendments, and text changes that promote alternatives to vehicular traffic thus reducing vehicle trips and reduced trip lengths.
8. The City shall explore incentives for re-development of existing commercial strips in order to help reduce the need to expand the Urban Growth Boundary.
9. As areas that are currently beyond Bend's existing Urban Growth Boundary (UGB) are urbanized, the city, property owners, developers and all applicable service districts shall work cooperatively to develop appropriate plans for extensions and connections of the transportation system, including but not limited to; roads, sidewalks, trails and/or public transportation. The objective of this planning effort will be to ensure that the new areas promote and facilitate the development of urban land use densities and systems that will fulfill the goals and objectives of the Transportation System Plan – see also: 6.9.4, Policy 22. ⁶
10. The city of Bend shall continue public and interagency involvement with Deschutes County in the transportation planning process for projects within the URAs. ⁸
11. The lead agency for transportation project review in the URAs shall be Deschutes County.⁸
12. The city of Bend shall coordinate the City Transportation System Plan with the Deschutes County Transportation System Plan. The City shall emphasize continuity in the classification of roads and appropriate design standards for roads that link urban areas with rural areas outside the urban growth boundary. The City and County shall agree on the functional classification and design standards of County roads within the URAs. ⁸
13. Road, pedestrian and bicycle projects occurring in the URAs shall be governed by the County's road and street standards. Those requirements shall be coordinated between the city of Bend, Deschutes County and the applicant during the land use process according to procedures identified in the Deschutes County Road Standards and Specifications document. ⁸
14. The city of Bend shall continue to work with ODOT and Deschutes County to coordinate solutions to highway and non-highway road issues that cross over jurisdictional boundaries. ⁸
15. The city of Bend shall work with Deschutes County and the Bend Metro Parks and Recreation District (where applicable) to acquire, develop and maintain those sections of trails that are located outside of the Bend UGB, but are inside a URA, and are part of a trail plan or map that has been adopted by the city of Bend. ⁸

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

16. The following transportation facilities, which are shown on the Bend TSP's Roadway System Plan map, but are located outside the Bend UGB and therefore not authorized by the TSP, shall not be constructed to an urban standard until approved by the County and the area is brought into the UGB. ⁸

Street	From	To
Clausen Drive	Grandview Drive	URA Boundary
Grandview Drive	Hunnell Road	Clausen Drive
Hunnell Road	Cooley Road	URA Boundary
Cooley Road	Hunnell Road	OB Riley Road
North Loop Road	OB Riley Road	OB Riley Road
OB Riley Road	North Loop Road	URA Boundary
US 20 Frontage Road	Robal Lane	Cooley Road
Robal Lane	US 20	Britta Road
Britta Road	Robal Lane	UGB
US 20 Frontage Road	Britta Road	US 20
Tumalo Creek Road	UGB	URA Boundary
Skyline Ranch Road	Tumalo Creek Road	Century Drive
Shevlin Park Road	UGB	URA Boundary
Skyliners Road	UGB	URA Boundary
Metolius Drive	Skyline Ranch Road	Mt. Washington Drive
China Hat Road	US 97	URA Boundary
Knott Road	15 th Street	Rickard Road
27 th Street	Rickard Road	Ferguson Road
Bear Creek Road	UGB	URA Boundary
US 20	UGB	URA Boundary
Neff Road	UGB	URA Boundary
Beal Road	UGB	URA Boundary
Butler Market Road	Deschutes Market Road	URA Boundary
Empire Avenue	Purcell Blvd.	UGB
Purcell Blvd.	UGB	Yeoman Road
Yeoman Road	UGB	URA Boundary
18 th Street	UGB	URA Boundary
Deschutes Market Road	UGB	URA Boundary
Hamehook Road	Deschutes Market Road	URA Boundary
Cooley Road	Deschutes Market Road	URA Boundary

17. The city of Bend shall seek approval from Deschutes County for the improvement of transportation facilities to urban standards that are located in URAs. ⁸

18. Transportation facilities currently located on rural lands shall not be constructed to an urban standard until the area is brought into the UGB. ⁸

Implementation:

1. In general, implementation of these objectives and policies will occur during the review and processing of individual land use applications.

2. Policies 1, 3, 4, and 5 will be implemented by reviewing and updating the standards in the General Plan, subdivision code and zoning code.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

3. City staff shall review and update the General Plan amendment criteria and zone change criteria to encourage innovative developments that reduce motor vehicle trips or trip lengths and to encourage mixed-use development.
4. City staff will study the impact of new mixed-use developments in Oregon on reducing motor vehicle trip numbers and length of trips.
5. City staff will review development codes from other cities for examples of performance standards that continue to improve the transportation system. After review of standards from other cities, Bend has identified a set of performance standards that balances operations criteria with financial constraints, safety impacts, quality of living aspects and community values. These operations criteria are included in the City' Development Code and included in this TSP by reference.¹⁰

Benchmarks:

1. Separate from the current zoning ordinance update process, complete a draft proposal modifying the plan amendment and zone change criteria as soon as possible after TSP adoption. After the required public involvement and planning commission process it is anticipated that the recommended modifications be considered for Council action no later than the close of FY 01/02.
2. Concurrent with the current zoning ordinance update process, develop proposals, code changes or other measures that implement the TSP land use policies described above, no later than the close of FY 02/03.
3. Review and report to the Planning Commission on the effectiveness of new mixed-use centers in reducing motor vehicle trips/trip lengths. This task is required as part of the DLCD prescribed periodic review process.

Funding:

Evaluate the cost to meet the above benchmarks and add resources to the Development Services budget to address the needs. The first year cost (FY 00/01) is estimated to be \$75,000 to \$100,000 for developing ordinance changes and the new regulations necessary to facilitate the implementation of the land use policies described above.

6.9.2 TRANSPORTATION SYSTEM MANAGEMENT

Objective:

- Provide cost effective transportation improvements and implement strategies that will improve the efficiency and function of existing roadways

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Policies:

1. The City shall adopt land use regulations to limit the location and number of driveways and access points, and other access management strategies on all major collector and arterial streets.
2. The City shall ensure that land use actions support the access management policies of the Oregon Department of Transportation along the state highways located in the urban area.
3. The City and State shall implement transportation system management measures to increase safety, reduce traffic congestion to improve the function of arterial and collector streets, and protect the function of all travel modes.

Implementation:

The City shall develop access management standards for all arterials and collector streets. Access Standards developed for principal arterials and expressways shall consider ODOT access management policies along state highways.

Benchmarks:

Develop or revise and implement access management standards and regulations within six months of adoption of the Bend TSP by the City Council.

Funding:

The City shall allocate or budget sufficient staff resources, within the next budget year (2000-2001), to develop City ordinances and/or standards that will establish and implement TSM supportive land use regulations.

6.9.3 TRANSPORTATION DEMAND MANAGEMENT

Objectives:

- To reduce peak hour traffic loading on the roadway system
- To reduce single occupant vehicle travel
- Implementation of a TDM Plan (Central Oregon Commute Options Program) for the city of Bend

Policies:

1. The City shall develop and implement a transportation demand management plan for its employees. This plan should be designed to serve as a model for the community.
2. The City shall work with businesses, especially those with more than 25 employees, to develop and implement a transportation demand management plan. These plans shall be designed to reduce peak hour traffic volumes by establishing trip reduction targets over five years.
3. The City and County shall work with business groups, schools, the Park District and other governmental agencies to develop and implement transportation demand management programs.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

4. The City shall manage and regulate parking by:
 - a) Establishing programs to lower parking demand in commercial and business districts citywide by providing preferential parking for carpoolers, encouraging mass transit use, encouraging shuttle systems from external parking lots, and maintaining an adequate supply of strategically placed bike parking facilities.
 - b) Requiring business groups and employers to develop parking management strategies that support reduced roadway system demand during the peak motor vehicle travel times.
5. The City, County and State shall participate in the Central Oregon Commute Options Program by assisting in:
 - a) Development of park and ride facilities; and
 - b) Establishment of educational programs particularly those that will inform the public regarding the full costs of single occupant vehicle travel.
6. The City shall develop and utilize teleworking strategies as part of their business plan that will facilitate the movement of information and data rather than people.
7. The City shall implement the measures outlined in the Central Oregon Commute Options Program and adopt ordinances as appropriate.

Implementation:

Transportation demand management is aimed at altering driver behavior and more efficient use of the entire transportation system. This could be accomplished either by using alternative modes of transportation or lowering the demand during peak travel times. An important aspect of altering driver behavior is education. Several governmental and private jurisdictions cooperatively formulated ***the Central Oregon Commute Options Program***. This program is a comprehensive plan to reduce traffic congestion and enhance the transportation choices in the city of Bend. The goals include:

- Less roadway congestion,
- Reduced pollution,
- More parking management strategies,
- Less money needed for development, maintenance and construction of roads and parking,
- Higher quality of life,
- Safer and more efficient travel while providing transportation options for all citizens.

Broader mobility needs are also addressed through TDM measures. Much of the unmet mobility need in Bend comes from people who are currently not contributing to reduced road capacity. These are people who are "transportation disadvantaged". Many citizens of Bend are physically challenged, without a drivers' license, elderly, or too young to drive. The city of Bend would benefit from a balanced transportation system by getting the transportation disadvantaged to and from work, conducting personal business around town or participating in community activities independently. The TDM measures discussed in this chapter are a good step in that direction. However, no amount of TDM measures will succeed unless other modes of transportation are

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

developed to be as safe and practical as driving alone. The Central Oregon Commute Options Program is divided into three levels. These levels differ in the complexity and funding commitments.

Level A

The steps associated with Level “A” are considered to be of little cost and can be implemented quickly. Steps or projects to be taken include:

1. The City’s Web site should include TDM information, a link to the Commute Options site and develop a more informational link to area TDM strategies (e.g., Dial-A-Ride, and park and ride lots).
2. Work with the Clean Air Committee to promote TDM including use of their newsletter.
3. Develop and implement a strategy for ensuring full compliance to bicycle ordinances and the Bicycle Parking guidelines.
4. Designate a TDM coordinator to work with Commute Options to encourage City employees to bicycle, walk, carpool or telework. This coordinator should establish a TDM program for City employees, which would serve as a model for the community. The City should:
 - Lead by example, which in turn could free up available parking in the downtown district and assist in educating the general public
 - Include Commute Options news in the City Newsletter
 - Offer TDM incentives to employees
 - Support flexible work schedules and teleworking
 - Support and participate in Commute Options Week
5. Implement TDM measures before or in conjunction with street widening and construction projects. Develop measures to determine TDM impact and cost-benefit analysis and consider businesses and other trip generators that are specific to the proposed project.
6. Work with the Bicycle and Pedestrian Advisory Committee to identify intersections, roadways and other facilities that can be developed for improved bicycle and pedestrian uses on a yearly basis.
7. Review other communities’ responses to the same problems that Bend faces and discuss options for Bend. Host a TDM presentation for City staff, council and public.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Level B

The second level of the program is Level “B”. This level requires a medium to moderate financial commitment by the City. The steps in the level are as follows:

1. Hire a Transportation Demand Management Coordinator.
2. Continue all Level “A” efforts.
3. Print coupon books as business incentives or contribute to Commute Options for this purpose. Coupon book incentives for leaving the car at home would help accomplish the trip reduction goals.
4. Coordinate efforts and provide educational opportunities with the Bend-LaPine School District to reduce student and staff trips. This could be accomplished by:
 - Providing trail access to schools and top-flight bicycle parking for students and staff
 - Work with the schools on student parking management plan
 - Work with administrators and students to develop incentives and disincentives
 - Encourage that new schools are sited convenient for walking and bicycling within the neighborhood and that the schools contribute to land cost for locating adjacent paths
 - Work with the school district and developers to identify school bus stops and reasonable amenities including, shelters or road enhancements to make the stops safer for children. (These stops designed as potential local transit bus stops.)
5. Work with developers to create more bicycle and pedestrian friendly developments by:
 - Encouraging bicycle and pedestrian friendly developments (e.g. property tight sidewalks on both sides of neighborhood streets, narrow streets, grid system, trails and accessways).
 - Providing standards for storefronts close to the sidewalk with easy pedestrian access.
 - Providing standards for those developers who do develop these community friendly features (e.g. parking reductions).
 - Encouraging urban mixed-use development).
 - Redeveloping existing streets with a streetscape that is more attractive to pedestrians, transit and bicyclists (e.g., the redevelopment of Third Street).
 - Separating sidewalks from roadways with appropriate landscaping.
6. Coordinate efforts with the Bend Downtowners to reduce employee trips and develop parking guidelines to promote TDM strategies.
7. Assist with development and promotion of area Park and Ride lots and encourage City and other employees to "park and ride" into downtown Bend.
8. Continue to partner with Commute Options.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

9. Encourage removal of pedestrian barriers (e.g. cinder and snow removal from road shoulders and sidewalks, installation of handicapped ramps).
10. Work with the Parks and Recreation District to plan and implement a trail system.
11. Provide staff with TDM training.

Level C

Continue all efforts in Levels “A and B” and in addition the City shall:

1. Support and coordinate with shuttle services to and from Bend.
2. Support and coordinate with shuttle systems within the City of Bend.
3. The coordinator will support funding for sidewalks, bicycles, trails and transit by advocating for their inclusion in the Capital Improvement Program (CIP).
4. Ensure that the design of street intersections accommodates all travel modes.
5. Develop a prioritized list of bicycle and pedestrian projects for the Capital Improvement Program:
 - Work with the Bicycle and Pedestrian Advisory Committee
 - Seek input from other groups
 - Allocate adequate funds to tackle several projects each year
6. Improve efficiency of Dial-A-Ride services. It is envisioned that with improved efficiency the Dial-A-Ride service would be expanded into an operating and functional public transit system.

Benchmarks:

- A measurable reduction in single occupant vehicle miles traveled. This is to be measured by the efforts of the TDM Coordinator each year.
- Develop a TDM plan for city of Bend employees that shows a reduction in single occupant vehicle miles traveled by June of 2002.
- At least 10 businesses will develop TDM programs for their employees, which shows a reduction in single occupant vehicle miles traveled by June of 2003.
- All businesses with 100 or more employees will be given a TDM presentation by June of 2004.
- All business with 25–100 employees will be contacted by June of 2005.
- TDM Coordinator will make a yearly presentation to the City Council.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Funding:

Year 2001

- \$55,000
 - \$5,000 is the projected program cost to implement all of Level A by June 2001.
 - \$50,000 is the projected cost to hire a TDM coordinator by June 2001 and have the City to continue to implement Level A. This will also allow the City to get started on implementing Level B.

Year 2002

- \$75,000
 - \$55,000 to maintain the program at level described above.
 - \$20,000 is the projected program cost to implement all of Level B by June 2002.

Year 2003

- \$100,000
 - \$75,000 to maintain program at level described above.
 - \$25,000 is the projected program cost to implement all of Level C by June 2003.

Year 2004-2020

- \$100,000 per year to be increased as needed.
 - There needs to be a funding amount per year that will allow the City to efficiently maintain the efforts of this program.

6.9.4 PEDESTRIAN AND BICYCLE SYSTEMS

Objectives:

- To support and encourage increased levels of bicycling and walking as an alternative to the automobile
- To provide safe, accessible and convenient bicycling and walking facilities

Policies:

1. The City, County, State, Forest Service, Park District and public agencies shall work together to acquire, develop and maintain a series of trails along the Deschutes River, Tumalo Creek, and the canal system so that these features can be retained as a community asset. Connections between the Bend Urban Area Bicycle and Trails System should be made to the USFS trail system.

2. The City and Park District shall work together to acquire, develop and maintain the *primary* trails designated on the *Bend Urban Area - Bicycle and Pedestrian System Plan – TSP: Map Exhibit B*. New development shall be required to construct and dedicate Primary Trails for public use according to this plan. The alignments depicted are general in nature and shall be located according to criteria defined in TSP Section 6.3.1.3.⁶ These trails, and future trail additions, shall support the need for non-motorized travel in the community.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

3. The City and Park District shall adopt standards for trail system right-of-ways and trail improvement that are based on the type of planned trail use.
4. The City shall develop safe and convenient bicycle and pedestrian circulation to major activity centers, including the downtown, schools, shopping areas and parks. East-west access to the downtown area needs particular emphasis across major obstacles, such as 3rd Street, the Bend Parkway and the railroad.
5. The City shall facilitate easy and safe bicycle and pedestrian crossings of major collector and arterial streets. Intersections shall be designed to include pedestrian refuges or islands, curb extensions and other elements where needed for pedestrian safety. Also, bike lanes shall be extended to meet intersection crosswalks.
6. Bike lanes shall be included on all new and reconstructed arterials and major collectors, except where bikeways are authorized by the TSP.¹ Bike lanes shall also be provided when practical on local streets within commercial and industrial areas.¹ Bike lanes shall be added to existing arterial and major collector streets on a prioritized schedule. Specific effort shall be made to fill the gaps in the on-street bikeway system. An appropriate means of pedestrian and bicyclist signal actuation should be provided at all new or upgraded traffic signal installations.
7. Property-tight sidewalks shall be included on both sides of all new streets except where extreme slopes, severe topographical constraints, or special circumstances exist. Landscape strips shall separate curbs and sidewalks on new and reconstructed roads. Sidewalks shall be added to all existing arterial and collector streets to fill the gaps in the pedestrian system.
8. The City shall develop a program to ensure timely maintenance and repair of all sidewalks, including but not limited to assigning responsibility for maintenance and repair. The City shall also include removing sidewalk obstructions or barriers that might otherwise not comply with Americans with Disabilities Act (ADA).
9. The City's top priorities for pedestrian improvements are:
 - a) Sidewalks and trail system in-fill and school walking routes,
 - b) Retro fitting existing sidewalks along select collectors and arterials into property tight sidewalks and
 - c) The construction of pedestrian-oriented improvements (other than regular sidewalks, e.g., curb extensions) and elimination of pedestrian barriers.These projects will be identified and prioritized in the CIP.
10. Bicycle and pedestrian facilities shall be designed and constructed to minimize conflicts between transportation modes.
11. Bicycle and pedestrian facilities shall be maintained in a manner that promotes use and safety. The City shall analyze the impacts of the use of cinders and consider alternatives to mitigate the impacts. Street repair and maintenance shall be performed in a manner that does not negatively impact bicycle and pedestrian facilities and their use.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

12. The City shall repair and maintain, including but not limited to striping, snow plowing, sweeping, stenciling and signing all bike lanes in a timely manner.
13. Bicycle parking facilities shall be provided at all new multifamily residential, commercial, industrial, recreational, and institutional facilities, major transit stops, all transit stations and park and ride lots. The City shall support a “Bikes on Transit” program and work to increase the number of bicyclists using transit when the transit system is established.
14. Establishing or maintaining accessways, paths, or trails must be considered prior to vacating any public easement or right-of-way.
15. The City, school and park districts shall work together to inventory, designate and protect access corridors and connector trails. City standards will be developed for such trail corridors.
16. The City shall develop local standards for the construction of bicycle and pedestrian facilities. The state of Oregon - Bicycle and Pedestrian Plan shall serve in the interim as a guide in development of these facilities and standards.
17. The City shall refer to the Park District, for its review and recommendation, all development proposals that include or are adjacent to existing or proposed parks or trails.
18. The City should support bicycle and pedestrian education and safety programs. The City shall establish and promote a comprehensive program for the reporting of and responding to bicycle and pedestrian hazards.
19. The City shall work with the Burlington Northern – Santa Fe (BNSF) Railroad to determine where, if possible, railroad right-of-ways could be used also as trail corridors. Provided this joint-use agreement can be reached with the Railroad company, the City shall evaluate the entire Rails with Trails Corridor in light of opportunities to augment the local primary trail system and future amendments to the TSP should be considered to establish those corridors as a part of the Transportation System Plan. ⁶
20. There are expansion plans for the city domestic water storage and supply facilities on the Overturf Butte Reservoir site, therefore the existing “connector trails” *alignments* shown on the plan shall be considered temporary in nature. These trails shall be subject to relocation if conflicts arise relative to future plans to expand or alter the water storage facilities on the Butte. Relocation of these trails to alternative alignments shall not require a Transportation System Plan amendment. In the event that these trails cannot be relocated to an alternative location that serves the same trail function on the Butte and therefore the affected trail(s) must be closed to public use, this type of action *shall* require an amendment to the TSP. ⁶
21. The city of Bend and Bend Metro Park and Recreation District shall develop a Memorandum of Understanding (MOU) or an Intergovernmental Agreement (IGA) to define respective agency roles and responsibilities relative to the network of trails on Overturf Butte. ⁶

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

22. As land areas that are currently beyond Bend's existing Urban Growth Boundary (UGB) are urbanized and as it relates specifically to the Bend Primary Trail System, external destinations (beyond the UGB) and specific connection points (within the existing UGB) have been delineated on the Bend Urban Area Bicycle and Pedestrian System Plan [Map A] – see also: 6.9.1, Policy 9.⁶

Implementation:

1. The City shall implement the TSP trail policies in cooperation with the Bend Metro Parks and Recreation District (BMPRD) as described in the joint agency intergovernmental agreement Resource Document A.11, 2003, and any subsequent amendments.⁶ The City and BMPRD shall meet to review the intergovernmental agreement and make appropriate amendments to allocate responsibility for trail construction and maintenance.

2. The Bend Urban Trails Plan, or subsequent updates, shall be implemented as a part of the Bend Urban Area TSP.

3. New trails shall be built generally following the priority of trails listed in the Bend Urban Trails Plan, or subsequent updates. New *accessways* shall be built following the system defined by the *Bend Urban Area - Bicycle and Pedestrian System Plan* (TSP: Map Exhibit B) *Assessment of Bicycle and Pedestrian Needs Report* ^[Resource Document 2.3], as much as practical.⁶

4. The City shall consider amendments to the appropriate ordinances in order to facilitate trail right-of-way acquisition and improvements, and trail connections in new development that contain a Primary Trail as shown on the Bend Urban Area Bicycle and Primary Trail System Plan Map.

5. The City shall identify funding options for right-of-way acquisition, design, construction and maintenance of priority trails (e.g., The Deschutes River and Larkspur trail systems).

6. New and existing trails and accessways shall be created and maintained following the design standards described in the State of Oregon Bicycle and Pedestrian Plan, the Bend Metro Park and Recreation District (BMPRD) Parks, Recreation and Green Spaces Comprehensive Plan, the Bend Urban Trails Plan, the City of Bend Standards and Specifications or subsequent updates of those documents.⁶ Local design standards shall have precedence over state standards, where there are conflicts – The BMPRD standards shall apply to the Primary Trail System and the city of Bend Standards shall apply to all other non park, related public improvements.⁶

7. The City shall meet with BMPRD and the school district to establish a process to inventory, designate and protect access corridors and connector trails which will create a network of trails for safe access to schools, parks and other activity centers.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

8. The City shall update inventories of existing bike lanes, accessways and sidewalks, and identify gaps and missing system segments, and, in conjunction with the Deschutes County Pedestrian and Bicycle Advisory Committee, prioritize these for input into the annual City of Bend Capital Improvement Program planning process as indicated in the Council adopted Transportation Implementation Plan (TIP).⁶
9. The City shall identify hazardous, potentially hazardous, and substandard bicycle and pedestrian facilities and intersections, and prioritize needed repairs and improvements, and implement repairs and improvements in order of priority.
10. The City shall establish a timely and regular maintenance and repair program for all bicycle and pedestrian facilities, which may include enforcement of the responsibility for sidewalk maintenance by adjacent property owners and/or the City assuming the responsibility for sidewalk maintenance.
11. The City shall educate builders, architects and developers concerning city design regulations for bicycle and pedestrian facilities (including bicycle-parking facilities). The City shall require a specific inspection of bicycle and pedestrian facilities (i.e., bicycle racks) as a part of the commercial building construction inspection process.
12. The City shall adopt a methodology for prioritizing new bicycle and pedestrian facilities for construction, and build new bicycle and pedestrian facilities according to the priority plan. This shall include the provision of bike parking facilities at public transportation facilities or other activity centers as described in Policy 6.9.4 (13).
13. The City shall construct, stripe and stencil bike lanes as a part of street overlays and widening, and simultaneously adjust all catch basin grates to grade that are located within bike lanes.
14. Work with private property owners to open-up existing, public accessway easements and make improvements to accommodate public use.⁶
15. The City shall work with the BNSF Railroad to determine the feasibility of the “Rails-with-Trails” concept.⁶ If this trail corridor is feasible, then the City shall develop acceptable trail designs and details for implementation of this part of the primary trail system.⁶ The City should consider subsequent amendments to the TSP to incorporate those corridors as a part of the *Bend Urban Area - Bicycle and Pedestrian System Plan* (TSP: Map Exhibit B).⁶
16. The city of Bend shall include the Bend Metro Parks and Recreation District and the general citizenry in the planning and design of Transportation related river crossings.⁸

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Benchmarks:

1. Develop a plan, in coordination with BMPRD, to identify funding for and implementation of Primary Trail system projects within six months after adoption of the TSP by the Bend City Council.
2. Update sidewalk, trail and bike lane systems inventories and identify gaps and missing system segments and prioritize these for completion, within six months after adoption of the TSP by the Bend City Council.
3. Remediate the needs of prioritized bicycle and pedestrian facilities as follows:
 - a) Hazards – immediately
 - b) Potential hazards – as soon as practicable
 - c) Substandard conditions – at the rate of 20 percent per year for the next five years
4. Add four miles of in-fill sidewalks per year.
5. Add designated bike lanes to roads with substandard shoulders at the rate of 20 percent per year for the next five years.
6. Public right-of-ways or easements for trails shall be secured and trails constructed at a rate of at least 2 miles each year (on average), starting with the trail priority list depicted in the Bend Urban Trails Plan, or subsequent updates.
7. Incorporate the specific inspection of bicycle and pedestrian facilities (including bicycle-parking facilities) as a part of the commercial building construction inspection process within six months after adoption of the TSP by the Bend City Council.
8. Develop a detailed bicycle and pedestrian facility maintenance program within twelve months after adoption of the TSP by the Bend City Council.
9. Update the City bicycle and pedestrian facility hazard reporting and responding system within twelve months after adoption of the TSP by the Bend City Council.
10. Fund a coordinator to implement the City's bicycle and pedestrian programs within six months after adoption of the TSP by the Bend City Council.

6.9.5 PUBLIC TRANSPORTATION SYSTEM

Objectives:

- Continue to develop public transportation services for the transportation disadvantaged
- Reduce reliance on automobiles and develop public transportation facilities
- Increase mobility and accessibility throughout the urban area
- Continue to provide infrastructure and land use planning to support transit

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Policies:

1. The City shall preserve and improve the existing Dial-A-Ride service (efficiency, expanded ridership and routes, zone destination) and develop a strategic plan for its future expansion that results in the initiation of a citywide public transportation system.
2. The City shall develop a public transportation system that accommodates the needs of Bend residents and visitors in order to reduce reliance on the automobile.
3. The City shall coordinate with the State and other jurisdictions to evaluate funding alternatives and seek appropriate resources to support a public transportation system. Effort should be made to evaluate creative funding techniques that may include the combination of public and private transportation resources in coordination with other agencies and transportation providers.
4. The City shall work together with Central Oregon communities and the State to develop inter-urban public transportation services. Priority shall be given to high load ridership corridors.
5. To accommodate a fixed-route transit system, land use ordinances and other regulations shall be implemented that establish pedestrian and transit-friendly design along potential or existing transit routes.
6. The City shall work with other governmental agencies to develop a 20-year transit master plan. The plan shall include but is not limited to routing maps, the type and location of required infrastructure, marketing/public education plan, development/ redevelopment requirements for transit, and funding mechanisms. Ordinances shall be adopted that implement the Master Plan.

Implementation:

1. Develop a strategic plan for public transportation that results in the initiation of a citywide public transportation system.
2. Develop an improved public transportation system for the urban area by:
 - a) Forming a Transit Advisory Group
 - b) Expanding the existing Dial-A-Ride system for the general public using existing funding resources,
 - c) Expanding the existing Dial-A-Ride system and implementing a fixed-route bus system* for the general public using additional funding resources. (*To be developed as ridership increases along corridors; a fixed-route service would provide a more efficient transit rider service).
3. The City shall actively participate in and support regional discussions and efforts to develop and improve countywide public transportation services (e.g., City participation in Central Oregon Area Commission on Transportation – COACT and Central Oregon Intergovernmental Council – COIC, discussions on public transportation). Discussion to include the development of a countywide transit district and evaluation and implementation of creative public/private sector funding techniques to accomplish this task.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

4. Work with other Central Oregon communities to improve inter-urban transportation services.
 - a) Priority shall be given to high load ridership corridors within the Deschutes County area (i.e., Bend to Redmond, Bend to LaPine, etc.).
 - b) Development of other inter-city services outside of the Deschutes County area (i.e., Bend connections to the Willamette Valley, other destinations outside of Deschutes County).
5. The City shall establish land use ordinances and other regulations that support the development of pedestrian and transit-friendly design along all arterial and collector roadways.
6. Develop a 20-year transit master plan and implement a phased fixed-route transit system serving the Bend urban area:
 - a) Develop a fixed-route master plan to include a basic transit system and incremental improvements to the system, such as:
 - i) The 5-bus (6-route) transit system, illustrated on Figure 13, shall serve as an example of a basic start-up transit network.
 - ii) The 9-bus (7-route) transit system, illustrated on Figure 14, shall serve as an example of a more comprehensive transit network.
 - b) Acquire properties (or secure joint use agreements) for Park-n-Ride lots at strategically located sites (see also item “d.”) throughout the urban area.
 - c) Plan, acquire and develop a site in the downtown area for a transit center.
 - d) Plan, acquire and develop at least four major transit stops including the Central Oregon Community College, the St. Charles Medical Center, and sites on the north and south reaches of Bend.
 - e) Implement a phased, fixed-route transit system, focusing initially on high transit ridership corridors.
7. To supplement City funds, seek additional public transportation funding resources for Bend urban area that will support a public transportation system by seeking:
 - a) State and federal grants that support expanding public transportation for general public services
 - b) Voter approval of a funding measure to expand Dial-A-Ride system to support general public services
 - c) Voter approval of a funding measure to develop a fixed-route system to support general public services

Benchmarks:

1. Obtain funding for Dial-A-Ride expansion, and begin operation of this improved system by July 2001.
2. Meet 100% of the work and medical trip demands of the general public, and 70% of shopping trip demand by July 2002.
3. Determine candidate fixed-route transit corridors and implement, as appropriate, by July 2003.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

4. Provide 175,000 transit rides per year by July 2003.
5. Develop a “countywide” transit master plan in coordination with other public agencies and private transit providers by July 2003.

Funding:

1. Explore the use of System Development Charges (SDCs) for a portion of local share of transit system capital improvements.
2. Seek other stable local funding opportunities for public transportation to support operating needs on a long-term basis that may include levies, special districts and other funding strategies.
3. Lobby the state of Oregon Legislature to consider bills that could result in increased public transportation funding.
4. Pursue multi-year funding with major employers and/or other public/private organizations (e.g. transit service contracts).
5. Seek voter approval of a transit funding measure to operate and support an expansion of local Dial-A-Ride service, to include the general public, and establish scheduled, fixed routes open to the general public as demand dictates and funding permits.
6. Seek additional funding to establish a countywide transit district and improve other inter-city transportation services.
7. Seek state and federal grants to support:
 - a) Urban area transit planning;
 - b) Dial-A-Ride expansion;
 - c) Acquisition of buses for a fixed-route transit system; and
 - d) Development of a downtown transit center, park and ride lots and other transit use amenities.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

6.9.6 STREET SYSTEM

Objectives:

- To provide a practical and convenient means of moving people and goods within the urban area that accommodates various transportation modes
- To provide a safe and efficient means to access all parts of the community
- To provide an attractive, tree-lined, pedestrian friendly streetscape sensitive to protecting the livability of the community

Policies:

General:

1. Streets shall be located, designed and constructed to meet their planned function and provide space for adequate planting strips, sidewalks, motor vehicle travel and bike lanes (where appropriate). Specific effort should be made to improve and enhance east-west circulation patterns for all modes of travel throughout the community.
2. Where a subdivision or partition is adjacent to land likely to be divided in the future, streets, bicycle paths, and accessways shall continue through to the boundary line of the subdivision or partition in order to achieve connectivity within the grid system.
3. Streets shall be classified and generally located according to the Bend Urban Area - Roadway System Plan (Map Exhibit B), the Street Functional Classification (Table 12), and the Street Grid System (Figure 29). Street right-of-ways and improvements standards shall be developed to meet the needs of the Transportation Plan and Functional Classification System. Transportation project development review and approval shall be subject to the provisions of the Bend Development Code and Oregon Administrative Rule 660-012, Section 0050, as applicable.⁹
4. In order to reduce vehicle speed, avoid construction of excessive pavement, and create livable neighborhoods, the City shall adopt standards that allow for narrower streets and lane standards, on-street parking, and other pedestrian friendly design elements.
5. The City shall manage the development process to obtain adequate street right-of-way and improvements commensurate with the level and impact of development. New development shall be supported by traffic impact analysis(es) to assess these impacts and to help determine transportation system needs.
6. Access control shall be part of the design standards for major collectors, arterials, principal arterials and expressways to ensure that adequate public safety and future traffic carrying capacity are maintained while at the same time preserving appropriate access to existing development and providing for appropriate access for future development. The city of Bend *Arterial Access Policy* (Street Policy No. 2) and the *Access Management Policy* (Street Policy No. 4) shall be reviewed and revised, and new street policies shall be adopted if necessary, to:

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

- a) Conform street designations and other terminology to that which is used in this TSP;
- b) Adopt written policies and procedures for access control on new and reconstructed major collectors, minor arterials and major arterials;
- c) Provide that raised medians that eliminate left turn movements to existing streets or improved properties will only be installed after notice to affected property owners and an opportunity to be heard;
- d) Require that in the case of new access control measures that will restrict existing turn movements into or out of existing homes, businesses or streets, the least restrictive measure (such as shared driveways, elimination of curb-cuts or “no left turn” signs) that is effective to achieve the purposes of the policy will be evaluated prior to installation of raised medians;
- e) Require that the cost of installation and maintenance of raised medians, and in particular those with landscaping, be evaluated and alternatives be considered before raised medians are approved or required;
- f) Replace any mandatory requirements for raised medians on streets other than new principal arterials and expressways with an analysis of the factors set forth above, and any other factors that are identified in the policy;
- g) Provide that where commercial or industrial land uses abut residential areas, access shall not be directed to local residential streets.

7. City and state transportation system improvements shall comply with the Americans with Disabilities Act requirements.

8. Traffic signals or roundabouts shall be constructed in accordance with the design, spacing and standards adopted by the City and State.

9. The City Council shall involve the public, where appropriate, in the development and redevelopment of street designs prior to their construction.

10. The City shall consider the impact of improvements to or completion of existing facilities when considering the need for constructing new facilities.

11. The City shall place a high priority on providing adequate funding for street maintenance.

12. Traffic calming devices may be considered anywhere traffic impacts are adverse to residential livability.

Residential Streets:

13. Residential block lengths shall not exceed 600 feet without a connecting cross street. When existing conditions or topography prevent a cross street, a pedestrian accessway to connect the streets shall be required.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

14. A grid-like pattern of residential local streets shall be developed whenever practical in order to increase street connectivity within a neighborhood. A system of local streets shall be developed within a framework that is defined by the *Bend Urban Area - Bicycle and Pedestrian System Plan* (TSP: Map Exhibit B), as much as practical. ⁶

15. The City may require adjustment to the street pattern or installation of traffic calming devices in order to discourage high speed and volume vehicular traffic on local residential streets.

16. Street widths on public residential local streets may vary depending on topography, anticipated traffic volume, natural features that warrant protection, and existing street patterns in the neighborhood. Right of way shall be a minimum of sixty (60) feet except in special circumstances. Narrower streets may have limited on-street parking to ensure emergency vehicle access.

17. New alleys should be developed to City standards and shall be maintained by the property owners.

18. Cul-de-sac or “hammer-head” residential streets may be allowed only where existing development, steep slopes, open space, or natural features prevent through street connections, or when the objectives of connectivity are met within the neighborhood.

Arterial Streets:

19. Due to the sensitive nature of the Deschutes River corridor, the extension of Reed Market Road, between Blakely Road and Century Drive, shall be limited to a two-travel lane roadway.

20. Appropriate facilities for bike, pedestrian and transit use shall be included in any road-widening project.

21. The City shall evaluate the effect of transportation demand management (TDM) and transportation system management (TSM) measures that would successfully eliminate or delay the need for minor arterial street widening beyond the existing travel lanes within the twenty-year design life of a proposed roadway project. Transportation system computer modeling is one acceptable evaluation method that can be used to assist in the assessment of forecast travel demand and the associated vehicle travel lane needs. ⁴

TDM/TSM measures as an alternative to roadway widening: The TDM and TSM measures **incorporated into this analysis**, as an alternative to roadway widening, shall be capable of funding and fulfillment within a reasonable time period such that the subject arterial level-of-service shall not diminish below an acceptable adopted City standard.^{4,5}

TDM/TSM measures AND roadway widening: If the implementation of TDM and TSM measures **from the previous analysis** are determined to be insufficient in meeting the transportation system needs along the subject roadway corridor, the City shall undertake an

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

evaluation of the consequences that additional roadway widening may have on adjoining neighborhoods as well as the benefits gained by additional street construction.^{4,5}

This evaluation shall include an assessment of the design features and construction options for the road widening project. The design analysis of roadway widening shall consider the impacts on all modes of travel, adjacent affected travel corridors and the impact on properties immediately adjacent to the contemplated road widening. The most effective and appropriate TDM and TSM measures recommended by the evaluation as selected by the City Council, shall be implemented either in conjunction with, or before, the road widening project. The City Council after providing notice and opportunity to be heard at a public hearing shall decide whether to authorize the street widening based upon this policy and the evaluation report. Written notice shall be provided to property owners within 250 feet of the proposed widening and to affected neighborhood associations. In addition, notice of the hearing shall be posted in conspicuous locations along the proposed widening and published at least ten days prior to the hearing.^{4,5}

The City Council shall receive this evaluation report that makes the aforementioned analysis of TDM and TSM measures, and the evaluation of roadway widening design options, prior to considering authorization of proceeding with the road widening project.⁴

Minor arterial street corridors shall be designated by City Council as falling into one of three classifications: ⁴

- a. "Not authorized for lane expansion". These minor arterial corridors are described in the TSP, in Section 6.5.1.4 requiring a TSP amendment before being categorized as "b" or "c" as described below.
- b. "Possible lane expansion". These minor arterial corridors are listed in the City's annual Capital Improvement Plan as corridors where additional travel lanes may be necessary within the 20-year planning period. Street corridors in this category may not be programmed for lane expansion in the CIP without City Council authorization.
- c. "Probable lane expansion". These minor arterial corridors are listed in the City's annual Capital Improvement Plan as corridors where additional travel lanes are probably going to be necessary within the 20-year planning horizon. Street corridors in this category may not be programmed for lane expansion in the CIP without City Council authorization.

Intersection widening and improvements, that are necessary for vehicle turning lanes or pedestrian safety, are exempt from this policy. ⁴

Notwithstanding a street's categorization as "possible lane expansion" or "probable lane expansion", the City Council must comply with paragraphs 3 and 4 of Transportation System Plan Arterial Street Policy 21 prior to authorizing a road widening project. ⁴

22. The City shall involve the public, the Park District and other governmental agencies in developing a roadway design for the southern river crossing that complements the natural features of the river area.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

23. The City and State shall develop and implement a plan to improve the appearance, safety and function of East 3rd Street, portions of Highway 20 and old Highway 97 when the Parkway is completed.

24. The City shall work with the State to line the entrance to the city of Bend along Highways 97, Highway 20, Century Drive and the Parkway, with large stature trees.

25. Landscaped medians should be included on all arterial streets, except where right-of-way acquisition is not possible, that incorporate left-turn refuge lanes at controlled intervals to improve community appearance, maintain system mobility and to reduce the adverse affects of wide street widths to all types of travel (Figure 28). On streets with multiple vehicle lanes and wide curb radii, pedestrian refuge islands shall be constructed to minimize street crossing distances.

26. Frontage roads shall be provided parallel to arterial streets, as illustrated on the Bend Urban Area Roadway System Plan Map, or as determined necessary by the City or State, to maintain an acceptable level of safety and carrying capacity on the arterial street system.

27. The state highway system (i.e., Highways 97 and 20, Century Drive and the Parkway) shall be designated as the through truck route system. Trucks shall be permitted on the City and County arterial street system for local trip activity, unless otherwise restricted.

28. The city of Bend shall work with ODOT to plan for specific improvements needed to grade separate Cooley Road from US 97 and the railroad.^{3, 12}

29. When a final land use or limited land use decision determines that a right-turn lane will improve, maintain or prevent further degradation of an applicable performance standard for the intersection of an arterial with another arterial of the intersection of an arterial with an expressway, the right-turn lane shall be considered allowed by the TSP at the appropriate location, provided that if the need for the right-turn lane is caused by a specific application, the applicant shall be responsible for full payment of the costs associated with construction of the right-turn lane.²

Parkway:

30. The Bend Parkway will be planned, constructed, and managed to limit direct access to the facility to meet the policies and requirements of the Oregon Highway Plan, to protect the integrity of the route's through capacity, and to promote public safety.¹²

31. To maintain the viability of the existing East 3rd Street and downtown business districts, the Bend Parkway will provide convenient access to these areas in so far as this does not compromise the function of the Parkway.

32. The Bend Parkway shall, to the greatest extent possible, include landscaping, medians, separated sidewalks, and bike lanes.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

33. The City accepts the findings of US 97 Bend North Corridor Project Preferred EIS Alternative. Prior to design and construction, the City and ODOT will coordinate to conduct two independent project development plans/designs within the study area of the preferred alternative to verify the construction meets the then current needs of both the City and ODOT. One plan development and design will be for the study and analysis, including the impact on any business, of a possible Robal Road connection to the ODOT Preferred Alternative to be completed prior to entering into an intergovernmental agreement (IGA) for implementation of the US 97 phase of the Preferred Alternative. The other development and design will be for the Empire interchange area to be completed prior to entering into the intergovernmental agreement (IGA) for implementing the phase of work that would impact any business, public street, or private driveway access onto Empire Avenue. The final redevelopment of the transportation system at Robal and Empire and the ODOT Preferred Alternative may include some or all of the changes determined in the final design to improve the transportation system and meet the City's transportation needs. The IGAs will conform with the studies and analyses.¹²

34. The City of Bend will coordinate with ODOT to determine when to implement closures to approaches on Empire Avenue and improvements to Mervin Sampels and connecting roads shown in the US97 Bend North Corridor preferred alternative.¹²

Safety:

35. The City and State shall improve transportation safety for all modes through approved design practice, sound engineering principles and regulation of vehicle speeds.

36. The City shall explore with the State and implement appropriate "Intelligent Transportation System Devices".

37. The City shall take measures to ensure that traffic speeds are appropriately designated throughout the City.

38. As a part of the development process, right-of-way shall be acquired as necessary for the correction of street intersections, excessively sharp curves, or as otherwise necessary to improve the safety of a road alignment.

39. The City and State shall support efforts to educate the public regarding safe travel on the transportation system.

40. The City and State shall monitor transportation crash and safety issue locations, and develop and implement corrective improvement projects.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Implementation:

1. Update, expand background justification, priorities, categories and weightings in the Transportation CIP, and monitor it on a regular basis.
2. Study alternatives to improve the street grid system and east/west street connectivity in order to address future transportation needs: ⁹
 - a) Evaluate the need for more through routes and grid connections in the northeast section of Bend in order to preserve capacity on the 27th Street corridor - this will require the City to coordinate street extensions with the County.
 - b) Study the completion of the Purcell corridor and determine placement in the CIP.
 - c) Study the American Lane/9th Street offset intersection reconstruction.
 - d) Study options for the future extension of Cooley Road in the northwest quadrant of the City.
 - e) Study the Blakely/Brookwood connection and determine the priority in light of the Southern Bridge Crossing project.
3. Install interim signals where warranted for traffic safety and enhancement of traffic flow. Complete a list of interim signalization projects and monitor on an annual basis.
4. Monitor completion of Bend Parkway impacts on local intersections and determine if additional improvements are needed.
5. Complete the current study to evaluate and produce appropriate roundabout construction and performance standards. Give special consideration to the needs of the disabled community.
6. Produce preliminary topographical and engineering alignments for future road extensions prior to acquiring right-of-way.
7. As a part of the Project Development for the construction, or reconstruction, of roadways that will impact Resource Areas that have been identified by the city of Bend - Goal 5 Inventories, an Environmental, Social, Energy and Economic (ESEE) analysis shall be conducted. Land-use findings will be required on all transportation projects that will have impacts to a Goal 5 identified resource. Mitigation measures to address Goal 5 impacts shall be developed and implemented as a part of the construction of transportation projects where Bend's Goal 5 protection ordinances apply. ⁸
8. The City shall work cooperatively with the state of Oregon to resolve any level-of-service issues on the state highway system that are forecast to exceed the mobility standards of the Oregon Highway Plan (OHP). Methods to be considered to accomplish this goal shall include limiting the number and type of access points to the highway system. Refinement Plans shall be initiated cooperatively by the City and the State, involving affected property owners, to help identify these issues and to develop agreed upon strategies that will help fulfill the OHP standards. ⁸

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

9. The City shall seek alternative highway classifications, where appropriate, as identified in the Oregon Highway Plan (i.e., STAs and/or UBAs) for qualifying state highways within the urban area.⁸

6.9.7 RAIL SYSTEM

Policy:

1. When railroad rights-of-way are considered for abandonment or vacation, the City, County and State shall seek the preservation of these corridors for other transportation services.

2. The City shall work with Burlington Northern Santa Fe Railway to develop and implement a plan for train scheduling to ensure that the current needs of the transportation system in the City are minimally affected.

6.9.8 TSP MAP UPDATES¹³

Policy:

Any Bend TSP map that illustrates a dashed line for a proposed transportation facility may be updated administratively by staff upon the construction/completion of that facility. Updating of any affected maps shall convert any “dotted” lines into “solid” lines that follow as-built alignments, as much as practical, and shall not constitute a land use decision.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Street Functional Classification System
Typical Characteristics
Table 12

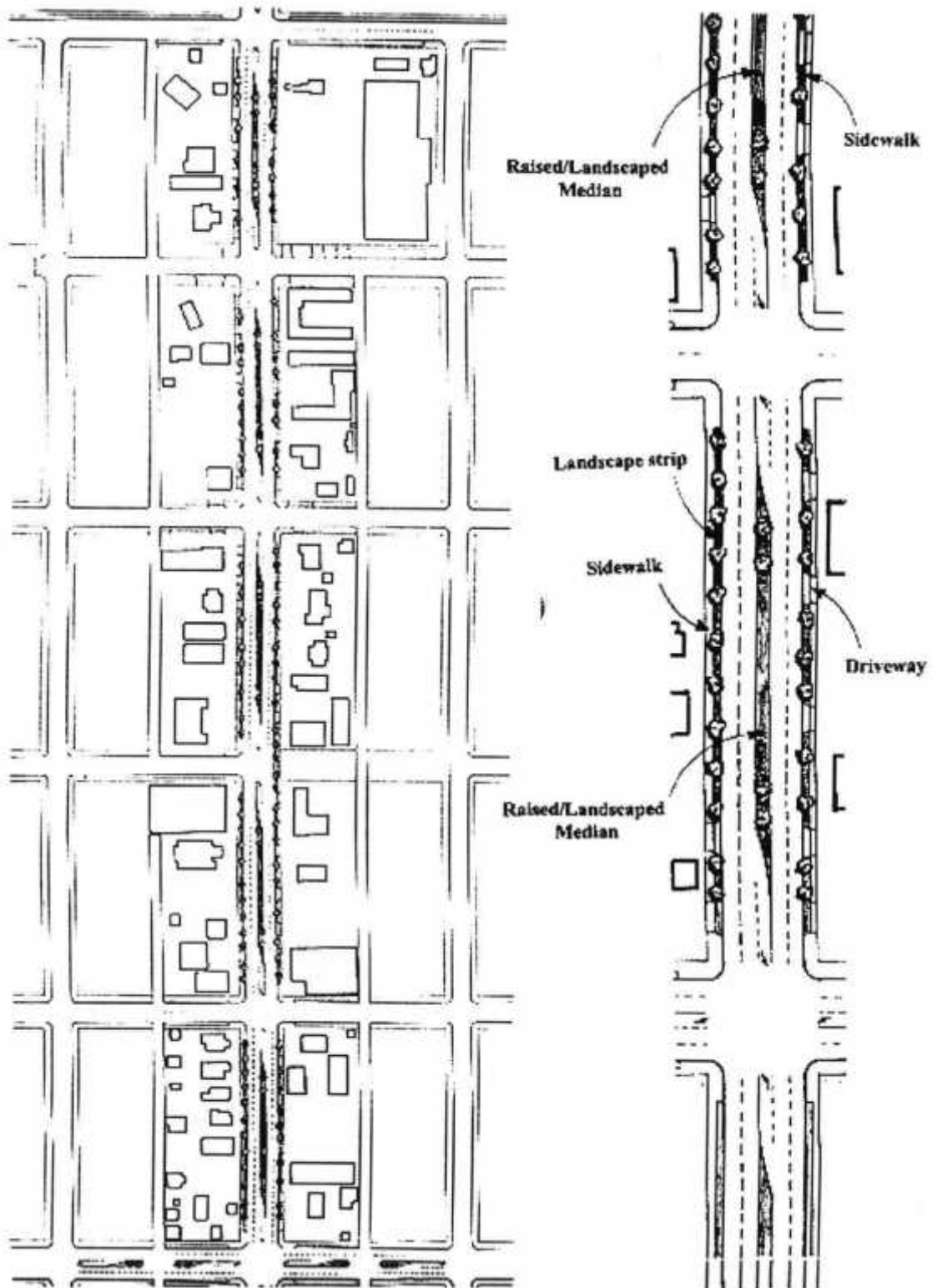
Functional Classification	Projected Daily Traffic (Typical)	F.C. Spacing (Typical)	Trip Length (Typical)	Vehicle Lanes (Typical)	Bike Lanes	Sidewalks	Parking Permitted (Typical)
Arterial:							
Expressway	20,000 - 45,000+	5+ Miles	Over 5 miles	5	Yes	Yes Both sides	No
Principal Arterial	15,000 - 40,000	2+ Miles	Over 2 miles	5	Yes	Yes Both sides	No
Major Arterial	10,000 - 30,000	1-2 Miles	Over 1 mile	3-5	Yes	Yes Both sides	No
Minor Arterial	5,000 - 18,000	1/2-1 Miles	Over 1 mile	2-5	Yes	Yes Both sides	No*
Major Collector	1,500 - 9,000	1/2 Mile	Under 1 mile	2-3	Yes	Yes Both sides	No*
Industrial Streets	500 - 3,000	Not applicable	Varies	2	Not required	Yes Both sides	Yes
Local Street	< 1,500	300-600 feet	Under 1/2 mile	2	Not required	Yes Both sides	Yes
Frontage Road	Varies	Not applicable	Varies	2	Not required	Yes Both sides	Yes** if adequate width provided
Alley	< 400	Not applicable	Not applicable	1 1/2	Not applicable	Not applicable	Yes** if adequate width provided

* Parking permitted if approved by local jurisdiction

** Parking permitted adjacent to the facility but NOT obstructing the travelway

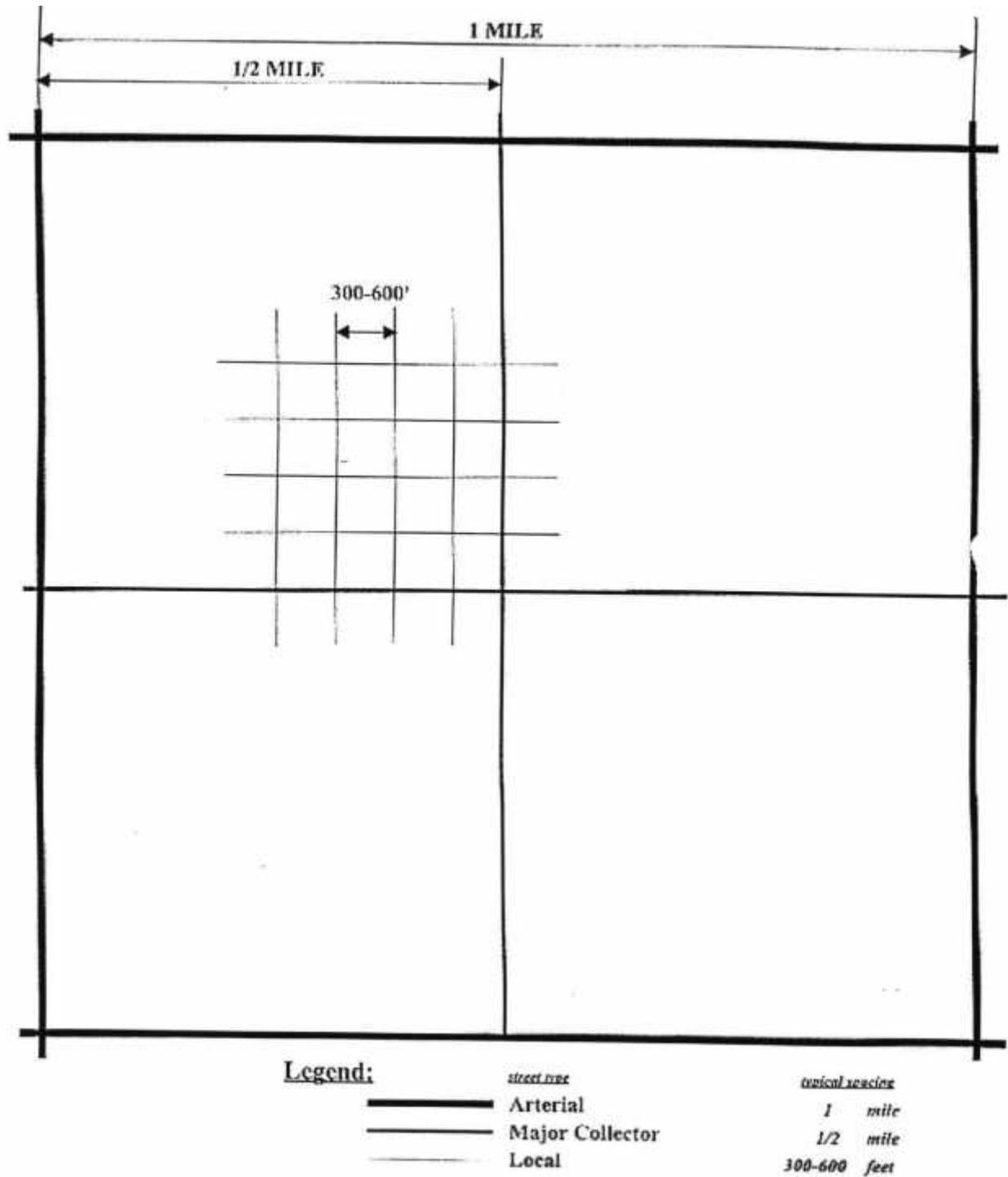
BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 28
Arterial Streetscape
Typicals



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Figure 29
Street Grid System
Typical Street Spacing



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

7.0 TRANSPORTATION SYSTEM IMPLEMENTATION¹¹

7.1 TRANSPORTATION IMPROVEMENT PLANNING & DEVELOPMENT PROVIDERS WITHIN TSP PLAN AREA

City of Bend: The city of Bend is responsible for maintenance and capital improvements for the transportation system under the City’s jurisdiction. It plans for its transportation system needs through a *Capital Improvement Program* (CIP) process. The Bend CIP represents a five-year planning forecast of prioritized transportation system improvements. This document is updated yearly and it is incorporated within the City’s Budget. The CIP addresses transportation elements that include construction and modernization needs of roads, sidewalks and bike lanes. Modernization projects are construction of roadways to urban and/or complete street standards. As such, many of the planned improvements are typically focused on bicycle, pedestrian and safety improvements.

The CIP is also coordinated with the Bend Metropolitan Planning Organization, the Community Development and Public Works Departments, along with input from the Infrastructure Advisory Committee, the Deschutes County Bike and Pedestrian Committee and the Bend Transportation Safety Advisory Committee. Factors such as the assessment of transportation system priorities, transportation coordination needs, other funding opportunities and maintenance or operational impacts as well as changes in population and/or land use patterns all help to define the priorities and structure of the Bend CIP.

The City’s Biennial Budget is adopted by the Bend City Council by the end of June of every other year. The CIP is incorporated into the City biennial budget.

Bend Metropolitan Planning Organization – The Bend Metropolitan Planning Organization (BMPO) was designated as a MPO in December 2002. The BMPO is the federally designated regional transportation planning organization for Bend. It serves as a forum for cooperative and coordinated transportation decision-making by state and local governments, and regional transportation and planning services. The current adopted BMPO boundary is slightly larger than the city of Bend Urban Growth Boundary (UGB).

Deschutes County – Deschutes County is responsible for maintenance and capital improvements for the transportation system under the County’s jurisdiction. It programs transportation improvement and maintenance projects through an annual process known as the Major Roads Capital Improvement Program (MRCIP). The County’s MRCIP is a 20-year list of capital and major maintenance projects. Projects are prioritized based on a high to low ranking methodology and are forwarded for development and construction through the annual budget process which is approved by the Board of County Commissioners. County transportation improvements are typically focused on roadways that fall outside the UGB.

State of Oregon – The Oregon Department of Transportation (ODOT) utilizes a process called the Statewide Transportation Improvement Program (STIP) to plan for highway improvements along the state system. This is a four-year programming document that is updated every two years. The STIP is ODOT’s short-term capital improvement program, providing project funding and scheduling information for the state and other affected government jurisdictions. For administrative purposes, ODOT segregates the state into five distinct *regions*. The STIP document is organized and addresses projects within each of these defined regions. The Central Oregon area, including Bend, is contained within State Region 4. In recent STIPs, the compound effect of ever increasing existing transportation needs, combined with a shrinking funding stream, have placed more and more priority on making investments in maintenance related projects rather than adding new modernization (capacity and facility upgrade) projects. The latest version of the STIP (2015-18) provides funding for both “Fix-it” (typically maintenance related) projects and preserves a portion of funding for “Enhance-it” (capacity increasing) projects.

Bend Park and Recreation District – The Bend Park and Recreation District (BPRD) is a special taxing district that was formed in 1974, when recreation functions separated from the City. BPRD is governed by a five-member publicly elected board of directors. The District includes a geographic area that is slightly larger than the area encompassed by the Bend UGB.

Under the terms of an ongoing intergovernmental agreement between the City and District, the District is responsible for the primary trail system. The District maintains and operates nearly 70-miles of trails. Primary trails are further described in the Bend TSP in Chapter: **6.3.1.3** and delineated on TSP **Map Exhibit-C**; the *Bend Urban Area Bicycle and Pedestrian System Plan – Trail Surface Type*. The maintenance and development of the major trail system of the City is primarily the District’s financial responsibility. Many other connector or secondary trails, multi-use pathways and accessway trails remain the responsibility of the City and/or private development.

The District derives funding for trails primarily from park system development charges, state and federal grant programs and other District general fund revenues. Many sections of the primary trail system have been, and will continue to be, acquired during development. A recent (2012) voter-approved Park Bond Measure will further augment trail system funding substantially.

The entire trail network is depicted on TSP **Map Exhibit-B**; *Bend Urban Area Bicycle and Pedestrian System Plan*.

Central Oregon Intergovernmental Council – The Central Oregon Intergovernmental Council (COIC) serves Crook, Deschutes and Jefferson counties and the cities of Bend, Culver, La Pine, Madras, Metolius, Prineville, Redmond and Sisters. COIC is governed by a 15-member board that is made up of elected officials appointed by each of the member governments and appointed representatives from several other key economic sectors. The respective county courts, councils or commissions make each appointment to the Board.

COIC began serving the residents and communities of Central Oregon, in 1972, as a Council of Governments.

Since the fall of 2010, COIC's Cascades East Transit (CET) has, through an intergovernmental agreement with the city of Bend, taken over the administration and management of the City's former Bend Area Transit (BAT) system.

It is expected that COIC will seek the formation of a transit district and supporting operating levy in the future.

7.2 TRANSPORTATION FUNDING SOURCES

7.2.1 Historic Transportation Funding Distribution.

The largest share of historic transportation funding for Bend projects has been provided by transportation system development charges (T-SDCs). Roughly 2/3rds of the funding for improvements over the last ten years has come from T-SDCs. Table 13 provides a summary of the transportation funding sources.

Table 13

Historic Transportation Funding Sources			
	Last 10 years	Average per year	Percent
SDCs (net)	\$39,938,595	\$3,993,860	64%
State/Federal Grants	\$6,379,523	\$637,952	10%
Franchise Fees (water & sewer)	\$5,024,467	\$502,447	8%
Dev. Exactions/Contributions	\$4,216,294	\$421,629	7%
General Obligation Bonds	\$3,000,000	\$300,000	5%
Interest	\$2,527,796	\$252,780	4%
ROW/real property sales	\$878,622	\$87,862	1%
City/ODOT partnership	\$532,000	\$53,200	1%
Totals =	\$62,497,297	\$6,249,730	

7.2.2 Funding Sources

The sources of funds that the City relies on or has relied on to pay for transportation system operations and capital needs are outlined in this section.

Transportation System Development Charges - Growth related capital improvements are funded by Transportation System Development Charges (T-SDCs) which are assessed on new development. The T-SDC rate was established by methodology studies consistent with Oregon Revised Statutes. The City Council may adjust the charge to reflect changes in methodology, construction standards and costs and inflation.

In prioritizing the TSP projects to be considered eligible for T-SDC expenditure, only those projects that are anticipated to be necessary within the 20-year planning period were included as T-SDC funding eligible. This project list is the basis for calculating the T-SDC. However, the T-SDC funding eligible projects were further prioritized to achieve a fiscally constrained T-SDC project list because the City Council elected to set the T-SDC at 55% of the amount calculated by the methodology for the unconstrained T-SDC project list. The T-SDC methodology contains two project categories: one, projects that are currently eligible for expenditure of T-SDCs and two, a second category of potentially eligible projects that are unfunded. If local priorities change and a project in the second category becomes a priority it can replace a project (or projects) of an equal cost on the first list so that no change in the T-SDC rate would be required. The adopted T-SDC ordinance maintains the flexibility to make this type of change solely within the yearly CIP/City Budget process. A list of currently eligible T-SDC expenditure projects and a map are included in TSP **Appendix E**.

The City used the Deficiency Methodology (growth share = cost – existing deficiency) to allow for a larger portion of some projects to be funded by T-SDCs. Although fewer projects are allocated funding with the constrained list, a larger portion of project costs are now SDC eligible.

Also, if private development occurs that would precipitate the need to build a project identified in the TSP plan but not on the T-SDC list, it would remain ineligible for T-SDC expenditure. However, the facility improvement would be authorized by the TSP and could be built either at the developer's expense, using some other funding source, or both.

The T-SDC also recognizes multi-modal projects as eligible cost expenditures. Now included in the list of eligible projects for T-SDC is the construction of missing sidewalks, including projects along the state highway system.

T-SDC funds remain a relatively variable funding source given fluctuations in development because of the economy. The city experienced large fluctuations in the fund over the last ten years, which makes it difficult to plan for projects and be assured of stable funding.

Both the “Slow Growth Scenario” and “Strong Growth Scenario” funding estimates anticipated incremental increase in T-SDC rates. Increasing the T-SDC rates is one of many potential funding options available to the City. The decision to raise the T-SDC rate is a discretionary decision to be made by the City Council in the future based on the information and policy considerations available to them at the time.

Franchise Fees – In 2004, the City implemented a 4% garbage franchise fee assessed on gross revenues collected by the solid waste franchisees. This revenue provides approximately \$480,000 (2012 dollars) annually and is primarily dedicated to funding street maintenance.

In 2006, the City implemented a 3% water and sewer franchise fee which is assessed on water and sewer rate revenues generated by the City, Roats Water System and Avion Water Company. This revenue is primarily used to fund transportation system capital improvement implementation. In 2012, water and sewer franchise fees generated close to one million annually. These fees are a flexible funding source and can be used to supplement the SDC fund.

General Obligation Bonds – State law allows local governments to issue general obligation debt for infrastructure improvements. An unlimited-tax general obligation bond often must follow a voter authorization in which local residents agree to raise property taxes by an amount equal to debt-service requirements over the life of the bonds.

On May 17, 2011, Bend voters approved a \$30 million general obligation bond to fund various transportation capital improvements including construction of three new roundabouts, and reconstruction and modernization of the Reed Market Corridor. The projects will be completed by 2015. The City intends to use the bond program for transportation improvements in the future.

General Fund Allocation – The City allocates monies from its General Fund each year for street maintenance and preservation and transportation planning. General Fund allocations to street maintenance and preservation and transportation planning have historically ranged from \$1.1 million to \$2.7 million annually. These allocations can be adjusted by the City Council to meet future transportation needs.

Local Improvement Districts (LIDs) – Local street infrastructure improvements that benefit specific properties in a defined area may be funded by LID assessments. Bend Code 2.10.005 provides the governing rules and procedures to create an LID for funding street improvements. Generally a street LID would be initiated by property owners, and if approved by City Council, the local street improvement is planned, designed and constructed by the City and an LID assessment is charged to benefited property owners over a period of ten years to finance the local street improvement.

Developer Contributions – Private land development is currently required to build the entire local, collector and/or arterial streets within or fronting their respective new developments. In addition, private development is required to contribute a proportional

share for improvements to all affected higher classified facilities that are within a predefined impact area. This includes mitigating impacts sufficiently to ensure that adopted transportation mobility standards are met. T-SDC credits are given to private development if the projects are eligible for T-SDC reimbursement under the City's SDC reimbursement section of the Bend Code.

Urban Renewal Funding – Governed by ORS 457, the purpose of urban renewal is to improve specific areas of a City that are poorly or under developed (such as areas that have deteriorated buildings) or lack adequate public infrastructure. Urban renewal provides the authority to use tax increment financing to finance improvement projects. The City has established several urban renewal districts over the years to fund transportation improvements within each district including:

- The Central Bend Development Program Area
- The Juniper Ridge Urban Renewal Plan
- The Murphy Crossing Urban Renewal Plan

Surface Transportation Program (STP) Funds – Started in 2000, the STP is a Federal Highway Administration (FHWA) program created under the Transportation Equity Act for the 21st Century (TEA-21). The STP provides flexible funding for road and bridge reconstruction or resurfacing projects, transit capital and operational projects, bikeways and planning. . The funds are approved and allocated by the MPO Board. For fiscal year 2011-12, the BMPO allocated \$668,611 in STP funds to the City for street maintenance.

Moving Ahead for Progress in the 21st Century – Moving Ahead for Progress in the 21st Century (MAP-21) is the current federal funding authorization bill. MAP-21 authorizes Federal-aid highway programs for the next two years (2013-2014) while maintaining current spending levels. MAP-21 guidelines and policies will be implemented by ODOT and there could be opportunities for funding to the City based on the outcome of that process.

Grants – Federal and state transportation grants historically have been available on a competitive basis. Bend has benefited from several transportation grant programs over the last ten years. The City will continue to apply for grants for needed transportation facilities and improvements.

- **OTIA** – In 2001, The Oregon Transportation Investment Act (OTIA) I and II were created to fund increases to lane capacity and improve interchanges, repair and replace bridges, and preserve road pavement. In 2003, the Oregon Legislature enacted OTIA III to focus on repairing and replacing aging bridges throughout Oregon.

In the early 2000s, the City partnered with the ODOT on a large project on Highway 20, between 12th and 27th streets to fully complete the highway to five lanes, including a trail undercrossing on the east side of Pilot Butte. The project was supported by \$6.5 million in funding from OTIA I & II. The city of Bend also received \$4.76 million of OTIA III grant funds for replacement of the Newport Bridge, in 2005.

- **JTA** - The Oregon Jobs and Transportation Act (JTA) is the transportation funding plan adopted by the 2009 Legislature through House Bill 2001. The increased fuel tax and vehicle fees provided new funding for highways, roads and streets. The JTA allocated \$25 million for the US 97 at Murphy Road Overcrossing project. The Murphy Overcrossing project will begin construction in 2013 and will be completed by 2015-16.

- **Connect Oregon** – In 2005, the Oregon Legislature authorized \$100 million for Oregon’s Multimodal Transportation Fund to invest in air, rail marine and transit infrastructure. In 2007, the Oregon Legislature approved a second authorization of an additional \$100 million. In 2009, a third authorization (House Bill 2001) added another \$100 million. Most recently, in 2011, a fourth authorization added another \$40 million statewide.

The City has received various grant awards through the Connect Oregon Program that have included; the Bear Creek Road Transit Operations and Maintenance Center (Connect Oregon I), the Hawthorne Intermodal Transit Facility (Connect Oregon II) and the Bend Airport taxiway improvements (Connect Oregon IV).

- **STIP** – The Oregon *Statewide Transportation Improvement Program* (STIP) is the state’s four-year transportation improvement program for state and regional transportation systems, interstate, state, and regional highways, bridges, and public transportation. It covers all state and federally-funded system improvements for which funding is approved and that are expected to be undertaken during each four-year period. The STIP is updated every other year and each update cycle begins in odd numbered years. The STIP is adopted by the Oregon Transportation Commission (OTC) and is approved by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) as required by federal law.

One element of the STIP is funding for bicycle and pedestrian projects. This program is managed using a combination of projects on state highways, emergency grants, and a statewide competitive grant application process. The program is state-funded and implements ORS 366.514, which requires cities, counties, and ODOT to provide pedestrian and bicycle facilities on all road construction and reconstruction projects. The statute also requires cities, counties, and ODOT to spend no less than 1% of the State Highway Fund on projects that improve bicycle and pedestrian transportation. ODOT’s Bicycle and Pedestrian Program includes three elements: Grants, urban highway pedestrian projects and quick fixes. Grants are awarded for stand-alone pedestrian and/or bicycle projects on a competitive basis to cities and counties for improvements on City streets or county roads.

Over the years, the City has received a number of grants for bicycle and pedestrian improvements from the state of Oregon. Most recently in 2009, the City received \$255,000 for bike/pedestrian improvements on Galveston (14th St. to Lindsay Ct.) and has been awarded another grant of \$649,993 for improvements to Riverside Boulevard and Franklin Avenue (from Lava to Broadway).

- **TIGER** - The Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants, administered by the US Department of Transportation (USDOT) have provided funding for projects that have a significant impact on the nation, a region or a metropolitan area. For 2012, USDOT is authorized to award \$500 million pursuant to the Consolidated and Further Continuing Appropriations Act, 2012. TIGER grants are awarded on a rigorous competitive basis and past projects awarded have been multi-modal, multi-jurisdictional projects or projects that are otherwise challenging to fund through existing programs.

- **ARRA** – The American Recovery and Reinvestment Act of 2009 (ARRA) and commonly referred to as the Stimulus or The Recovery Act, was an economic stimulus package that was enacted by the U.S. Congress, in February 2009. The intent was to respond to the recession of the late 2000s with a primary objective of the Act to save and create jobs almost immediately.

In Bend, ARRA funding has supported improvements to the transit system (purchase of replacement transit vehicles, several bus stop improvements and the installation of on-board security cameras), efficiency improvements to many of the City’s existing traffic signals and a series of street maintenance repaving (overlay) projects. Projects included: 1) Bend Area Transit = \$627,612 (federal share), 2) Signal efficiency = \$180,000 (federal share), and 3) street overlays = \$1,230,000 (federal share).

Public-Private Partnerships – The City can enter into partnerships with private developers for the construction of transportation improvements. In general, with new development proposed by developers, the Bend Development Code has the provision that if public facilities are not adequate, new development must either wait for the City to install the facilities or pay the cost of a needed project if it is ahead of the City’s Capital Improvement Plan schedule. The City and developers can enter into a public/private partnership to accomplish the funding and timelines for such improvements. In 2000, the City and a consortium of 12 developers (called the Westside Consortium) entered into an agreement that constructed many west Bend transportation system roundabouts and street improvements that increased transportation system capacity and served the developments that were proposed by the developers. The consortium plan resulted in the construction of over \$20-million in transportation improvements.

Debt Service – Since year 2000, the City has issued \$17.5 million in debt for transportation system improvements. There was \$11.5 million for the Southern River Crossing (Bill Healy Bridge) and \$6 million for the Olney connection. The current debt matures in 2021-2022 and is repaid from transportation SDCs. When considering long-term debt for capital projects, the City adheres to adopted fiscal policies which require that there is sufficient debt capacity and that the debt is financially manageable before debt is issued. In general, debt constraints are as follows:

1. Debt is issued only when necessary for capital improvements that are too large to be funded by current available resources.

2. Capital projects financed through long-term debt shall be financed for a period not to exceed the useful life of the project.
3. Sources of repayment, debt ratios and the affordability of debt will be analyzed prior to issuance of long term debt.

The City will also determine the least costly financing available when issuing debt. State bond banks or financing programs may offer loans at low interest rates and if the total cost of obtaining such loans is lower than the total cost of issuing debt, the City will apply for low interest loans offered by state or federal programs.

7.2.3 Potential New Revenue Sources of Funds for Transportation

Possible new revenue sources that have not been used in the past were included in the funding “Stronger Growth Scenario” funding forecast. Descriptions of these additional funding sources are as follows:

Local Fuel Tax – The City could pursue a local fuel tax as a method of raising additional funding for the transportation system. Under the City’s current Charter, voter approval is required for the City to enact such a tax. In 2009, the Oregon Legislature placed a moratorium on new local fuel taxes. The moratorium will expire in September of 2014.

Transportation Utility Fee – A Transportation Utility Fee (TUF) is a fee assessed monthly through the utility bills. Approximately 19 cities in Oregon use a TUF to fund street maintenance and improvements. The City Council has the authority to enact a TUF when it is deemed necessary to meet transportation maintenance needs.

Local Option Levy – Local governments may ask voters for either a five or ten year local option levies for general government operations. These levies can include street maintenance and transportation improvements. A levy of ten cents per \$1000-tax assessed value is estimated to raise approximately \$800,000 annually using the 2012 assessed valuation of the City.

Local Vehicle Registration Fee – The City had considered a local vehicle registration fee in year 2000 but decided against it at that time. However in Oregon, current state law now only permits counties (but not cities) to implement a local vehicle registration fee. Adoption of a local vehicle registration fee can now only be imposed by *counties* with a population of less than 350,000 if they are supported by the voters of the respective counties.

7.3 PROJECT PRIORITIZATION

Capital Improvement Plan (CIP)

In developing the City CIP for transportation, the City currently has developed the Capital Improvement Strategy that was created in 2010. This document outlines a two-year and five-year CIP that is fiscally constrained, provides recommendations for program direction and intent, and is transparent to the community. It was based on a newly created evaluation model that will be periodically implemented as the CIP is updated.

The transportation needs for the next 20 years were determined by the Transportation System Plan (TSP), current City CIP projects, and City Council priorities.

The objectives for the strategy were the following:

- Define revenue estimates, timing, and possible new sources of funds
- Identify strategies for managing revenue, assets and programs
- Define the criteria and process for ranking and implementing projects
- Develop a down-sized two - five year capital improvement program

The following evaluation criteria were developed:

- Safety – Does the project address or provide enhancements to a known and documented safety-needs location or deficient area? (Providing a crossing, reducing vehicle conflicts, provides connections, etc.)
- Congestion/Mobility – Does the project have the potential to improve existing and expected future traffic flow when compared to a no-build condition? Does it improve local and regional traffic throughout the City on different road hierarchies?
- Cost/Funding Feasibility – Does the project appear to offer user benefits greater than the cost? Is the project able to leverage funding through development and/or synergy can be found with other related projects for funding or construction?
- Connectivity – Does the project create more connections or routes to key destinations including redevelopment, commercial, entertainment and residential areas? Does it provide appropriate facilities for vehicles, bicyclists, pedestrians and transit vehicles?
- Economic Development – Is the project consistent with economic development goals? Does it allow for future economic development and provide for future growth? The project should not heavily impact commercial and employment land within the City.

Roadway System Inventory:

The roadway system inventory information is included on TSP **Appendix A**.

Roadway System Cost Estimates:

Planning level cost estimates have been developed for the roadway system and are included on TSP **Appendix B**.

Roadway System Priorities:

Transportation system priorities for the community are summarized in **Appendix C**.

Roadway System Intersection Priorities:

A proposed schedule for intersection improvements has also been developed in the TSP as many of these intersections will likely be improved ahead of roadway link improvements. Projections (and estimates) have been made for possible intersection control at all intersections (i.e., a traffic signal vs. a roundabout) that are forecast to meet warrants for higher level traffic control. This list also includes existing intersections that are forecasted to be grade-separated. This detail is included on **TSP Appendix D**.

For planning purposes, forecasted transportation improvements have been categorized into three time periods; *near-(1-10 years)*, *mid (11-20 years)* and *far-term (beyond 20-years)*. *Near-term* priorities are projects that have been identified in the five-year CIP process, have other committed funding or are recognized as an improvement that is in imminent need. *Mid-term* priorities are typically beyond the funding capabilities of the current CIP, but none-the-less represent other acknowledged important transportation needs that are anticipated over the twenty-year planning period of the TSP. *Far-term* priorities represent the balance of transportation improvements that are beyond the planning period but are projects that are authorized by the Bend TSP.

The CIP is updated each year. Changes in transportation priorities will result as changes in the community occur with growth and new development, or as new funding is identified. The projects that are defined in the TSP as near and mid-term transportation priorities represent transportation improvements that will be necessary to serve the community for the next twenty-years.

7.4 LONG TERM TRANSPORTATION NEEDS

7.4.0 Transportation Implementation Plan

In 2001, the Bend City Council adopted the Transportation Implementation Plan (TIP) in an effort to provide City staff with policy direction and design criteria for implementing the goals of the General Plan and the TSP. The TIP identified 12 topic areas of guidance; nine of the subjects dealt with completing transportation infrastructure, two with transportation studies and one concerned public involvement. The fundamental premise of the TIP was “*to continue creating a transportation system, which maximizes the ability of vehicles to flow smoothly through the city streets while providing alternative transportation modes, protecting neighborhoods and enhancing the livability of the community.*”

Sidewalk Priorities The completion of the sidewalk system is a major priority for the City. Not only will an improved pedestrian system serve the needs of the mobility disadvantaged (people without a car and/or people that may have some form of physical mobility limitation) with a more complete system of sidewalks, it will provide safer pedestrian access to and from the public transportation system that serves the City. Virtually all roadway improvements are required to include sidewalks on both sides of a

street by the Bend Development Code. About half of the City's T-SDC projects are specifically proposed for sidewalk infill.

7.4.1 Multi Modal System

The twenty-year estimate of the urban area collector and arterial transportation system is estimated to cost approximately \$291 million (in year 2012 estimates). The share anticipated to be funded from City and private development is \$213 million (not including urban renewal projects).

The City's current funding sources for meeting twenty-year transportation needs includes T-SDC's, state and federal funding, private developer funded exactions and public / private partnerships and Transportation General Obligation Bonds. Projects that are within the two approved urban renewal districts (Juniper Ridge and Murphy Crossing) will be funded with separate urban renewal district generated funding.

The timing of the construction of many of these improvements will occur when the additional capacity demand is created by new development, and the transportation facility must be improved for operations and safety. The timing of the dollars collected from T-SDCs will be consistent with the timing of the new demand generated by development and will be managed through requirements for improvements by developers or construction by the City.

Based on a review of historic transportation related funding, including the growth of SDCs, water and sewer rate increases, the bonding capacity of the City, including General Obligation Bonds, state and federal grant programs, private development potential, reserves and other miscellaneous funding for transportation, the City has developed a revenue forecast that ranges from a conservative *Slow Growth Scenario* to a more optimistic *Stronger Growth Scenario* (Table 15).

Major assumptions in the revenue forecasts include the following:

1. In both the conservative and stronger growth scenarios, T-SDCs are adjusted each year by a 2% inflation factor, then in 2017 the T-SDCs are adjusted to \$6,374 per peak hour trip (a 30% increase) and in 2023, the T-SDCs are raised again by another 5%. These adjustments are incorporated in the revenue estimates to reflect the level of T-SDC needed to fund transportation improvements identified in the TSP. In the 2004 T-SDC methodology update, the City's maximum allowable T-SDC rate was determined to be \$6,119/Peak Hour Trip (PHT) and in the 2011 methodology update, the maximum allowable T-SDC rate was determined to be \$8,058/PHT. The City opted to keep the SDC rate below the maximum allowable in an effort to keep development costs down. In order to provide adequate funding for the transportation improvements identified, the revenue estimates assume the City will raise its T-SDC rate in 2017 to a higher level, but still below the maximum allowable rate.
2. In both scenarios, another \$40 million GO bond is assumed in 2032. The City's current GO bond will be paid off in 2032 and the revenue estimates assume that voters will approve another GO bond for transportation improvements to replace the current one that will expire.

3. In the stronger growth scenario, a new revenue source (e.g., local gas tax) is assumed to provide \$500,000 each year starting in 2015.

It is projected that sufficient funding will be available to build the twenty-year needs of the transportation system that are included in the TSP (and are further defined as the near- and mid-term priorities). It should also be noted that actual funding availability will be directly correlated to the rate of community growth and fluctuations in growth rates will lead to varying amounts between the lower and upper funding estimates. Likewise, transportation improvements (and need) will also vary according to actual community growth, and the desires and goals of the community to improve the transportation system. The estimated transportation funding and twenty-year system needs are summarized in Tables 14 and 14A.

Table 14
Twenty-year Forecast Funding and estimated Transportation Needs Summary

20-Year Transportation Funding Growth Forecast Scenarios	
Slow Growth	Stronger Growth
\$193,000,000	\$233,000,000
Estimated 20-year Transportation System Needs (non-state and non-urban renewal)	
\$213,000,000	

Table 14A

Planning Period Needs			
	Near Term (1-10 yrs.)	Bal. of Plan. Period (11-20 yrs.)	Total 20-years
Existing Arterial Modernization	\$94,000,000	\$50,000,000	\$144,000,000
New Arterials	\$10,000,000	\$19,000,000	\$29,000,000
Existing Collector Modernization	\$10,000,000	\$48,000,000	\$58,000,000
New Collectors	\$9,000,000	\$33,000,000	\$42,000,000
Subtotal	\$124,000,000	\$149,000,000	\$273,000,000
Subtract Urban Renewal	<u>-\$28,000,000</u>	<u>-\$32,000,000</u>	<u>-\$60,000,000</u>
Total	\$96,000,000	\$117,000,000	\$213,000,000
Urban Renewal			
	Near Term (1-10 yrs.)	Bal. of Plan. Period (11-20 yrs.)	Total 20-years
Districts			
Juniper Ridge	\$12,000,000	\$25,000,000	\$37,000,000
Murphy Crossing	<u>\$16,000,000</u>	<u>\$7,000,000</u>	<u>\$23,000,000</u>
Total	\$28,000,000	\$32,000,000	\$60,000,000

Table 15

Forecast Potential Transportation Funding Sources					
Next 20-years					
	Growth Scenario		Slow: Strong Aver. 20-yrs	Average per year	Percent
	Slower	Stronger			
SDCs (net)	\$90,210,156	\$119,161,333	\$104,685,744	\$5,234,287	48%
General Obligation Bonds	\$67,000,000	\$67,000,000	\$67,000,000	\$3,350,000	31%
Franchise Fees (water & sewer)	\$30,482,493	\$31,147,031	\$30,814,762	\$1,540,738	14%
Possible <u>NEW</u> Revenue Sources	-	\$9,000,000	\$9,000,000	\$450,000	4%
Current reserves	\$7,000,000	\$7,000,000	\$7,000,000	\$350,000	3%
State/Federal Grants	\$2,285,476	\$2,885,476	\$2,585,476	\$129,274	1%
Interest	\$1,530,000	\$1,530,000	\$1,530,000	\$76,500	1%
Dev. Exactions/Contributions	\$1,200,000	\$1,750,000	\$1,475,000	\$73,750	1%
ROW/real property sales	\$0	\$0	\$0	\$0	0%
City/ODOT partnership	\$0	\$0	\$0	\$0	0%
Debt Service	-\$7,323,030	-\$6,149,715	-\$6,736,372	-\$336,819	-3%
Totals =	\$192,385,095	\$233,324,125	\$217,354,610	\$10,867,730	

The City will continue to evaluate and update its yearly CIP and make adjustments, as necessary, to project priorities and/or assess the need to seek additional funding that may be necessary to complete needed transportation system improvements.

If projected funding cannot be acquired, the City Council may consider accepting additional congestion on the transportation system and postponing transportation projects beyond the planning period.

7.4.2 Non Roadway System

Public Transportation System

As indicated in TSP Section 7.1, the operation and maintenance of the local fixed-route public transportation system that serves the City is currently the responsibility of Cascades East Transit (CET). As of September of 2010, CET assumed the responsibility to run Bend's local transit system. This arrangement was formalized by an Intergovernmental Agreement that included the transfer of the existing transit maintenance facility, on Bear Creek Road, as well as the existing fleet of transit vehicles (both fixed-route and Dial-a-Ride vehicles). Bend's 2010 to 2015 financial commitment to fund transit through CET is one million dollars per year. CET also agreed to manage and coordinate the construction of the Connect Oregon grant funded intermodal transit facility located adjacent to the existing Bend Transit Center, on Hawthorne Avenue. Under terms of the agreement, CET also acquired ownership of the new inter-modal facility when construction was completed.

CET has successfully run the Bend Area Transit system with no reduction in service for approximately two years. Completion of the Hawthorne transit station has provided an

important transit hub in Bend that provides both easy access for county residents coming into Bend from north and south county origins to the Bend transit system as well as providing Bend residents the added mobility to reach destinations outside of the City.

For general planning purposes, Table 16 provides a rough estimate of typical transit system costs particularly those related to bus stops.

Table 16
Miscellaneous Transit Costs

Transit Costs (typical)	
Description	Cost (2012 \$)
Fixed-Route Vehicle ¹	\$151,000
Dial-a-Ride Vehicle ²	\$72,000
Bus Stop: Basic ³	\$225
Bus Stop: PLUS ⁴	\$450
Bus Stop: Covered Shelter ⁵	\$7,800
Bus Stop Pad ⁶	\$1,200
Bike Racks ⁷	\$350
Other Considerations ^{8,9}	variable

1 = 31-ft. Diesel Bus (seating for 27-passengers) with 10-year life including: bus graphics, radio, bike racks, fare box system digital destination signs, **mobile data terminal** (MDT) & licensing
2 = Dial-a-Ride Vehicle - fully equipped (including MDT & licensing)
3 = Sign + pole + schedule holder + braille sign
4 = "3" + Additional costs [for a bench and trash can]
5 = Large Shelter: installed price (costs vary depending on size of shelter)
6 = Concrete Pads - installed: costs can vary depending upon location; unit cost represents typical dimensioned pad for a bus stop, if needed
7 = Cost for a Standard "U"- style bike rack, installed
8 = Landscaping, ash cans, information boards, supplemental bus stop access sidewalk - needs vary dependent on location & demand
9 = Other: Bus Stop Design/Engineering costs - dependent on location

Note: This data is provided for information purposes only. CET is responsible for providing public transit services within Bend's UGB.

Neighborhood Accessway System

The Neighborhood Accessway System is comprised of a network of local streets, forming a grid of approximately a 1/4-mile frequency, and the system of community wide trails. Most of the planned Accessway System will be completed by the respective development or redevelopment of those areas of the City as they are eventually urbanized.

The Neighborhood Accessway System is depicted on TSP Map B. Costs for the development of the trail system are included in the *Assessment of Bicycle and Pedestrian System Needs* report. Development of the full network of the planned Neighborhood Accessway System is anticipated to be completed principally by private and some public funding resources. In the case of the local roadways, most if not all of any new local roads will be constructed by private development. Development of adjacent Primary and Secondary (i.e., connector) trails are also normally a required part of the private development responsibility.

Trails Priorities Both the City and the Park District place a high priority in completing the River Trail system and large sections have been completed from the north end of the community to the south.

7.5 TRANSPORTATION FUNDING AND PRIORITIZATION POLICIES

Funding Policies:

1. The Bend City Council should regularly evaluate existing funding sources and explore the use of new funding opportunities to increase resources for maintenance operations and capital improvements.
2. The City shall work with the County and State to develop new sources of transportation funding for all transportation modes.
3. The City shall annually prepare a five-year capital improvement program for a balanced transportation system. The selection of transportation improvements, within the City's yearly Capital Improvement Program plan, shall continue to be subject to public review and comment through a City Council public hearing process.
4. The City shall explore ways in which to better inform and involve citizens in the development of transportation system budgets.
5. The City shall work with ODOT to develop funding sources for projects on the state highway system that include City and State as major funding partners.
6. The City shall use the City Council adopted Transportation Implementation Program (TIP) as a guide to the development of all transportation projects in the Capital Improvement Program (CIP).
7. The Financing Program projections show that sufficient funding will be available to build the twenty-year needs of the transportation system that are included in the TSP and further defined as the near- and mid-term priorities. However, if existing and future funding levels do not fully cover increased demand on the system, the City Council may accept additional congestion on the roadway system to allow transportation projects to be postponed beyond the planning period.¹¹

Benchmarks and Guidelines

1. City shall establish transportation revenue and needs benchmarks to monitor progress toward fulfilling a balanced transportation system. This will occur during the CIP budget process.
2. City will create a set of economic performance measures such as but not limited to building permits, population growth, and property tax revenues that establish benchmarks and guidelines to determine the need and timing for additional transportation revenues.
3. The City will use the following existing financial policies as guidelines for establishing and modifying the CIP and evaluating CIP projects:
 - A. *A five-year Capital Improvement Program (CIP) encompassing all City facilities shall be prepared and updated annually. A public hearing will be held to provide for public input on the CIP. The five year CIP will be incorporated into the City's budget and long range financial planning processes.*
 - B. *Projects included in the CIP shall have complete information on the need for the project, description and scope of work, total cost estimates, future operating and maintenance costs and how the project will be funded.*
 - C. *An objective process for evaluating CIP projects with respect to the overall needs of the City will be established through a ranking of CIP projects. The ranking of projects will be used to allocate resources to ensure priority projects are completed effectively and efficiently.*
 - D. *Changes to the CIP such as addition of new projects, changes in scope and costs of a project or reprioritization of projects will require City Council or City Manager approval.*

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

8. IMPLEMENTATION OF THE TSP

8.1 EXISTING ORDINANCES

The implementation measures listed in Table 16 below were in place at the time the Bend Transportation System Plan was adopted in the year 2000. Some measures were adopted previously to comply with requirements in the Transportation Planning Rule to provide for safe and convenient travel by non-vehicle modes. Other measures, adopted before the Transportation Planning Rule went into effect, provide for mixed residential and commercial use. These measures are included in Table 16 because they support mode choice and opportunities for shorter vehicle trips and reduction in vehicle miles traveled.

Table 17
Existing Measures that Implement the Bend Transportation System Plan
As of June 2000

ZONING CODE		
Which Part	What it Does	Adopted
RS zone: Accessory dwellings permitted outright in new subdivisions and PUDs [10(2)(f)]	Allows for increased density in the City's major residential zone and possibly reduced trip lengths	12 / 98
RS zone: Reduced minimum lot size to 4000 square feet for new developments [10(5)(a)]	Allows for increased density in the City's major residential zone and possibly reduced trip lengths	12 / 98
RM zone: Reduced minimum lot size to 2500 square feet [11(5)(a)]	Allows for increased density in areas near downtown and around new commercial centers to reduce vehicle trip numbers and trip length	12 / 98
RH zone: Reduced minimum lot size to 2000 square feet [12(5)(a)]	Allows for increased density in areas near downtown and around new commercial centers to reduce vehicle trip numbers and trip length	12 / 98
CN zone: Added dwellings above or behind commercial use as a permitted use; building and parking orientation [13(2)(l) & (7)(e)]	Supports concept for "live-work" opportunities in residential areas to reduce trips; site design supports local pedestrian and bike trips	11 / 95
CC zone: Permits outright housing as secondary use; specifies "build-to" line 10 feet from ROW, requires parking in back or side, requires pedestrian walkways connecting bldgs. to sidewalk [14(2)(a) & (3)(a) & 14(7)]	Provides more pedestrian friendly developments in commercial zones that serve neighborhoods	05 / 94

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

CL zone: Added dwellings above or behind a commercial use as a permitted use, and new residential as conditional use [15(2)(tt) & (3)(a)]	Allows for residential development in major commercial zone to support fewer vehicle trips and reduced trip lengths	05 / 94 and 07 / 88
CH zone: allows high density residential as a conditional use [16(3)(I)]	Allows residential to be close to jobs in major retail and service zone to reduce vehicle trip length and miles traveled	07 / 88
CG zone: allows high density residential as a conditional use [17(3)(c)]	Allows apartments or other high density residential uses to locate close to jobs and shopping to reduce trip numbers or length	07 / 88
CB zone: Added dwellings above or behind a commercial use as permitted use [18(2)(j)]	Allows for residential use in downtown core to support more housing in major employment areas, to reduce vehicle trips and encourage alternative modes	05 / 94
MR zone: Added new mixed use commercial, industrial, and residential zone in center of urban area [21A]	Requires bicycle and pedestrian corridors to maximize foot traffic exposure to goods and services; prohibits big box retail	06 / 95
ME zone: Added new mixed use zone in center spine of urban area that prohibits big box retail and drive-up food service; multiple housing as secondary use [21B]	Can reduce vehicle trip numbers or trip lengths by providing a better mix of job types close to City center and state highway	12 / 98
Site Layout: Transit facility and building orientation to serve other modes; bike parking and internal pedestrian circulation [23(6)(k) & (l); 23(9)(e)-(g)]	Makes commercial and office sites more supportive of pedestrian activity and use by non-automobile modes	02 / 96
Building and Site Design: Provides standards for building orientation, pedestrian walks, pedestrian amenities, building appearance [23A(6)(a) & (6)(b)]	All designed to support pedestrian, bicycle and future transit use, and thereby reducing motor vehicle trips	02 / 97
Showers: Shower and changing facility required for commercial and public uses with more than 25 employees [24(9)(f)]	Requires that showers and an area to change clothes are available to employees who bicycle to work	06 / 93
Bike Parking: Added required bicycle parking “spaces” for almost all uses [24(8)]	Provides bicycle parking for employers and customers	06 / 93

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Bike Parking Facilities: Design standards for type and location of bicycle parking [24(9)]	Provides safe and convenient bicycle parking for employees and customers	06 / 93
Parking Lot Design: Additional standards for pedestrian access in shopping centers [24(5)(g)]	Provides for safe and convenient pedestrian movements to and within large commercial centers	06 / 93
Reduce Parking: Permits reduction in required parking when developer takes extra steps to support other modes [24(5)(I)]	Incentive to reduce paving costs and required parking spaces by taking other steps to support carpool, bike, pedestrian, and transit uses	06 / 93
Reduced Parking for Elderly Housing: Special reduction in parking requirements and minimum lot area for elderly housing [25(18)]	Reduces barrier to needed housing by not requiring standard multi-family parking ratio	02 / 83



SUBDIVISION CODE

Which Part	What it Does	Adopted
Alternative Mode information: Added requirements to show existing and proposed pedestrian accessways and bikeways [3.020(2) & (3)]	Supports alternative modes by providing connectivity between existing and planned pedestrian and bike facilities	06 / 93
Orderly Development of other modes: Subdivision must contribute to orderly development of bikeways and pedestrian facilities [3,060(3)]	Supports alternative modes by providing connectivity between existing and planned pedestrian and bike facilities	06 / 93
Design Standards – alternative modes: Requires convenient and safe pedestrian and bicycle facilities [6.015(1)]	Supports alternative modes to motor vehicle trips	06 / 93
Design Standards – connectivity: Restricts use of cul-de-sacs and dead-end streets [6.015(3)]	Supports connectivity and reduces out of direction travel for all modes	06 / 93
Design Standards – off-site facilities: Provides for off-site pedestrian and bike facilities to schools or parks [6.015(15) & (16)]	Supports alternative mode travel for short trips to local school and parks	06 / 93
Access Corridors: Describes when pedestrian access corridors are required for long blocks, or dead-end streets [6.020(3)]	Reduces out of direction travel for pedestrian and bike travel and encourages alternative mode travel	06 / 93

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

8.2 PLANNED IMPLEMENTATION ORDINANCES

Additional changes to the Bend Zoning Code, Zoning Map, and Subdivision Codes are planned as part of the City's Periodic Review work program beginning in the year 2000. These changes will implement several amendments made to the Bend Area General Plan in 1998 and other changes made by adoption of the TSP. In general, the planned changes to the codes during Periodic Review will support more efficient travel patterns and non-motor vehicle travel.

Changes being considered at the time of adoption of this Transportation System Plan are described in Table 17. Other changes may be considered as needed to address transportation planning in the urban area or region.

Table 18
Planned Changes to City Development Codes
As of June 2000

ZONING CODE		
Which Part	What it does	Likely Adoption
Cluster Housing: New section with more flexible standards for residential in-fill parcels	Supports single and multifamily in-fill projects which may occur close to urban core and reduce trip length	06 / 2001
Professional Office Zone: New zone to shift office development out of RH zone	Will generate higher residential density development in RH zone to support potential transit use; PO zone also permits housing above office use	09 / 2000
Performance Standards: Various new site plan or zone change standards to consider vehicle trip reduction	Will allow additional consideration for projects that can demonstrate reduced reliance on automobile, reduce trip length, or use of alternative travel modes	Mid 2001
Zoning Map: Various changes to zoning map to increase housing density along arterials and around new commercial centers	Will support future transit use, help support new commercial development, and can reduce trip length or promote use of other trip modes	After 2001
Commercial Centers: Locate new, small commercial centers throughout urban area	Reduces peak loading and trip length by dispersing future commercial development away from state highway corridors	Over time based on residential growth and demand
SUBDIVISION CODE		
Which Part	What it does	Likely adopt.
Definitions: Adds definition of Bikeway [1.050]	Clarifies intent of earlier changes regarding pedestrian and bike access corridors and bikeways	10 / 2000

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Alternative Mode information: Extends requirements for information on existing and planned pedestrian and bike facilities to partitions [3.030(1)]	Allows consideration and development of pedestrian and bike facilities as part of a partition as well as subdivisions	10 / 2000
Design Standards – cul-de-sac streets: Restriction of cul-de-sac extended to land partitions [6.020(3)]	Allows for needed pedestrian and bike connections during partition review	10 / 2000
Sidewalk Location: Requires property tight sidewalks in most circumstances [6.020(14)]	Property tight sidewalk allows for a planter strip between sidewalk and street and therefore a more safe and pleasant pedestrian route	10 / 2000
Block Length: Reduces residential block length to 600 feet [6.030(2)]	Provides better connectivity of street system and more direct pedestrian and bike travel	10 / 2000
Access Corridors: Corresponding reduction in block length for required connecting access corridors[6.030(3)]	Provides more direct pedestrian and bike travel between neighborhoods	10 / 2000
Pavement Width: Reduces street pavement width for local residential streets [Tables A-C]	Supports “new urbanism” concepts for pedestrian friendly street design	10 / 2000
Alley Pavement: Reduces alley pavement width [Tables A-C]	Supports “neo-traditional” housing by reducing pavement costs and encouraging alley access	10 / 2000
Trails: Sets standards for trail dedication and improvements [6.120(1)-(5)]	Provides dedication and development of trails shown in General Plan to facilitate non-vehicle travel	10 / 2000
Neighborhood Parks: Subdivision review criterion for new neighborhood parks [6.120(6)]	Establishes a process for creating neighborhood parks which could reduce vehicle trip lengths and support walking or biking trips to neighborhood recreation area	10 / 2000

- ***Skinny Streets:*** The subject of skinnier street standards has been a topic of discussion as it relates back to the 1998 update of the Comprehensive (General) Plan and the development of Transportation System Plan. The fundamental issue has always been - *Is there a skinnier street standard for local streets that is an acceptable width less than a 36-foot wide street?* This whole topic has been driven by a desire to make local streets more “pedestrian friendly”, to reduce development costs and to help encourage slower vehicle speeds. Weighing in on this issue also are the needs of the Public Works and the Fire departments to ensure that the operational needs and safety aspects of the street are not adversely impacted by a reduction of street width. Consequently, many discussions

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

locally (as well as at the state level) have occurred with these interests in hopes of reaching a standard that everyone can accept.

City Council, knowing that this discussion would take some time before an agreement was reached, revised the City standard in 1996. They realized that this was only an interim standard until more discussion occurred on this topic. The new standard adopted permitted the construction of a 30-foot wide street in single-family residential areas. This new standard did not indicate whether parking would be prohibited from either side of the street. It was pointed out, at the time, that on street parking on both sides of a 30-foot wide street could create some operational problems for the public works and fire department activities. However, no stipulations were made at that time to limit on-street parking, it was deemed that problems, if they developed, would be addressed through appropriate parking restrictions.

In 1997, as a part of their General Plan update review, the Bend Transportation Citizens Advisory Committee (T-CAC) made a recommendation to adopt a 32-foot standard on local streets – with 20 foot openings at intersections (fitted with curb extensions).

An example of this type of intersection design was later constructed at a Bend intersection - see: Figure 30). The committee recommendation came after many discussions concerning the issues and needs relative to street widths including traffic calming, pedestrian safety, maintenance and fire response needs. The committee also recommended a 24 foot wide street would be allowed if the block was relatively short and intersected by a wider



Figure 30. Example of a 20' wide curb extension or "choker" on a 30' wide street

Photo by: City of Bend

street – however *it was stipulated* that parking would not be permitted on either side of this street. It was recommended that these standards would replace the 30-foot wide street standard when the street standards were updated. The latest version of the Subdivision Ordinance update is consistent with the T-CAC recommendation and it also includes a 28-foot wide street with parking on one side (public hearings on the Subdivision Ordinance will be held before the City Council later this year).

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

The Subdivision Ordinance update will provide flexibility in street design while accommodating emergency service access. It has been recognized that skinnier streets may reduce traffic speeds and thereby improve livability. The State (DLCD) has been working on guidelines that also seek to improve livability through the use of narrower streets. The City's Subdivision Ordinance is consistent with that objective however the City will continue to explore methods to balance this goal with public safety needs and addressing the unique characteristics of the Bend urban area.

8.3 COMPREHENSIVE PLAN CHANGES

The citizens advisory committee (BTAC), in addition to the TSP recommended changes, had several suggested changes to the Comprehensive (General) Plan as a part of their recommendation to the City. Concurrent with the TSP approval process those sections of the General Plan text and policy sections will be updated to be consistent with the TSP. Those changes are detailed in the BTAC recommendation^{C.10}.



BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

GLOSSARY

ACCESS CORRIDOR - A separate travel way for pedestrians and bicyclists that may be a dedicated right-of-way or an easement. The purpose is to minimize travel distances within and between residential areas and commercial centers, major employment areas, transit stops, or within and between nearby neighborhood activity centers such as schools and parks.

ARTERIAL (STREET) - A major street designed to move large volumes of traffic through the urban area, or to different neighborhoods.

BALANCE/BALANCED - An allocation of planning, financial, and other resources based on the relative need or demand of competing or similar goals or programs.

BEND AREA - A geographic area, larger than the urban growth boundary, roughly equivalent to the 97701 and 97702 ZIP codes. Often used by Chamber of Commerce, realtors, and others to describe the service area and population around Bend.

BIKE LANE - A portion of a roadway which has been designated by striping and pavement marking for the exclusive or preferential use of bicyclists.

BIKE WAY - Any trail, path, part of a highway or shoulder, sidewalk, or other travelway specifically marked and/or signed for bicycle travel.

BIKES ON TRANSIT - A strategy that includes providing “bike racks” on buses. The idea is to encourage bike-transit-bike travel for longer distances or to traverse difficult to bicycle areas (hills, barriers, etc.).

BUILDABLE LANDS - Lands within the urban growth boundary that are suitable, available, and necessary for urban uses.

BULB-OUT - Also called street bulb, curb extension, street intersection ears or knuckles. An extension of the curb line into an intersection with the purpose of reducing the width of a street crossing for pedestrians.

CAPITAL IMPROVEMENT PROGRAM (CIP) - A schedule showing when permanent City or County facility improvements such as streets, sewers, and water facilities will be constructed and how they will be financed. Usually lists project five budget years in advance and is updated annually.

CAR POOLING - Also called ride sharing. A strategy to reduce traffic congestion by having two or more riders in a vehicle to a common destination rather than individual vehicles.

COLLECTOR - A street designed to carry traffic between local streets and arterials, or from local street to local street.

COMPREHENSIVE PLAN - A document with general, coordinated text, policies, and land use map that interrelates all functional and natural systems and activities relating to the use of land.

CURB TIGHT - The location of a sidewalk when it is located immediately adjacent to the street curb rather than separated from the curb by a landscape strip.

DENSITY - The number of dwelling units per acre of land. The General Plan housing needs are based on dwellings per gross acre of land.

DESTINATION RESORT - A self-contained development- providing visitor oriented accommodations, developed recreational facilities, and permanent housing in a setting with high natural amenities.

DEVELOPMENT - A manmade change to improved or unimproved real estate, including but not limited to construction, installation or change to a building or other structure, paving, or land divisions.

DRAINAGE WAY - Any natural or manmade watercourse, trench, ditch, swale or similar depression into which surface water flows.

GENERAL PLAN - The official name for the Bend Area land use plan. Essentially the same as a Comprehensive Plan.

GENERATED TRAFFIC - Describes traffic that is caused, or generated, by street system improvements or by creation of major employer, retail center or similar use that attracts high volumes of vehicle traffic.

GROSS ACRES - The total area including land used for public or private streets, alleys, easements, open space, and other such uses.

IN-FILL - The use of vacant or under-developed parcels of land within existing developed residential areas.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

LARGE STATURE TREE - Describes a tree that is, or will grow to, a significant size and may have a large trunk size and/or wide canopy.

LOCAL STREET - A street designed to provide access to and from residences or businesses.

MEDIAN - A physical divider, typically down the middle of a street, which may be of solid material and/or planted with shrubs and trees.

MULTI-MODAL - A transportation system or right-of-way that plans for and provides for different transportation modes such as driving, walking, biking, and bus service.

NATURAL AREAS - Includes land and water that has substantially retained its natural character. Such areas are not necessarily completely natural or undisturbed, but can be significant for the study of habitats, historic, scientific, geologic features, or as open space.

NEIGHBORHOOD - An area made up of one or more subdivisions or housing developments with geographic features or manmade features such as major roads or rail lines that provide distinctive boundaries to the area.

NET ACRES - The amount of land remaining after necessary deductions have been made for streets, open space, utility easements, access corridors, or other necessary dedications.

OPEN SPACE - Any open lands or waters that are free of intensive development and are intended to remain in such a condition. Includes parks, golf courses, public trails, cemeteries, conservation easements, and other public or private sites that are set aside to conserve natural or scenic resources.

PEDESTRIAN FACILITY - An improvement provided for the benefit of pedestrian travel, including walkways, sidewalks, crosswalks, median refuges, signs, signals, illumination and benches.

PLANNING AREA - The area within the Urban Growth Boundary and Urban Reserve Area, and subject to General Plan policies.

PLANNING PERIOD - As used in the Transportation System Plan, a period of twenty years.

PLANTER STRIP - Typically the landscaped area between a street curb and sidewalk, or between a pedestrian walkway and parking or maneuvering areas in a parking lot.

PLATOONING - A transportation planning term used to describe a group of vehicles traveling in a tight sequence along a roadway. Typically occurs along transportation corridors managed by traffic signals that create breaks and surges in vehicle spacing.

REFINEMENT PLAN - A development plan for a designated geographic area that provides more detail on future street and utility locations, and may include additional standards for uses. Refinement Plan, as used in the Bend Area General Plan, is not the same as defined in Oregon Revised Statutes, Chapter 197.200.

RIGHT-OF-WAY - Public or private land dedicated and planned for the movement of people and goods. May include roads, sidewalks, bike lanes, landscaped planter strips, medians, areas for utility lines, and parking or loading areas.

RURAL LANDS - Those lands outside of the urban growth boundary or urban reserve area.

SIDEWALK - A walkway separated from the roadway with a curb, constructed concrete or other durable surface, and designed for pedestrian use.

STREETSCAPE - Describes all the physical elements that appear in the cross-section of a street right-of-way. May include sidewalks, planter strips, bike lanes, travel lanes, median strip, and lighting.

TELE-COMMUNICATIONS - A general term that includes *tele-commuting* and *tele-working*. The ability to conduct business from home or other location over phone, cable lines or other communication systems and thereby reducing the need to travel to work or a place of business.

TRAFFIC CALMING - A method to modify driving behavior or speed on residential streets using signage, traffic circles, diverters, bulb-outs, and other features.

TRAILS, PRIMARY TRAILS, CONNECTOR TRAILS - Are pathways open for non-motorized vehicle travel. Commonly used by walkers, joggers, bicyclists, or hikers for recreational or transportation purposes. **PRIMARY TRAILS** are also defined as the more significant "City-wide" trail system that is illustrated on the Bicycle and Trail System Map.

TRANSPORTATION PLANNING RULE (TPR) - Oregon Administrative Rule 660-12 that establishes transportation system planning standards and guidance for local and state government.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

TRANSPORTATION SYSTEM - The local and state system of roads, bike lanes, sidewalks, trails and transit facilities needed to transport people and goods within and through the urban area.

TRANSPORTATION SYSTEM PLAN (TSP) - An overall plan for all transportation modes in the urban area as required by the Transportation Planning Rule. Major policy issues in the TSP are discussed in the Transportation Systems chapter in the General Plan.

UNBUILDABLE - Land which because of natural conditions, location, or shape is unsuitable for urban development.

URBAN GROWTH BOUNDARY (UGB) - A site specific line, shown on the General Plan land use map, which separates lands planned for urban level development from rural lands.

URBAN LANDS - Lands that are planned for urban level and types of development and for which urban services are needed. This includes developed land within the City limits and adjacent area within the urban growth boundary.

URBAN RESERVE AREA - An area beyond the urban growth boundary that is planned for long term expansion of the urban growth boundary for urban level development. The urban reserve area is shown on the General Plan land use map.

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

LIST OF ACRONYMS

AADT/ADT	Average <i>Annual</i> Daily Traffic/Average Daily Traffic
AV	Assessed Value (also: TAV – Taxable Assessed Value)
AWDT	Average <i>Weekday</i> Daily Traffic
BDB	Bend Development Board
CAC	Citizens Advisory Committee/also: A local private bus/shuttle company
CIP	Capital Improvement Prgm./Citizen Involve. Prgm. (also:CCI: Comm. for Citizen Involve.)
COATS	California & Oregon Advanced Transportation Systems
COACT	Central Oregon Area Commission on Transportation
COB	City of Bend
COBA	Central Oregon Builders Association
COCAAN	Central Oregon Community Action Agency Network
COCC	Central Oregon Community College
COEC	Central Oregon Environmental Center
COIC	Central Oregon Intergovernmental Council
CORIL	Central Oregon Resources for Independent Living
CORS	Central Oregon Ride Share
DAR	Dial-A-Ride (in Bend, a demand responsive transit service for elderly and disabled persons)
EMME/2	(The “Transportation” Computer Model Program)
FTA	Federal Transit Administration
FHWA	Federal Highway Administration
ISTEA	Intermodal Surface Transportation Enhancement Act (the former federal trans. funding act)
ITE	Institute of Transportation Engineers
KAI	Kittelson and Associates, Inc.
LOS	Level-of-Service
LRT	Light Rail Transit
MAX	Metropolitan Area Express (LRT “name” in Portland)
MPO	Metropolitan Planning Organization
MRCIP	Master Roads – Capital Improvement Program (Des. Co.)
MSD	Metropolitan Service District or METRO (Portland)
MSTIP	Major Streets – Transportation Improvement Program (Wash. Co.)
MUTCD	Manual of Uniform Traffic Control Devices
ODOT	Oregon Department of Transportation
OMD	Old Mill District
PAC	Project Advisory Committee
PC	Planning Commission (Also: BUAPC - Bend Urban Area Planning Commission, or BPC – Bend Planning Commission)
PMS	Pavement Management Systems
SAC	Steering Advisory Committee/Stakeholders Advisory Committee
SDC	Systems Development Charge
SIGCAP	Signal Capacity Analysis (computer software)
SMSA	Standard Metropolitan Statistical Area (also: MSA)
SHTF	State Highway Trust Fund
STF	Special Transportation Fund
STIP	State Transportation Improvement Program (ODOT equivalent of local CIP)
T-CAC	Transportation - Citizens Advisory Committee
TEA-21	Transportation Enhancement Act for the 21 st Century (the current federal trans. funding act)
TED	Traffic Engineering Device (also: a “Traffic Calming” street feature)
TDM	Transportation Demand Management
TGM	Transportation Growth Management
TIS/TIA	Traffic/Transportation Impact Study/Analysis
TND	Traditional Neighborhood Design
TMA	Transportation Management Association
TOD	Transit Oriented Development
TPR	Transportation Planning Rule

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

LIST OF ACRONYMS (continued)

TRIMET	Tri-County Metropolitan – Transit District (Portland)
TSM	Transportation Systems Management
TSP	Transportation System Plan (planners)/Tri-Sodium Phosphate (painters)
TSR	Traffic/Transportation Site Review
T-TAC	Transportation – Technical Advisory Committee
UGB	Urban Growth Boundary
URA	Urban Reserve Area/Urban Renewal Agency
USDOT	United States Department of Transportation
VHT/VMT	Vehicle Hours Traveled/Vehicle Miles Traveled

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

9.0 2016 AMENDMENTS TO THE TRANSPORTATION SYSTEM PLAN

NOTE: This chapter of the Bend Transportation Systems Plan (TSP) includes the amendments necessary to address the requirements of Oregon Administrative Rule 660-12, known as the Transportation Planning Rule (TPR), for the 2016 expansion of the Urban Growth Boundary (UGB). In Chapters 1-8, there may be outdated or inaccurate information. **Where there is a conflict between Chapters 1-8 and this one, the information and policies in this Chapter prevail.**

In addition, the Bend General Plan (now called Comprehensive Plan) Transportation Chapter 7 has been updated as part of the 2016 UGB expansion. **Where Objectives and Policies in Chapter 7 of the Comprehensive Plan differ from those found in Chapters 1-8 of the TSP, the Objectives and Policies in Chapter 7 of the Comprehensive Plan prevail.**

The City plans to begin an update of the TSP after the UGB is approved by Council, at which time the entire document will be revised.

9.1 Background

9.1.1. History and Changes Since 2000

On October 11, 2000, the Bend City Council adopted the Bend Urban Area Transportation System Plan (TSP) by Ordinance No. NS-1756. In 2001, the Oregon Department of Land Conservation and Development (DLCD) remanded the TSP back to the City to correct certain deficiencies, which were addressed through subsequent work between 2002 and 2012. The final remanded section of the TSP, a transportation system financing plan, was acknowledged by DLCD in 2013. The acknowledged TSP is found in the preceding Chapters 1-8.

Since 2000, the City's population has grown from 52,000 to 81,000 and there have been a number of significant changes to the City's transportation system. These include:

- Inclusion of the City into a Metropolitan Planning Organization (MPO) in 2002;
- Creation of a Public Transportation System (Bend MPO Public Transit Plan, 2013);
- Update to the MPO's 2040 Metropolitan Transportation Plan (MTP) in 2014; and
- A number of large capital improvement projects were constructed, including:
 - o Bend Parkway (Highway 97),
 - o Healy Bridge (Southern Bridge Crossing), and
 - o A series of roundabouts and improvements to Mt. Washington Drive funded by a public/private Westside Consortium
- The City completed Transportation General Obligation Bond Projects:
 - o Roundabouts at 18th and Empire, Powers and Brookwood, and Simpson and Mt Washington;
 - o Reed Market from 3rd to 27th improved to City standards, with a new bridge and signal at American Lane,
 - o Railroad upgrades at the crossing,
 - o A new multi lane roundabout at 15th and Reed Market,

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

- o Murphy Road Overcrossing project with an extension of Murphy Road across the Parkway with a new bridge and a new multi lane roundabout at 3rd and Murphy Road, new roundabout at Brookwood and Murphy; and new roundabout at Parrell and Murphy intersections.

9.1.2. 2010 Remand Order

In 2008, the City attempted to expand the Urban Growth Boundary (UGB). This effort was remanded back to the City by DLCD in 2010. The Remand included a number of transportation-specific requirements relating to compliance with the Transportation Planning Rule (TPR), which is the Oregon Administrative Rule (OAR) that implements Statewide Planning Goal 12 – Transportation. In particular, the Remand required the City to comply with OAR 660-012-0035, which is the section of the TPR that addresses the transportation planning requirements that apply to cities that are located within MPOs.

In 2016, the City completed its work to address the issues raised in the Remand, resulting in an approximately 2,380-acre expansion of the UGB. As part of this work, the City has applied land use tools such as increasing residential densities and mixing uses to demonstrate that redevelopment and infill is likely to occur along transit corridors and centers (Opportunity Areas¹) throughout the City (Figure 9.1)

The UGB expansion triggered the need for specific amendments to this TSP. These include:

- An Integrated Land Use and Transportation Plan (ILUTP²);
- New policies to implement the Bend Central District Plan³.
- Projects needed to serve the UGB Opportunity Areas and expansion areas;
- New projects and/or changes to roadway standards needed to serve the Opportunity Areas and expansion areas; and
- An updated financial plan.

¹ "Opportunity Areas" are areas within the City boundary that were identified as having a strong potential for redevelopment because of proximity to transit, employment, and commercial areas. These areas received new mixed use Comprehensive Plan land use designations (and in some cases zoning) as part of the 2016 UGB expansion. See (Chapter 11, Growth Management) of the Bend Comprehensive Plan for details.

² Appendix F.

³ Bend Central District Multimodal Mixed Use Area Plan, July 2014

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

Bend UGB Opportunity Areas July 18, 2016

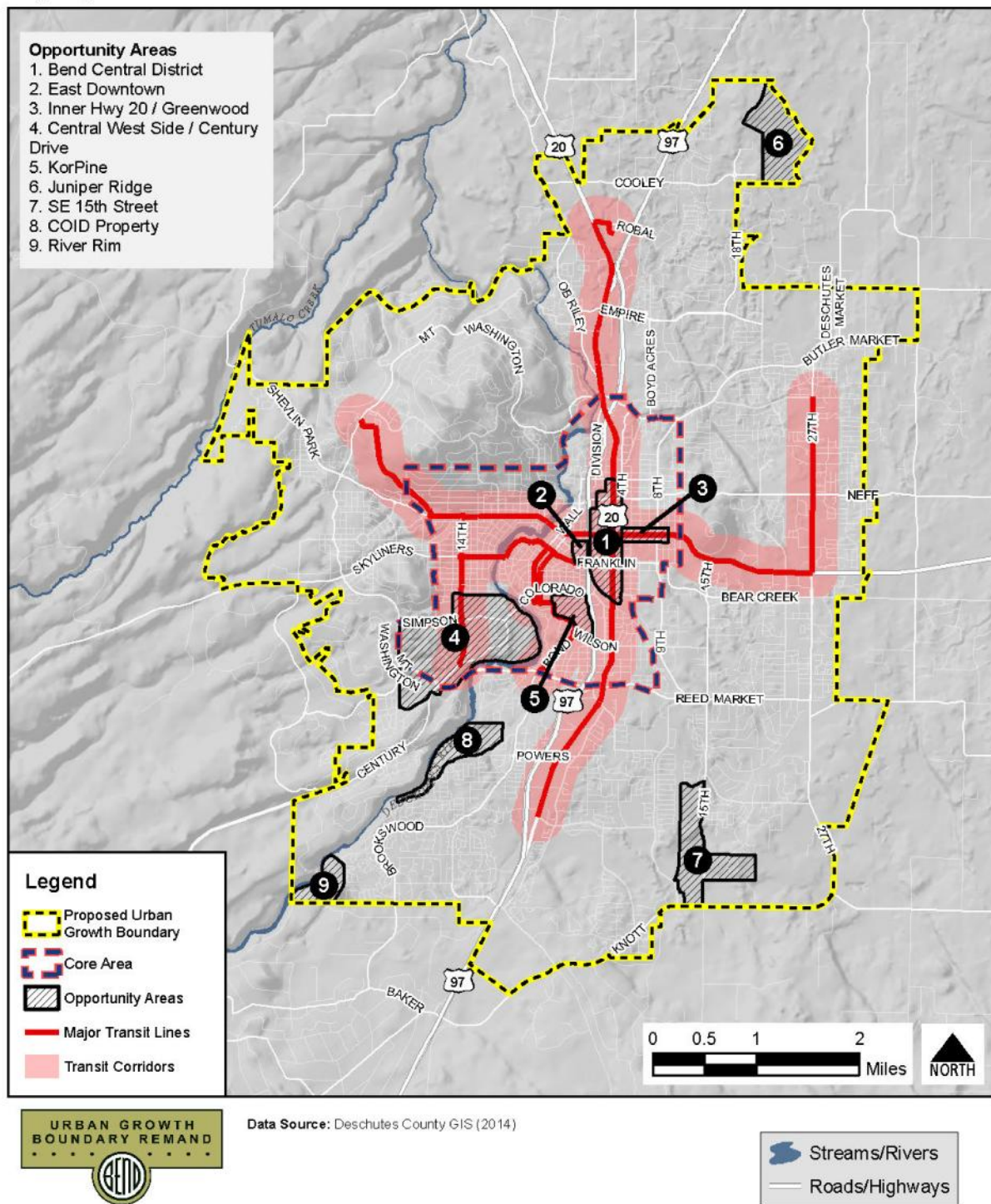


Figure 9.1

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

9.2 Coordination with the Bend Metropolitan Planning Organization

The Remand directed the City to comply with the TPR (OAR 660-012-0016) planning requirements for cities within metropolitan planning areas (MPOs). At the time of the adoption of the acknowledged 2000 Bend TSP, the City of Bend was not yet part of a designated Metropolitan Planning Organization (MPO) area. The Bend MPO was established in December 2002. A federally-compliant regional transportation plan, the Bend MTP, was adopted in June 2007.

The MTP was updated in 2014 (Bend 2040 MTP⁴) to ensure compliance with federal requirements. The 2014 MTP included the full list of projects that were developed for the City's acknowledged TSP Financial Plan (see Chapter 7 and Appendices A-E)..

The travel demand model network modeling for the UGB analysis was based on the Bend 2040 MTP, inclusive of motor vehicle facilities and transit service that are included in the financially constrained system, adjusted to 2028. The amendments to the Bend TSP (Chapter 9 of the TSP) required for the Bend UGB expansion were coordinated with the 2014 MTP. The 2040 MTP transportation demand model was utilized to determine the transportation effects of the UGB expansion proposal, and a coordinated list of projects was created.

In addition, the TPR also requires cities and MPOs to coordinate efforts to reduce reliance on the automobile (OAR 660-12-035). The City has coordinated with the Bend MPO to create an Integrated Land Use and Transportation Plan (ILUTP), as described below (9.3).

9.3 Integrated Land Use and Transportation Plan

9.3.1 Overview

The TPR requires Oregon's larger communities, including Bend, to plan transportation systems and land use patterns that increase transportation choices and reduce reliance on the automobile. How much people are driving, measured as vehicle miles traveled (VMT) per capita (the average distance driven in a day per person) is a key measure of reliance on the automobile. Specifically, the Remand Order required the City to demonstrate that it had included measures and policies to increase transportation choices and reduce reliance on the automobile.

The Remand specified that the City prepare analyses of baseline VMT per capita and then demonstrate the change in VMT that would result from that the proposed UGB expansion, along with land use and transportation measures. If the analysis showed a decline of 5% or more per capita, then the City would have demonstrated compliance with this aspect of the TPR under OAR 660-12-0035(6). If the results showed a decline of between 0% and 4.99%, then the City could prepare a work program to achieve a reduction of 5% or more over the planning period. Finally, if the results of the VMT analysis were to show an increase in VMT

⁴ Bend 2040 MTP's planning period was 2010 to 2040.

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

per capita, then the City would be required to prepare an integrated land use and transportation plan as described in OAR 660-12-0035(5). The purpose of the ILUTP is to describe what can be done to lessen that increase in VMT and “demonstrate progress towards increasing transportation choices and reducing automobile reliance.”

9.3.2 VMT Analysis and Key Findings

As is true with most U.S. cities of Bend’s age, urban form, and rapid growth, Bend’s VMT per capita has been increasing in recent decades. Bend measured growth in VMT per capita against baseline years of 2003 (as specified in the Remand) and 2010 (which the City believes is a better indicator of conditions in 2008 – the beginning of the 20-year planning horizon for the UGB work). In order to evaluate the impact of various VMT reduction strategies, a series of land use and transportation packages, or scenarios, were created and tested. The scenarios tested and the results are included in the ILUTP, Appendix F.

The results of the VMT analysis (using the regional travel demand model) for the preferred UGB expansion scenario showed that there would be an increase in VMT using either baseline. However, the modeling also demonstrated that the increase can be limited to less than 5% under the proposed UGB expansion scenario, with the implementation of certain strategies (Table 9.1). The ILUTP (Appendix F) details the strategies and outlines standards by which the effectiveness of those strategies can be measured.

9.3.3 ILUTP Strategies

The ILUTP identified strategies to be adopted with the UGB expansion, summarized below:

- Designate and ultimately rezone mixed use opportunity areas identified in UGB project.
- Adopt efficiency measures identified in UGB project.
- Set policy supporting incentives approach to TDM⁵ and increasing applicability of TDM programs
- Conduct analysis and feasibility for parking management and pricing
- Establish TDM requirements for institutional and employment master plans
- Support and maintain 2016 service improvements
- Define and enhance transit centers and corridors in opportunity and core areas.
- Propose new and enhanced transit funding
- Implement selective “road diets” where safety issues have been identified
- Implement programmed streetscape projects
- Prioritize streetscapes in opportunity and core areas and transit corridors.

⁵ Transportation Demand Management

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

9.3.4 ILUTP Standards and Measures

The approach to implementation was to identify corridors and centers (e.g. opportunity areas in the core) that have the highest likelihood to reduce VMT. The greatest VMT reductions will happen in locations that have some or many of the needed land use and transportation attributes already in place, such as diversity of land uses, density, connected and walkable design, and accessibility to key destinations. For modest amounts of funding, such areas can greatly reduce reliance on the automobile.

The City also has created standards that will be used to measure progress towards reducing VMT. The standards are performance measures that provide insights into the effectiveness of the City's ILUTP strategies. They are linked to variables that are key to changing travel behavior. The City's standards emphasize evaluating performance in certain targeted areas of the City, including opportunity areas, transit corridors, and the central core. This reflects the City's overall approach of focusing resources on areas that will have the highest likelihood to reduce VMT. The measures include:

- Activity density (population plus employment over area) in targeted areas
- Streetscape Project Implementation (streetscape and bicycle/pedestrian safety improvement projects completed in targeted areas)
- Household and employment transit access (percent of residents and employees within a quarter mile of a transit stop)
- Access to commercial services (percent of residential and employees within a half-mile of an existing or planned commercial area)
- Active TMAs & institutional TDM programs
- Jobs-housing balance (ratio of jobs to housing in the specified area)

9.3.5 ILUTP Implementing Policies

- The City will implement the land use, transportation demand management, parking management, transit, and complete streets strategies, projects and programs that are identified as Proposed Strategies in Chapter 4 of the ILUTP (Appendix F).
- The City will conduct a planning study to evaluate the potential for Transportation Management Areas for the opportunity areas, transit centers, and public and private institutions and companies.
- The City will include streetscape projects in opportunity and core areas and transit corridors when developing the transportation CIP priorities and projects.
- The City will develop transit priority corridors in the opportunity and core areas that include a combination of land use policies and codes and transportation enhancements that encourage transportation options.
- The City will update the assessments of the ILUTP standards at each update of the Bend MPO regional transportation system plan and the City TSP.

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

9.4 Bend Central District Plan

9.4.1 Overview

The Bend Central District is an Opportunity Area that has been the subject of extensive planning efforts. The Bend Central District Plan built on work previously completed for the Bend Central Area Plan (CAP) and focused specifically on an area between the Bend Parkway and 4th Street and between approximately Revere and Burnside Streets. The Bend Central District looked at ways to improve connections for people traveling in the area by foot, bike, bus, car, or freight truck. It also looked at ways to develop the area to include a combination of housing, businesses, shops and other uses to create a distinct and vibrant district.

The Bend Central District Plan included conceptual transportation facility design standards that are specific to the District. Therefore, implementing the Central District Plan will require adopting the transportation-specific policies included below.

9.4.2 Bend Central District Plan Policies

- The city will partner with property owners and developers to make improvements to transportation facilities within the District Overlay to improve connections for all modes of travel, including implementing a well-connected system for pedestrians, bicyclists, and transit users.
- The city will implement street concepts identified in the District Plan over the long term. Improvements may be phased in over time and will be refined, as needed and appropriate, through more detailed facility design processes.
- The city will encourage and work with local businesses and residents to implement transportation demand management programs and strategies.
- The city will work with local businesses and property owners to develop and possibly implement a parking strategy for the Bend Central District that meets local parking needs while also encouraging use of alternative modes (e.g., bicycling, walking, and transit) to travel to, from, and within the District.

9.5 Projects Needed to Implement the UGB Expansion

9.5.1 Overview

The Bend TSP Remand items were adopted by the City of Bend in 2012 and acknowledged by DLCD in 2013, following completion of a transportation system financing plan. The TSP included a list of projects needed to support Bend's project growth through 2032⁶. These were divided into near (1-10 years), mid (11-20 years), and far-term (beyond 20 years).

⁶ The TSP's 20-year planning horizon is 2032. Although this is slightly different than the UGB's 2028 planning horizon, it is reasonably similar.

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

Projects needed to implement the UGB expansion are divided into two groups. The first is improvements to transportation facilities **within** the existing UGB generated by the planned intensification of land uses in the Opportunity Areas (Figure 9.1)). The second group of projects are those that will be needed as part of development of the Expansion Areas **outside** of the existing UGB at the time of Area or Master Planning and annexation.

9.5.2 Opportunity Area Projects

The TSP projects support the UGB Opportunity Areas and efficiency measures except for an improvement needed to Highway 20 between Cooley Road and 3rd Street. The TPR analysis found that this section will further degrade above ODOT's mobility target. To remedy this impact, the corridor can be improved by a project that is already identified in the Bend 2040 MTP. This project would add a travel lane to southbound Hwy 20 from Cooley Road to 3rd Street. It is identified in the Bend 2040 MTP as an ODOT-funded project to be completed before 2040.

9.5.3 Expansion Area Projects

The City has identified 10 UGB expansion areas to provide needed housing and employment. These areas will require either Area or Master Planning (depending on whether they are in multiple or single ownership) prior to annexation. At that time, needed infrastructure, including transportation facilities, will be specified, including the funding sources and strategies for each project.

The City has conducted a high level transportation analysis of all of the Expansion Areas in order to determine their suitability for urban development. The analysis identified projects such as the construction of new arterials or collectors, the upgrade of rural arterials or collectors to urban standards, and the need for other improvements such as bridges over irrigation canals. These projects are summarized in Tables 9.1 and 9.2 and shown in Figures 9.2 and 9.3.

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

Table 9.1: Rural Road Network Upgrade Summary & Approximate Costs

Number	Street Name	Length (ft)	Classification	Improvement Description	Cost*
R1	O.B. Riley Rd	4,450	Major Collector	Curb and sidewalk on east side, bike lanes both directions	\$2.4
R2	Cooley Rd	1,650	Major Collector	Curbs, sidewalks and bike lanes both directions	\$1.3
R3	Cooley Rd	2,700	Minor Arterial	Curb and sidewalk on north side, bike lanes both directions	\$1.1
R4	Hunnell Rd	1,300	Major Collector	Sidewalk on west side	\$0.2
R5	Yoeman Rd	3,200	Major Collector	Curbs, sidewalks and bike lanes both directions	\$2.5
R6	Deschutes Market Rd	950	Major Collector	Curb and sidewalk on east side, bike lanes both directions	\$0.5
R7	Deschutes Market Rd	1,650	Major Collector	Curb and sidewalk on east side	\$0.4
R8	Butler Market Rd	1,350	Minor Arterial	Curb and sidewalk on north side	\$0.3
R9	Butler Market Rd	550	Minor Arterial	Curbs, sidewalks and bike lanes both directions	\$0.4
R10	Butler Market Rd	2,100	Minor Arterial	Curb and sidewalk on north side, bike lanes both directions	\$1.1
R11	Butler Market Rd	2,650	Minor Arterial	Curbs and sidewalks on both sides	\$1.1
R12	Eagle Rd	1,000	Major Collector	Curb, sidewalk, and bike lane on east side	\$0.4
R13	Stevens Rd	2,300	Major Collector	Curbs, sidewalks and bike lanes both directions	\$1.9
R14	SE 27th St	3,300	Minor Arterial	Curb, sidewalk, and bike lane on east side	\$1.3
R15	SE 27th St	1,150	Minor Arterial	Curb and sidewalk on east side, bike lanes both directions	\$0.6
R16	SE 27th St	650	Minor Arterial	Curb and sidewalk on east side	\$0.1
R17	SE 27th St	2,950	Minor Arterial	Curbs and sidewalks on both sides	\$1.3
R18	SE 27th St	650	Minor Arterial	Curbs, sidewalks and bike lanes both directions	\$0.5
R19	Knott Rd	6,800	Minor Arterial	Curbs, sidewalks and bike lanes both directions	\$5.5
R20	15th St	1,300	Minor Arterial	Curb and sidewalk on east side, bike lanes both directions	\$0.7
R21	Knott Rd	1,550	Minor Arterial	Curb and sidewalk on north side	\$0.3
R22	Skyliners Rd	2,300	Major Collector	Curb and sidewalk on north side	\$0.5
R23	Clausen Dr	1,450	Major Collector	Sidewalk on west side	\$0.2
R24	China Hat Rd	500	Major Collector	Sidewalks on both sides	\$0.2
R25	China Hat Rd	N/A	Major Collector	Widen bridge to include sidewalks on both sides	\$0.4
R26	Deschutes Market Rd	N/A	Major Collector	Widen bridge to include sidewalk on west side	\$0.4
				Total Cost	\$25.6

*Rounded, in Millions

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

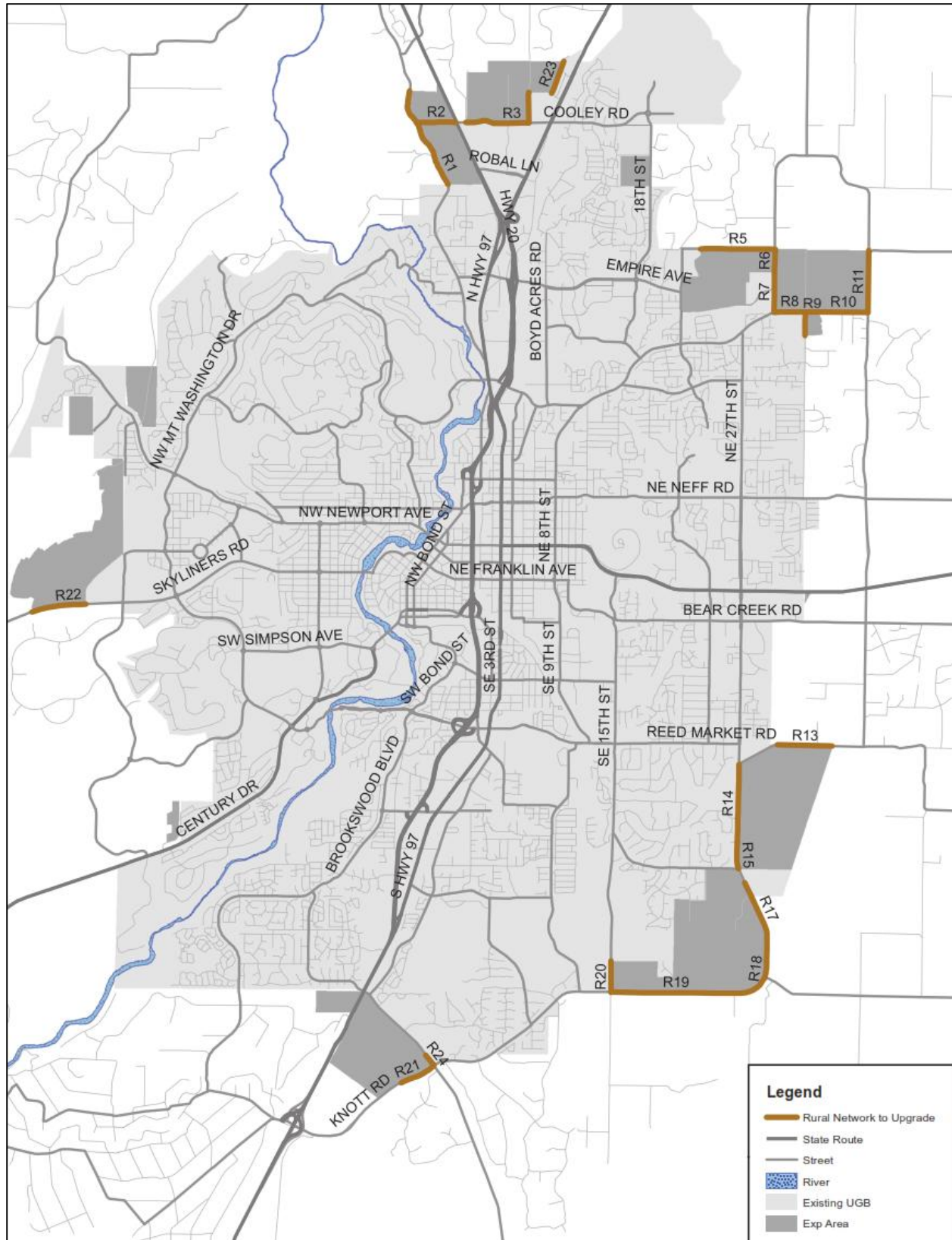


Figure 9.2 Rural Road Network Upgrades

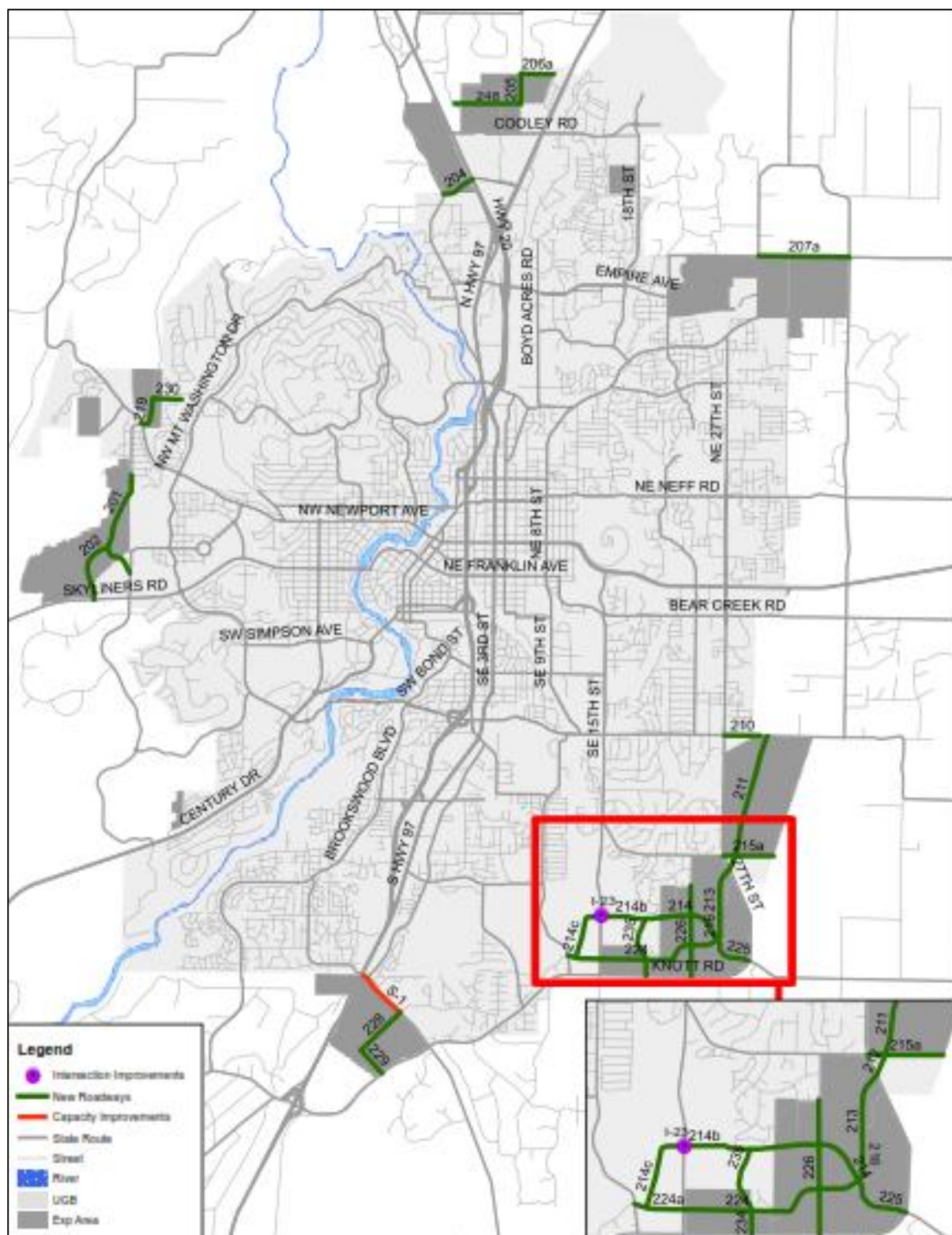
BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

Table 9.2: New Roadway, Corridor, and Intersection Cost Summary

ID	Roadway Name	Subarea	Miles	Lanes	Class	Base*	ROW	Crossing	Total
201	Skyline Rnch Rd Ext	West	0.95	2	Collector	\$6.0	\$3.0	\$0	\$9.0
202	Crossing Drive Ext	West	0.54	2	Collector	\$3.4	\$1.7	\$0	\$5.1
204	New Rd	OB Riley	0.28	2	Collector	\$1.8	\$0.8	\$0	\$2.7
205	Hunnell Rd Ext	Triangle	0.25	2	Collector	\$1.5	\$0.8	\$0	\$2.4
206a	New Rd	Triangle	0.27	2	Collector	\$1.7	\$0.8	\$0	\$2.5
207a	Yeoman Rd Ext	NE Edge	0.76	2	Collector	\$4.8	\$2.4	\$3.7	\$10.9
210	New Rd to Stevens	DSL	0.3	2	Collector	\$1.9	\$0.9	\$3.7	\$6.6
211	New Rd	DSL	1	2	Collector	\$6.3	\$3.1	\$0	\$9.5
212	New Rd	DSL	0.12	2	Collector	\$0.7	\$0.4	\$0	\$1.1
213	New Rd	Elbow	0.42	2	Collector	\$2.6	\$1.3	\$0	\$4.0
214	New Rd	Elbow	0.61	2	Collector	\$3.8	\$1.9	\$0	\$5.8
214b	New Rd	UGB	0.48	2	Collector	\$3.0	\$1.5	\$0	\$4.5
214c	New Rd	UGB	0.49	2	Collector	\$3.1	\$1.5	\$0	\$4.6
215a	New Rd	DSL	0.41	2	Collector	\$2.6	\$1.3	\$0	\$3.9
216	New Rd	Elbow	0.16	2	Collector	\$1.0	\$0.5	\$0	\$1.5
219	Skyline Ranch Rd	Shevlin	0.28	2	Collector	\$1.8	\$0.8	\$0	\$2.7
224	New Rd	Elbow	1.08	2	Collector	\$6.8	\$3.4	\$0	\$10.2
224a	New Rd	UGB	0.28	2	Collector	\$1.7	\$0.9	\$0	\$2.6
225	New Rd	Elbow	0.32	2	Collector	\$2.0	\$1.0	\$0	\$3.0
226	New Rd	Elbow	0.75	2	Collector	\$4.7	\$2.4	\$0	\$7.1
228	New Rd	Thumb	0.45	2	Collector	\$2.8	\$1.4	\$0	\$4.3
229	New Rd	Thumb	0.26	2	Collector	\$1.6	\$0.8	\$0	\$2.5
230	New Rd	Shevlin	0.24	2	Collector	\$1.5	\$0.7	\$0	\$2.3
234	Raintree Ct Ext	Elbow	0.25	2	Collector	\$1.5	\$0.8	\$0	\$2.4
235	Raintree Ct Ext N	UGB	0.26	2	Collector	\$1.6	\$0.8	\$0	\$2.4
248	Loco Rd Ext	Triangle	0.56	2	Collector	\$3.5	\$1.8	\$0	\$5.3
S-1	Corridor improvement, China Hat, widen from 2 to 3 lanes								\$2.5
I-23	Roundabout @ Murphy Rd/SE 15 th Street								\$2.4
TOTAL NEW PROJECTS									\$123.8

*Cost in millions, rounded

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN



BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

9.6 Financial Plan

The following are possible funding strategies for transportation projects listed in Section 9.4 as being needed as a result of the proposed UGB expansion.

The funding strategies identified below for these new projects are **in addition to** those identified in the Bend TSP Chapter 7 Financial Forecast.

The strategies listed in Chapter 7, along with those summarized below, represent reasonably likely methods for funding projects that are needed as a result of the opportunity areas inside the existing UGB as well as for the expansion areas.

The strategy or method for funding groups of individual Scenario 2.1G projects will be determined by the City Council at the time of annexation as part of an area plan or master plan. Area plans are intended, in part, to determine how infrastructure is funded and implemented, and may include refinements of an expansion area projects.

It is probable that a combination of strategies will be used to finance new UGB transportation projects, similar to projects identified on the existing TSP project list (see Appendices A-E). The funding source will depend on the type of development, location, benefits or impacts to the existing transportation system, and timing related to other planned projects.

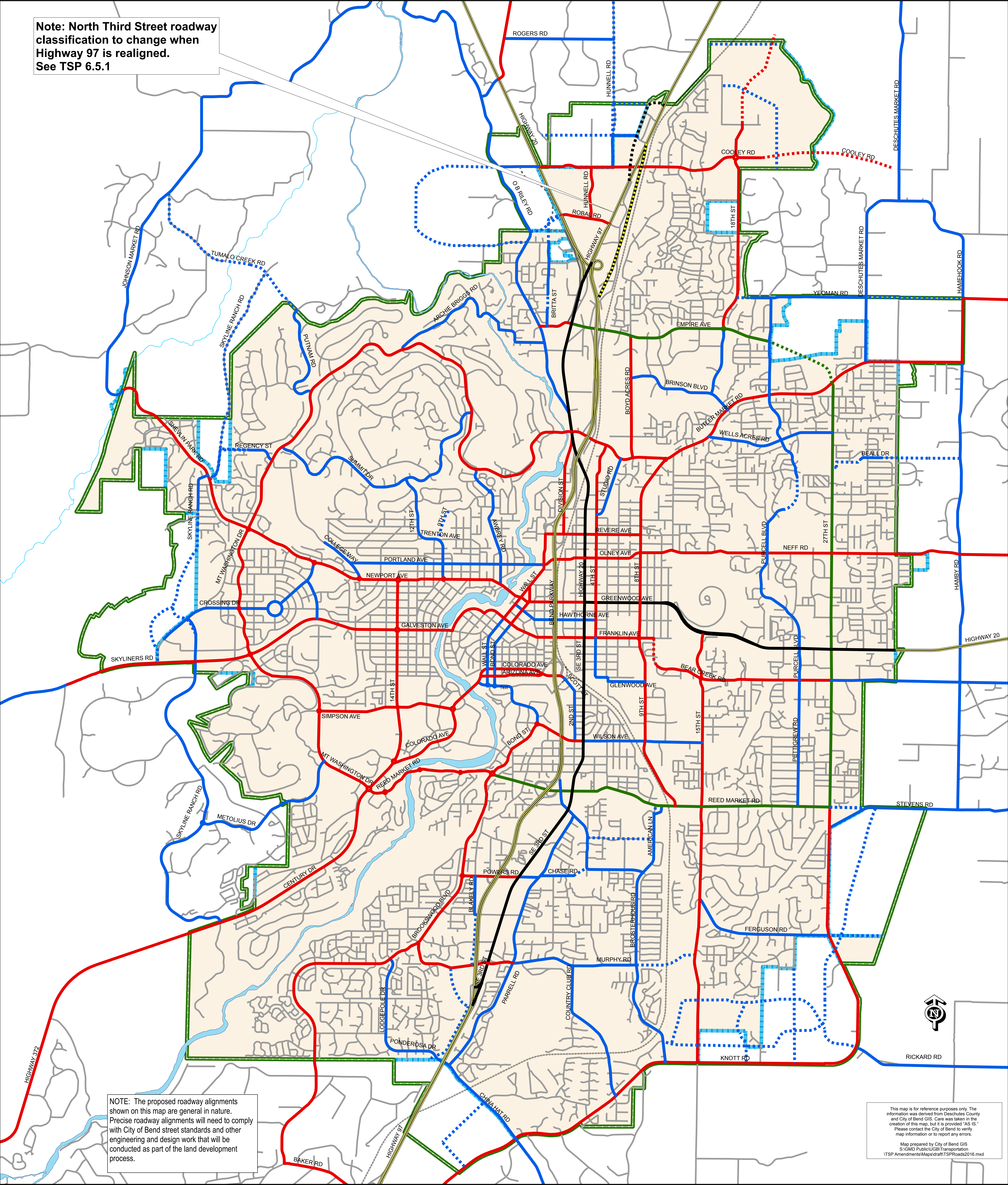
- **Expansion Area Supplemental SDCs:** A supplemental SDC may be paid in addition to the Citywide SDC. The supplement would be directed to a specific transportation project or group of projects within an expansion area. The area would be defined and a list of projects determined as part of the required Area Plan.
- **Sub-Area or District Contributions:** A sub-area or district contribution could be an outcome or in combination with other properties and development inside the existing UGB and one or more expansion areas. The City would need to determine the boundaries of the Sub-Area or District. Depending on traffic impacts and distributions and the nearby expansion areas, it may be advantageous to form larger pools of development contributions for larger more significant projects.

9.7 Updated Maps

The following figures are provided to update and replace maps provided with the 2012 TSP and General Plan updates:

- Figure 9.4: Bend Urban Area Street System
- Figure 9.5: Bend Urban Area Bicycle and Pedestrian System
- Figure 9.6: Bend Urban Area Primary Multi-Use Trail System
- Figure 9.7: Bend Urban Area Transit System

Note: North Third Street roadway classification to change when Highway 97 is realigned. See TSP 6.5.1



NOTE: The proposed roadway alignments shown on this map are general in nature. Precise roadway alignments will need to comply with City of Bend street standards and other engineering and design work that will be conducted as part of the land development process.

This map is for reference purposes only. The information was derived from Deschutes County and City of Bend GIS. Care was taken in the creation of this map, but it is provided "AS IS." Please contact the City of Bend to verify map information or to report any errors.

Map prepared by City of Bend GIS
S:\GIS\Public\UGB\Transportation
TSP Amendments\Maps\draft\TSPRoads2016.mxd

Figure 9.4: Bend Urban Area Street System

July 2016

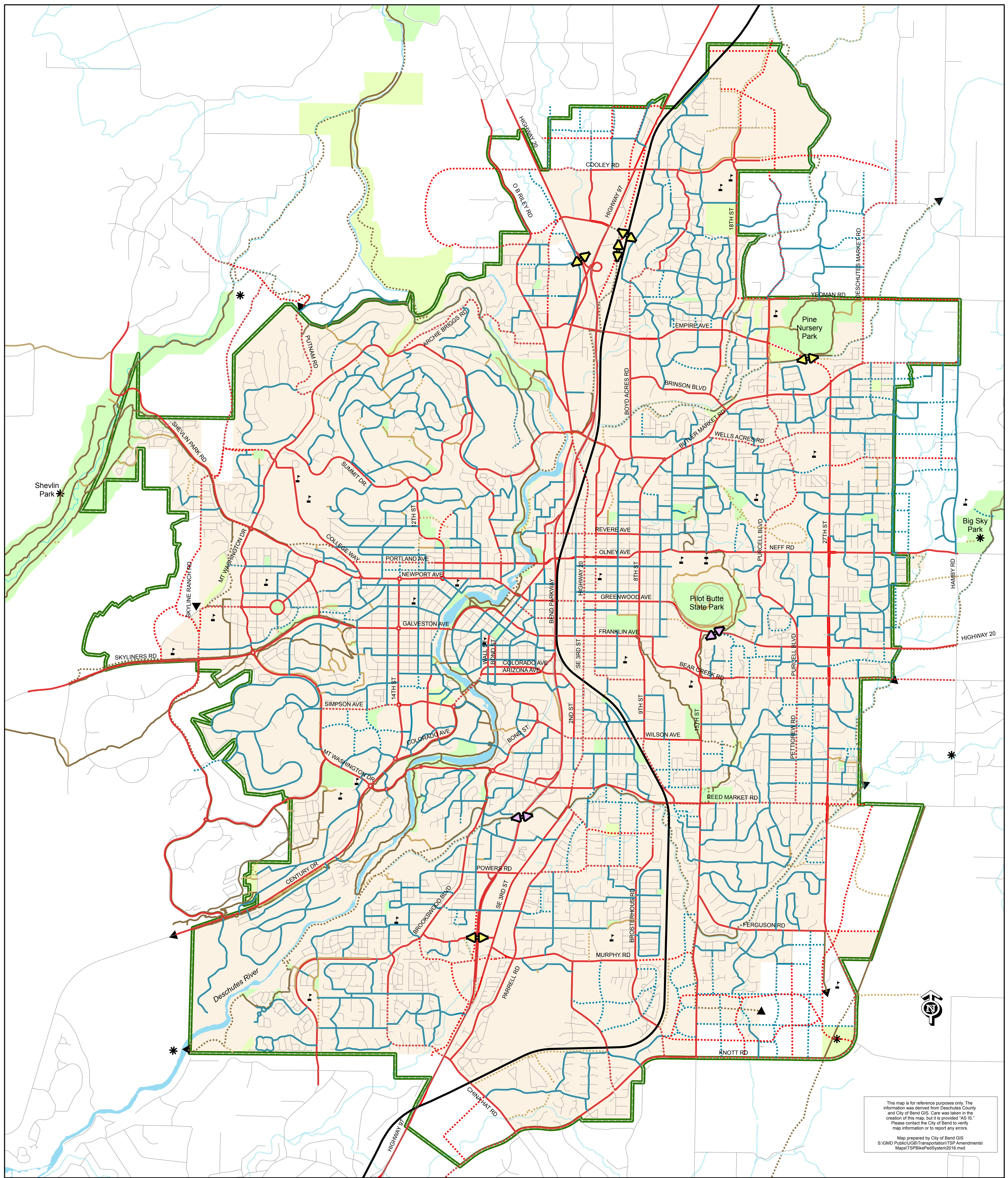
0 0.25 0.5 1 1.5 2 Miles

Legend

- | | | |
|-----------------------------|--------------------------|-----------------------------|
| Expressway | Minor Arterial | Railroad |
| Proposed Expressway | Proposed Minor Arterial | Deschutes River |
| Principal Arterial | Major Collector | Tumalo Creek |
| Proposed Principal Arterial | Proposed Major Collector | City Limits |
| Major Arterial | Frontage Road | UGB - Urban Growth Boundary |
| Proposed Major Arterial | Proposed Frontage Road | |



CITY OF BEND



This map is for reference purposes only. The information was derived from Deschutes County and City of Bend GIS. Care was taken in the creation of this map, but it is provided "AS IS." Please contact the City of Bend to verify map information or to report any errors.

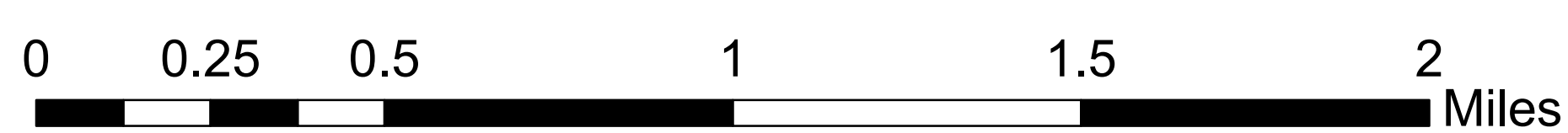
Map prepared by City of Bend GIS
 S:\GMD Public\UGB\Transportation\TSP Amendments\Maps\TSPBikePedSystem2016.mxd

Figure 9.5: Bend Urban Area Bicycle and Pedestrian System

July 2016

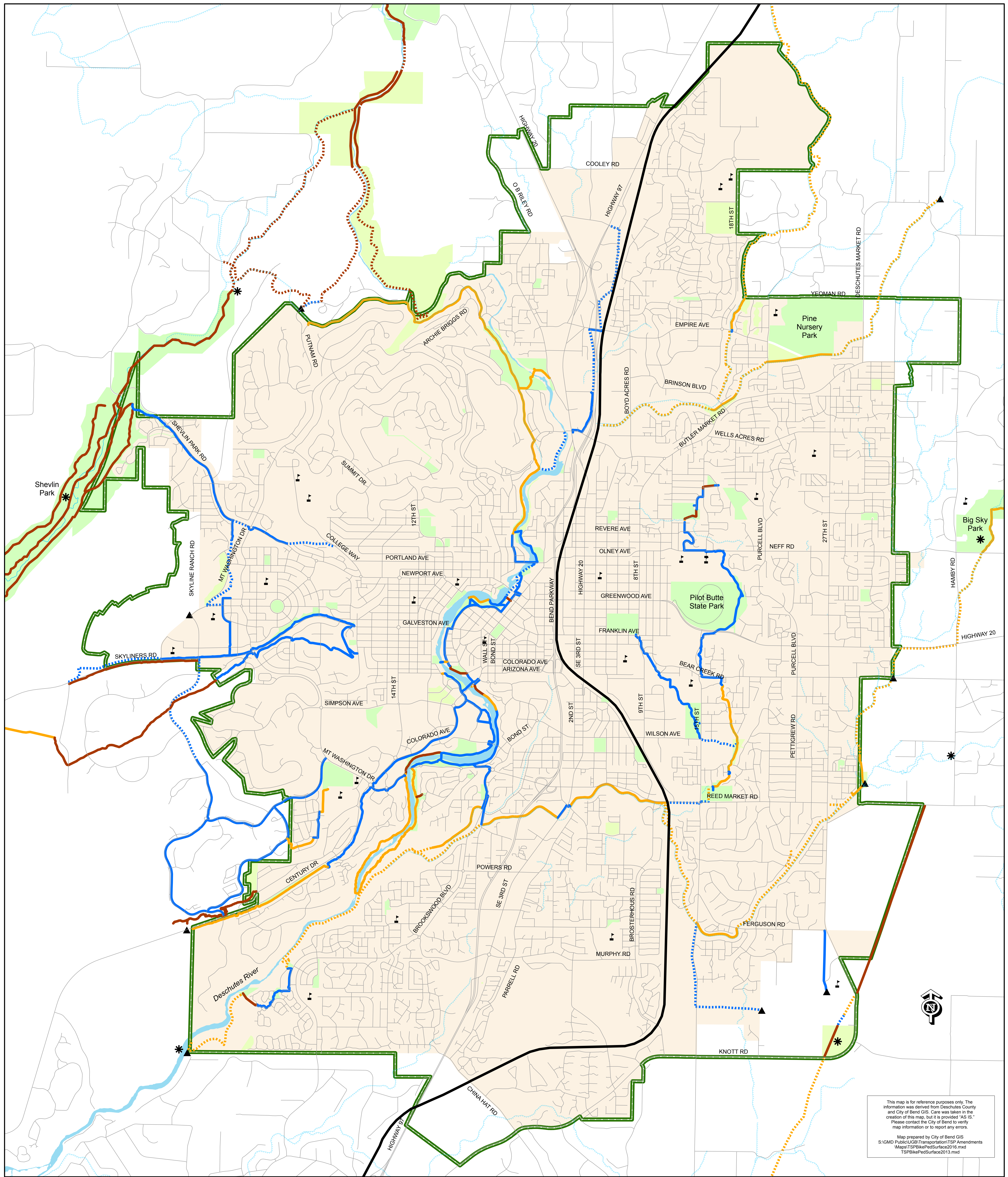


CITY OF BEND



Legend

- | | | |
|------------------------------------|---|-----------------------------|
| — Existing Bicycle Lane | — Existing Multi-Use Path, Connector | — Canal, Unpiped |
| ... Future Bicycle Lane | ... Future Multi-Use Path, Connector | ▲ Connection |
| — Existing Shared Roadway | — Rails with Trails Opportunity Corridor | * Destination |
| ... Future Shared Roadway | Developed Parks | ⚡ Schools |
| — Existing Multi-Use Path, Primary | Undeveloped Parks | City Limits |
| ... Future Multi-Use Path, Primary | Proposed Major Roadway & Trail Grade Separation | UGB - Urban Growth Boundary |
| | Existing Major Roadway & Trail Grade Separation | |



This map is for reference purposes only. The information was derived from Deschutes County and City of Bend GIS. Care was taken in the creation of this map, but it is provided "AS IS." Please contact the City of Bend to verify map information or to report any errors.

Map prepared by City of Bend GIS
 S:\GMD Public\UGB\Transportation\TSP Amendments
 Maps\TSP\BikePedSurfaces2016.mxd
 TSP\BikePedSurfaces2013.mxd

Figure 9.6: Bend Urban Area Primary Multi-Use Trail System

July 2016

Legend

Surface Types:

- Native, Existing
- Native, Proposed
- Alternative, Existing
- Alternative, Proposed
- Hard, Existing
- Hard, Proposed

- Rails with Trails Opportunity Corridor
- City Limits
- UGB - Urban Growth Boundary
- Developed Parks
- Undeveloped Parks

- Canal, Unpiped
- Connection
- Destination
- Schools



CITY OF BEND

0 0.25 0.5 1 1.5 2 Miles

BEND URBAN AREA TRANSPORTATION SYSTEMS PLAN

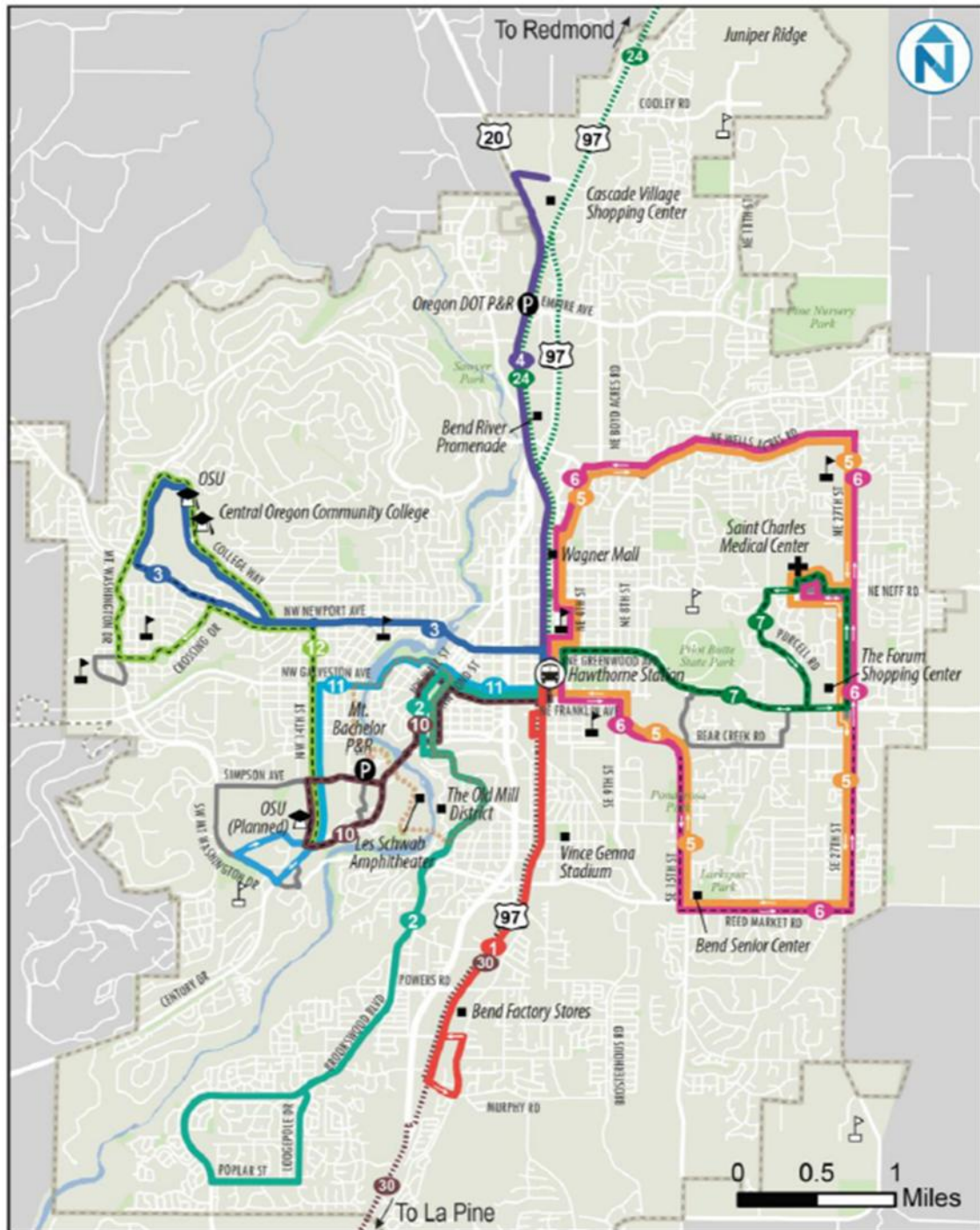
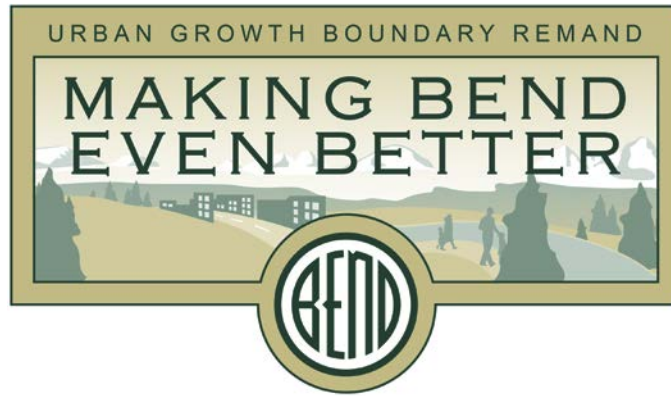


Figure 9.7: Bend Transit System 2016



Bend Integrated Land Use and Transportation Plan

July 19, 2016

ACKNOWLEDGEMENTS

City of Bend

Growth Management Department

Nick Arnis
Brian Rankin
Karen Swirsky

Bend Metropolitan Planning Organization

Tyler Deke
Jovi Anderson

Consultant Team

Angelo Planning Group

DKS Associates

Fregonese Associates

Advisory Committees

Residential Lands Technical Advisory Committee

Kristina Barragan	Kurt Petrich
David Ford	Gary Everett
Stuart Hicks	Don Senecal
Andy High	Sidney Snyder
Allen Johnson	Kirk Schueler
Thomas Kemper**	Stacey Stemach
Katrina Langenderfer	Mike Tiller, Bend-La Pine Schools
Lynne McConnell	
Michael O'Neil	

Laura Fritz, Bend Planning Commission (PC)
Steve Jorgensen, Bend Park & Recreation District (BPRD)*
Gordon Howard, Oregon Department of Land Conservation and Development (DLCD)*

Employment Lands Technical Advisory Committee

Ken Brinich	Robert Lebre
Peter Christoff	Dustin Locke
Ann Marie Colucci	Wesley Price**
Todd Dunkelberg	Damon Runberg
Brian Fratzke	Cindy Tisher
Christopher Heaps	Jennifer Von Rohr
Patrick Kesgard	Ron White
William Kuhn	Joan Vinci, PC

Wallace Corwin, Bend Economic Development Advisory Board
Jade Mayer, Bend Budget Committee
Tom Hogue, DLCD*

Boundary Technical Advisory Committee

Toby Bayard	Mike Riley
Susan Brody	John Russell
Peter Carlson	Ron Ross
Paul Dewey	Sharon Smith
John Dotson	Gary Timm
Ellen Grover	Rod Tomcho
Steve Hultberg	Robin Vora
Brian Meece	Dale Van Valkenburg
Charlie Miller	Ruth Williamson

Thomas Kemper**
Wesley Price**
Rockland Dunn, PC
Scott Edelman, DLCD*
Jim Bryant, Oregon Dept. of Transportation*
Nick Lelack, Deschutes County*

*Denotes Ex-Officio, non-voting members

** Member of Residential / Employment TAC in Phase 1, participating in Boundary TAC in Phase 2

TABLE OF CONTENTS

Executive Summary.....	1
Chapter 1. Introduction.....	5
Purpose of the Integrated Land Use and Transportation Plan	5
What is an ILUTP?	5
Why VMT Matters to the Community	6
Legal Context	6
Chapter 2. Best Practices	11
Land Use: The “D” Variables	11
Transportation Demand Management	16
Parking	18
Transit	20
Road and System Improvements that Influence Walking and Biking	20
VMT Reduction Efforts in Other Oregon Communities.....	21
Chapter 3. Analysis: Methods, Approach and Results.....	23
Methodology.....	23
Approach.....	24
Key Findings from VMT Scenario Testing.....	26
VMT Analysis for the Preferred UGB Expansion Scenario.....	27
Chapter 4. Existing and Proposed VMT Reduction Strategies	33
Introduction	33
Land Use Strategies.....	34
Transportation Demand Management	39
Transit	43
Roadway Improvement Management and Policies	44
Additional Plan and Ordinance Provisions: Complete Streets and Connectivity Investments.....	46
Summary and Implementation.....	49
Chapter 5. Policies, Standards and Benchmarks	53
Proposed ILUTP Policies.....	53
Proposed Standards.....	53
TPR Compliance	56

LIST OF ATTACHMENTS

Attachment 1 Comparison of 2003 and 2010 Regional Travel Demand Models

Attachment 2 Scenario Evaluation Methodology Memo

Attachment 3 TDM and TMA Program Impacts

Attachment 4 Documentation of 2028 VMT Hypothetical Scenario

Attachment 5 Evaluation of Long-Range VMT Trends and Strategies

Attachment 6 Analysis of Benefit of Connectivity Improvements since 1990

Attachment 7 Analysis of Long-Term Redevelopment Potential in Transit Corridors

Attachment 8 Sample Pedestrian-/Transit-Oriented Development Overlay Zone

Attachment 9 Medium-Term and Long-Term Transit Scenarios for ILUTP Testing

Attachment 10 Complete Streets Projects Table

EXECUTIVE SUMMARY

What is an ILUTP?

Oregon's Transportation Planning Rule (TPR) requires Oregon's larger communities, including Bend, to plan transportation systems and land use patterns that increase transportation choices and reduce reliance on the automobile. How much people are driving, measured as vehicle miles traveled (VMT) per capita (the average distance driven in a day per person) is a key measure of reliance on the automobile. When a city's adopted land use and transportation plans are expected to result in an increase in VMT per capita, the TPR requires preparation of an Integrated Land Use and Transportation Plan (ILUTP) that sets standards and policy direction to change that trend. The purpose of the ILUTP is to describe what can be done to lessen that increase in VMT and "demonstrate progress towards increasing transportation choices and reducing automobile reliance" (Oregon Administrative Rule 660-012-0035(5)).

In addition to being subject to legal requirements, policies to reduce VMT are also important to quality of life in Bend. Having more options to get around and shorter distances to travel to meet daily needs, both of which lead to VMT reduction, also improve quality of life. Lowering VMT has a positive effect on air quality and public health, and transportation safety, as well as reducing fossil fuel consumption, greenhouse gas emissions, and travel costs.

VMT Analysis and Key Findings to Date

As is true with most U.S. cities of Bend's age, urban form, and rapid growth, Bend's VMT per capita has been increasing in recent decades. Bend is measuring growth in VMT per capita against baseline years of 2003 (as specified in the Remand) and 2010 (which the project team believes is a better indicator of conditions in 2008 – the beginning of the 20-year planning horizon for the UGB work). In order to evaluate the impact of various VMT reduction strategies, a series of land use and transportation packages, or scenarios, were created and tested. These scenarios included:

- Three UGB expansion scenarios and three "Supplemental Analysis Area Maps" (SAAMs) for 2028 testing different potential growth areas, with consistent assumptions about growth, redevelopment and transit service inside the UGB;
- A hypothetical land use and transportation scenario for 2028 to test the impact of increasing redevelopment in the core, increasing transit frequency, and increasing connectivity in new neighborhoods;
- The draft and final preferred UGB expansion scenario; and
- Several iterations of hypothetical 2040 scenarios to understand how the policies and strategies identified in this ILUTP may affect VMT over time and determine what it will take to reverse the trend on VMT growth in the long term.

Key conclusions and findings from the VMT analysis are summarized below.

UGB Scenarios and SAAMs

- Each of the six scenarios tested increased per capita VMT relative to 2010 (ranging from a 2.9% to a 5.1% increase) due to the amount of growth located outside the center of the

city. The increase relative to 2003 ranged from 8.1% to 10.3%. The TPR requires VMT to not increase by more than 5%.

- Scenarios with an emphasis on complete communities in expansion areas and using growth areas to complete existing neighborhoods generally performed better on VMT.
- Even where there are complete communities in outer neighborhoods, the downtown remains a key destination. As a result, trip lengths and household VMT are generally lower in the central core of the city.
- Scenarios that focused growth close to the key transit and multimodal corridors that connect to downtown generally had shorter average trip lengths.

2028 Hypothetical Scenario

- A significant shift in housing and jobs from expansion areas to opportunity areas in the core (roughly 1,000 housing units additional and 2,000-2,500 additional jobs in the core relative to Scenario 2.1G, with a corresponding reduction in expansion areas), combined with significant transit service improvements and greater connectivity in new master planned neighborhoods, would reduce household VMT per capita slightly relative to 2014.
- The amount of redevelopment that was assumed in the core in this hypothetical scenario is not reasonably likely by 2028; significant transit service improvements may not be feasible by 2028; and increasing connectivity in master planned neighborhoods through smaller block sizes would have downsides including additional land being used for right of way, greater impervious surface area, and less developable area.
- The ideas tested in the hypothetical scenario are more appropriate for long-range strategies than for implementation by 2028.

Official VMT Results for 2028

The table below summarizes the results of the VMT analysis for the preferred UGB Expansion scenario (using the regional travel demand model) in comparison to both the 2003 and 2010 baseline years. VMT per capita increases by just over 1% relative to the 2010 baseline. Because there was nearly a 5% increase between 2003 and 2010, comparing to the 2003 baseline yields just over a 6% increase in VMT per capita. However, the TPR allows local governments to take credit for plans, programs, and actions implemented since 1990 that have already contributed to achieving VMT reductions. To assess this, the City compared 2028 VMT to what VMT *would have been* in 2003 without the connectivity improvements that the City has implemented since 1990 (which have been shown to reduce VMT growth). That comparison showed a VMT increase of less than 5% relative to the modified 2003 baseline. Thus, with this ILUTP, the City is in compliance with TPR requirements related to VMT, regardless of which baseline year is considered. See TPR Compliance Section in this document for further explanation.

	2003 baseline	2010 baseline	Preferred UGB Expansion Scenario (2028 projection) ¹
Daily Vehicle Miles Traveled per capita	9.18 / 9.38 ²	9.64	9.76
Percent increase relative to 2010	N/A	N/A	1.2%
Percent increase relative to 2003	N/A	5.0%	6.3% / 4.1% ²

Strategies to Reduce VMT in Bend

The approach to implementation will be to identify corridors and centers (e.g. opportunity areas in the core) that have the highest likelihood to reduce VMT. Coordination of the transportation system and land use patterns has the most impact on VMT reduction. The greatest VMT reductions will happen in locations that have some or many of the needed land use and transportation attributes already in place, such as diversity of land uses, density, access to transit and transit routes, connected and walkable design, and accessibility to key destinations. For modest amounts of funding, such areas can greatly reduce reliance on the automobile.

The ILUTP identifies “Proposed Strategies”, which are intended to be adopted with the UGB expansion proposal, and also “Additional Strategies for Further Consideration” over the longer-term future. Key strategies are summarized below.

ILUTP Element	Proposed Strategies	Additional Strategies for Further Consideration	
		Medium-Term	Long-Term
Land Use Strategies	Designate and ultimately rezone mixed use opportunity areas identified in UGB project. Adopt efficiency measures identified in UGB project.	Designate additional mixed use areas along transit corridors Adopt design standards for key pedestrian areas and transit corridors. Strengthen connectivity standards for new master-planned neighborhoods.	Consider up-zoning selected neighborhoods where there is potential and community support for infill development.
Transportation Demand Management (TDM) and Parking Management	Set policy supporting incentives approach to TDM and increasing applicability of TDM programs Conduct analysis and feasibility for parking management and pricing Establish TDM requirements for institutional and employment master plans	Consider transportation SDC reductions for TDM measures Require TDM programs for additional large businesses / institutions Partner to establish TMAs for certain areas Implement parking management programs in key areas based on outcomes of parking study	Implement parking pricing in key areas (e.g. downtown and 3 rd Street / Central Area), based on the results of the parking study.

¹ With average daily trip reductions assumed for Juniper Ridge (5%), COCC (10%), and OSU (10%) based on existing and proposed TDM programs.

² With credit for connectivity improvements since 1990. See Attachment 6 for details.

ILUTP Element	Proposed Strategies	Additional Strategies for Further Consideration	
		Medium-Term	Long-Term
Transit	Support and maintain 2016 service improvements Define and enhance transit centers and corridors in opportunity and core areas. Propose new and enhanced transit funding	Implement most components of Bend Transit Plan, including additional hours of service, more frequent peak headways, and two new routes.	Implement further hours of service, improved service and headways on specific routes primarily in opportunity and Core areas, and conversion of 3 routes from bus service to pre-BRT types of service
Roadway Improvement Management and Policies	Implement selective “road diets” where safety issues have been identified	Develop pedestrian and biking safety projects for the opportunity areas that enhance walking, biking, and transit modal splits.	Continue to develop and implement policies that increase walking and biking safety by modifying street standards
Complete Streets and Connectivity Investment	Implement programmed projects Prioritize streetscapes in opportunity and core areas and transit corridors.	Evaluate funding mechanisms for complete street improvements Implement planned but not-yet-funded projects, focusing improvements in opportunity areas and adjoining corridors.	Refinement and potential implementation of aspirational projects

Standards to Measure Progress

The City also must propose standards that will be used to measure progress towards reducing VMT. The proposed standards are performance measures that provide insights into the effectiveness of the City’s ILUTP strategies. They are linked to variables that are key to changing travel behavior. The City’s draft proposed standards emphasize evaluating performance in certain targeted areas of the City, including opportunity areas, transit corridors, and the central core. This reflects the City’s overall approach of focusing resources on areas that will have the highest likelihood to reduce VMT. The standards will be revisited when the City undertakes a more comprehensive Transportation System Plan update in the future. The draft proposed standards include:

- Activity density (housing units plus employment per acre) in targeted areas
- Complete Street Project Implementation (streetscape and bicycle/pedestrian safety improvement projects)
- Household and employment transit access (percent of housing units and employees within a quarter mile of transit)
- Access to commercial services (percent of housing units within a half-mile of existing or planned commercial areas)
- Active TMAs and institutional TDM programs
- Jobs-housing balance (ratio of jobs to housing units) in targeted areas

CHAPTER 1. INTRODUCTION

Purpose of the Integrated Land Use and Transportation Plan

The purposes of this Integrated Land Use and Transportation Plan (ILUTP) are to:

- Provide a policy framework for increasing transportation choices in Bend through an integrated set of long range land use and transportation strategies
- Address Transportation Planning Rule³ (TPR) and Urban Growth Boundary (UGB) Remand⁴ requirements related to reduction of Vehicle Miles Traveled (VMT) per capita and reduced reliance on the automobile
- Describe Bend's policies and standards to be used in demonstrating progress toward a reduction of VMT over time

This ILUTP is a supporting and supplemental document to the Bend Comprehensive Plan and Transportation System Plan (TSP). Bend's Comprehensive Plan and TSP have many policies and standards that support transportation choices. This ILUTP provides an additional policy framework that is specifically targeted at the purposes listed above.

What is an ILUTP?

Oregon's TPR requires that local governments within larger regions plan for transportation systems and land use patterns in ways that increase transportation choices and reduce reliance on the automobile. One way that this is often expressed is through how much people are driving, measured as VMT per capita, the average distance driven in a day per person.

When the City's adopted land use and transportation plans are expected to result in an increase in VMT per capita, the TPR requires preparation of a plan that sets standards and policy direction to change that trend (see below for the full legal context). The central purpose of the plan is to describe what can be done to lessen that increase in VMT and therefore "demonstrate progress towards increasing transportation choices and reducing automobile choices".⁵

As a practical matter, an ILUTP addresses four types of strategies for reducing VMT growth:

- Land use strategies
- Transportation demand management strategies
- Public transit planning
- Policies related to review and management of major roadway improvements

³ Oregon Administrative Rule (OAR) 660, Division 12

⁴ Remand Record 05844 (Section 8.6 e (c) page 121)

⁵ OAR 660-012-0035(5)

Why VMT Matters to the Community

In addition to being the subject of legal requirements, VMT is also important to quality of life in Bend. VMT per capita measures how much people are driving; it generally reflects a combination of the following factors:

- Availability and desirability of alternatives to driving (such as transit service and bike lanes), which influences whether and to what degree people can meet their needs without using the car;
- Proximity between land uses (e.g. the distance from home to the grocery store, work and school), which affects both the potential to reach a destination by walking or biking and the length of the car trip for those who drive; and
- Efficiency of the transportation system (e.g. whether there are direct routes between destinations or whether drivers must travel out of their way to reach their destinations).

Lower VMT can result from fewer and shorter auto trips, and by converting auto trips to other modes such as walking, biking, or transit. Having more options to get around and having shorter distances to travel to meet daily needs, both of which lead to VMT reduction, are generally seen as improvements to quality of life. VMT also impacts transportation emissions, which affect air quality and public health, as well as fossil fuel consumption, greenhouse gas emissions, transportation safety, and travel costs.

Legal Context

The Transportation Planning Rule and Remand Requirements

State administrative rule (Oregon Administrative Rule 660, Division 12, Section 0035; Division 12; also called the TPR) requires that TSPs be based upon “evaluation of potential impacts of system alternatives that can reasonably be expected to meet the identified transportation needs.”⁶ Areas, such as Bend, that are in Metropolitan Planning Organizations (MPO) must “evaluate alternative land use designations, densities and design standards to meet local and regional transportation needs.”⁷

This evaluation informs a strategy and adopted standards “for increasing transportation choices and reducing reliance on the automobile”.⁸ There are a number of strategies that must be evaluated such as improvements to existing facilities and services, enhancements to alternative modes of travel, transportation systems management, travel demand management, and land use standards. These strategies must result in “adopted standards to demonstrate progress towards increasing transportation choices and reducing automobile reliance.” This requires a qualitative and quantitative description in the plan demonstrating that:

- Reliance on the automobile is reduced;
- The availability or convenience of alternative modes is significantly increased;

⁶ OAR 660-012-0035(1).

⁷ OAR 660-012-0035(2).

⁸ OAR 660-012-0035(4).

- There is a likelihood of a significant increase in travel by alternative modes;
- VMT will not increase more than five percent; and
- The standards are measurable and reasonably related to the goal of reducing reliance on the auto.⁹

The TSP must include “policies to evaluate progress towards achieving the standard or standards adopted and approved pursuant to this rule. Such evaluation shall occur at regular intervals corresponding with federally-required updates of the Bend Metropolitan Planning Organization (BMPO) regional transportation plan. This shall include monitoring and reporting of VMT per capita.”¹⁰ The current TSP has policies directed at reducing reliance on the automobile and improving access to alternative modes. However, the TSP will be amended to include new policies specific to meeting the TPR requirements about reducing VMT.

If an MPO can show that adopted plans and measures are likely to achieve a five percent reduction in VMT per capita over the 20-year planning period, it will be found to be in compliance with the rule, but must still adopt interim benchmarks for VMT reduction and evaluate progress with each TSP update.¹¹

If an alternate standard is approved, but an increase in VMT (of less than 5%) is anticipated, the local jurisdictions in the MPO area must prepare and adopt an ILUTP containing specific required elements within three years of the approval of the standard.¹² The required elements are:¹³

- Changes to land use plan designations, densities, and design standards such as increasing residential densities adjacent to transit, major employment areas, and major retail areas; increasing employment densities in designated community centers; designating land for neighborhood shopping centers; and providing housing opportunities in close proximity to employment areas (see full list below);
- A transportation demand management (TDM) plan that includes significant new TDM measures;
- A public transit plan that includes a significant expansion in transit service; and
- Policies to review and manage major roadway improvements to ensure that their effects are consistent with achieving the adopted strategy for reduced reliance on the automobile.

The land use strategies that local governments “shall consider” are listed in detail below.

“(a) Increasing residential densities and establishing minimum residential densities within one quarter mile of transit lines, major regional employment areas, and major regional retail shopping areas;

⁹ OAR 660-012-0035(5).

¹⁰ OAR 660-012-0035(5)(e)

¹¹ OAR 660-012-0035(6)

¹² OAR 660-012-0035(5)(c)

¹³ OAR 660-012-0035(5)(c) and OAR 660-012-0035(2)

“(b) Increasing allowed densities in new commercial office and retail developments in designated community centers;

“(c) Designating lands for neighborhood shopping centers within convenient walking and cycling distance of residential areas; and

“(d) Designating land uses to provide a better balance between jobs and housing considering:

“(A) The total number of jobs and total of number of housing units expected in the area or subarea;

“(B) The availability of affordable housing in the area or subarea; and

“(C) Provision of housing opportunities in close proximity to employment areas.”¹⁴

The examples given in the TPR of policies regarding review and management of major roadway improvements (defined to include “new arterial roads or streets and highways, the addition of travel lanes, and construction of interchanges to a limited access highway”) include:¹⁵

“(i) An assessment of whether improvements would result in development or travel that is inconsistent with what is expected in the plan;

“(ii) Consideration of alternative measures to meet transportation needs;

“(iii) Adoption of measures to limit possible unintended effects on travel and land use patterns including access management, limitations on subsequent plan amendments, phasing of improvements, etc...”

Prior Work and Remand Issues

In the 2008 UGB expansion effort, the City did not address compliance with OAR 660-012-0035.¹⁶ The Remand from the Land Conservation and Development Commission (LCDC) summarizes it as follows: “The [Department of Land Conservation and Development (DLCD)] Director’s Decision found that:

- The metropolitan planning requirements of the TPR are applicable to Bend at this time;
- Bend has not complied with provisions of the TPR applicable to metropolitan areas for adoption of standards and benchmarks to reduce reliance on the automobile; and
- The metropolitan area planning requirements in the TPR must be met prior to a significant amendment of the UGB.”¹⁷

¹⁴ OAR 660-012-0035(2)

¹⁵ OAR 660-012-0035(5)(c)(D)

¹⁶ Note that Bend’s adopted TSP projects a 6% decrease in VMT from 2000 to 2020. However, due to issues with land use buildout consistencies and partner agency support of the technical modeling work that underlies the analysis, it does not provide an adequate basis for establishing compliance with the TPR.

¹⁷ Remand Record 05844 (Section 8.6 pages 119-121).

The City appealed this aspect of the Director's Decision, arguing that it is not required to comply with these requirements before amending its urban growth boundary.¹⁸ The Remand states that *all* goals and rules apply to a UGB amendment, except for the listed exceptions, and there is no exception for the metropolitan area planning requirements specified in OAR 660-012-0035; the City is required to comply with OAR 660-012-0035 before it may complete its UGB expansion.

The Remand identifies three possible outcomes based on the estimated change in VMT per capita projected to result from the revised UGB expansion, along with proposed land use and transportation measures:¹⁹

- (a) A decline of 5% or more per capita means the City is in compliance with this aspect of the TPR under 0035(6).
- (b) A decline of between 0% and 4.99 percent per capita means the City may proceed by preparing for DLCD/LCDC review and approval concurrently with the revised UGB, a work program/plan to achieve a reduction of 5% or more over the planning period.
- (c) An increase in VMT per capita means the city must prepare, submit and obtain DLCD/LCDC approval of an integrated land use and transportation plan as provided in OAR 660-012-0035(5) prior to approval of a revised UGB.

While the Remand requirements do not exactly match the administrative rule, the City's approach is to first meet the requirements of the rule, and then the Remand Order. The City worked collaboratively with the State during the preparation of this ILUTP, and the approach cited here has been reviewed and approved in concept by DLCD staff.²⁰

Time Periods Used in this ILUTP

OAR 660-012-0035 assumes that VMT analysis is being conducted as part of evaluating and selecting transportation system alternatives for the TSP. Determination of transportation needs for a TSP for a jurisdiction within a UGB must be based on population and employment forecasts for 20-years or more.²¹ OAR 660-012-0005 includes the following definition:

(22) "Planning Period" means the twenty-year period beginning with the date of adoption of a TSP to meet the requirements of this rule.

Because the City has been required to address OAR 660-012-0035 as part of the UGB adoption rather than as part of a comprehensive update to the TSP, and because the City is under Remand, the 20-year planning period in question is the planning period for the UGB: 2008 to 2028. However, there is no travel demand model available to represent 2008. Instead, there are models for conditions in 2003 and 2010.

¹⁸ Remand Record 05844 (Section 8.6 pages 119-121)

¹⁹ Remand Record 05844 (Section 8.6 pages 119-121)

²⁰ Personal communication between Karen Swirsky, Senior Planner with the City of Bend and Bill Holmstrom, DLCD Transportation Planner, January 13, 2016

²¹ OAR 660-012-0030(3)(a)

The Remand specifies 2003 as the baseline year. A later clarification letter from DLCD staff²² also described using the regional travel demand models for year 2003 and 2030 (which were the model years available at the time to approximate the 2008 to 2028 planning horizon). However, the MPO and the Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU) have since updated the regional models to base year 2010 and future year 2028. The updated base 2010 travel demand model includes enhancements that better reflect 2008 conditions in Bend and are better for assessing the Remand requirements. The enhancements include (see Attachment 1 for more details):

- An updated base land use developed for the Metropolitan Transportation Plan (MTP), which more closely aligns with 2008 land use patterns in Bend compared to the prior model base year of 2003;
- An updated transportation network to reflect what was built between 2003 and 2010, which more closely aligns with the 2008 network in Bend compared to the prior model base year of 2003; and
- A transit model component to reflect the transit system that now exists in Bend but was not present in 2003.

The year 2028 future scenario includes updates to model components consistent with year 2010 model (noted above) and offers an analysis year that aligns with Remand (as opposed to prior model year 2030).

In addition to providing the benefits listed above, the distinction between the baseline years is important because VMT increased in the Bend area by nearly 5% between 2003 and 2010. For purposes of analysis, the project team is evaluating both 2003 and 2010 as baseline years, and will demonstrate compliance with the TPR requirements based on both baseline years due to the legal uncertainties discussed above.

The ILUTP uses 2028 as the future year for the purposes of measuring VMT changes over the planning horizon. However, the analysis done as part of preparing this ILUTP also looked further ahead to how the policies and measures included in this ILUTP could affect VMT in the longer-range future to 2040. This analysis was intended to provide insights for long-range City policies and for the City's next TSP update, which will have a new 20-year planning period to consider, and will need to demonstrate compliance with the TPR standards, including section - 0035. The long-range evaluation is summarized in Attachment 5.

²² RE: Questions relating to the Bend Urban Growth Boundary (UGB) Vehicle Miles Traveled (VMT) Analysis, Letter from DLCD, November 10, 2011.

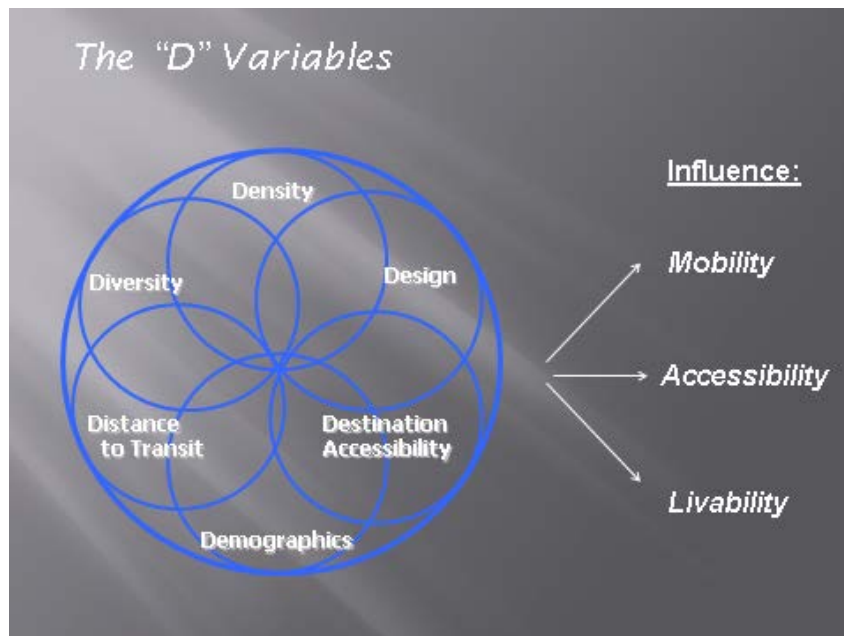
CHAPTER 2. BEST PRACTICES

This chapter provides a brief overview of the key factors that influence VMT -- land use, transportation demand management, parking, and the design of the transportation system -- and examples from other Oregon communities related to these factors. For examples of how these best practices are already being used in Bend, please see Chapter 4, Existing and Proposed VMT Reduction Strategies.

Land Use: The “D” Variables

Research by Drs. Chris Nelson and Reid Ewing of the University of Utah (among others) has identified a number of key factors that influence travel behavior, as summarized in Figure 1.

Figure 1: The “D” Variables



In brief, this research has found the following estimated impacts on travel behavior from the variables identified above:²³

- Density (Housing and employment densities):
 - o Doubling housing density reduces VMT 4%, increases walking and transit usage 7%
 - o Doubling of commercial density increases walking 7%
- Diversity (mix and types of land uses primarily housing and commercial):
 - o Doubling diversity of land uses, aka “Entropy” score within one mile (0-1 score) yields -9% VMT, +15% walking, +12% transit (twice as influential as housing density)
 - o Doubling ratio of jobs to housing (i.e. 0.5 to 1) yields -2% VMT, +19% walking (significant impact on walking, less so on VMT)

²³ Ewing, Tan, Goates, Zhang, Greenwald, Joyce, Kircher, and Greene (2014) Varying influences of the built environment on household travel in 15 diverse regions of the United States, *Urban Studies* 1-19.

- Design (Design refers to street patterns and also streetscape design) :
 - o Intersection density important, but measures of connectivity (% 4-way intersections) have a compounding influence; doubling intersection density yields -12% VMT, +30% increase in walking. Most influential predictor of walking.
- Destinations (Accessibility to employment and uses central to an urban area such as downtowns):
 - o Employment within 1 mile, employment within 20 and 30 minutes by auto, and employment within 30 minutes by transit: most influential variable on VMT – doubling job accessibility by auto yields a 20% reduction in VMT.

The approach outlined above is supported in the technical literature. Washington State Department of Transportation published an analysis of the relationships between urban form and travel behavior²⁴, and the Florida Department of Transportation confirmed that strategies to reduce transportation demand via coordination of land use and transportation planning can contribute to meeting future mobility needs²⁵.

In addition, the City used an extensive literature review to ensure that the proposed approaches would be effective. In particular, the Transportation Research Board has published a paper documenting the positive effects of growth management policies on travel demand²⁶. The City has considered measures from the Environmental Protection Agency's Guide to Sustainable Transportation Performance Measures, which describes 12 performance measures that can be used in transportation decision-making, from transit accessibility to bicycle and pedestrian facilities²⁷.

The urban form studies prepared for the UGB project illustrate where many of the key variables identified above are present in Bend today, including density, connectivity, access to destinations / neighborhood completeness, and access to transit. Key diagrams from those studies are included on the following pages. The land use diagrams were instructive in the beginning of the ILUTP analysis to show broad patterns of land uses in relationship to the transportation system and the "D" variables. In addition, the UGB scenario evaluations included analysis of many of these indicators for the future urban form expressed in the scenarios.

²⁴ Washington Department of Transportation, 1994, Publication WA-RD 351.2: An Analysis of Relationships between Urban Form (Density, Mix and Jobs-Housing Balance) and Travel Behavior (Mode Choice, Trip Generation, and Travel Time).

²⁵ Florida Department of Transportation, 2004, Publication BC353-46: The Relationship between Land Use, Urban Form, and Vehicles Miles of Travel: The State of Knowledge and Implications for Transportation Planning.

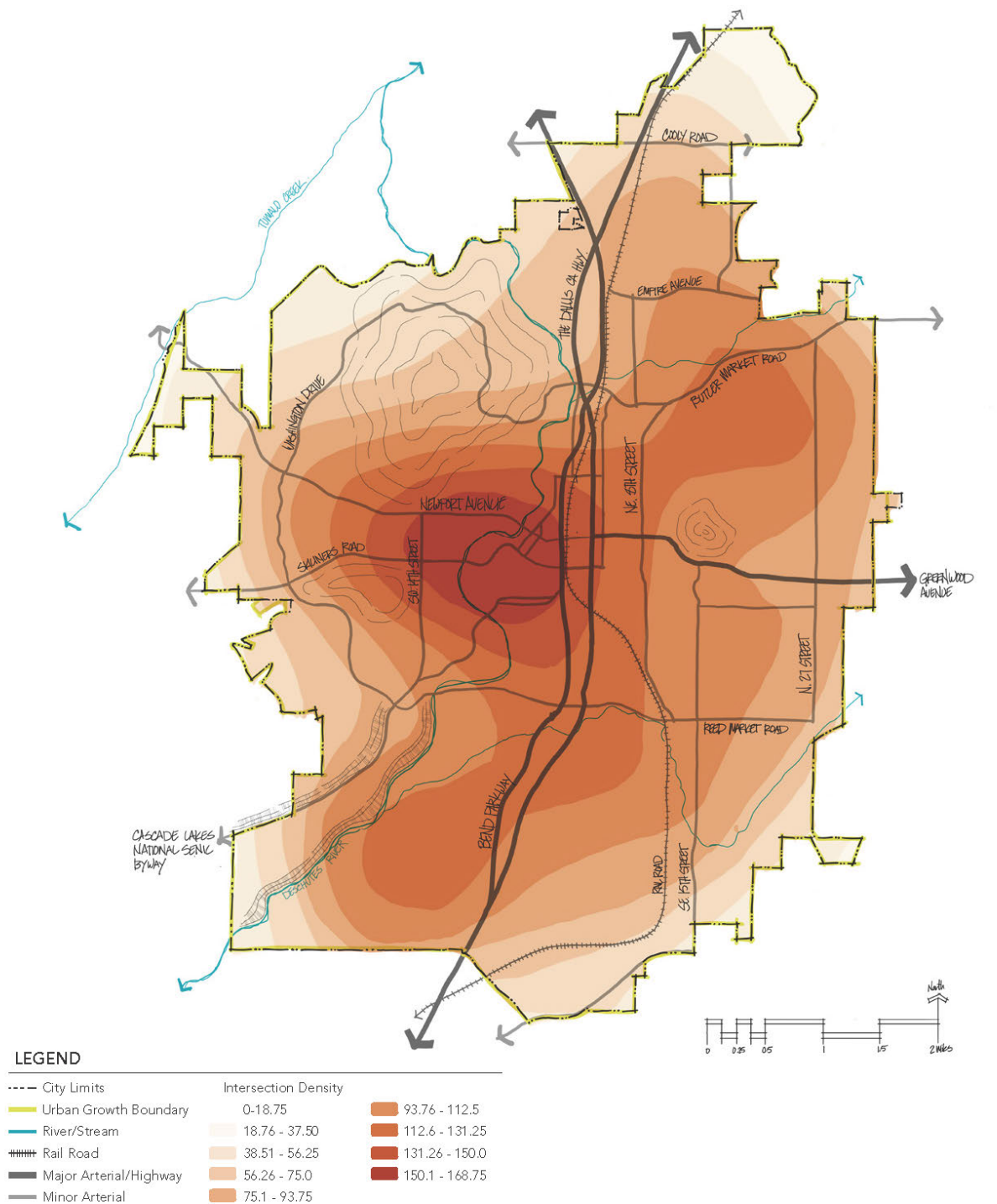
²⁶ Transportation Research Board, 2013, Publication SHRO 2 C16: The Effect of Smart Growth Policies on Travel Demand.

²⁷ Environmental Protection Agency, 2011, Publication 231-K-10-004: Guide to Sustainable Transportation Performance Measures

Bend Integrated Land Use and Transportation Plan
July 19, 2016

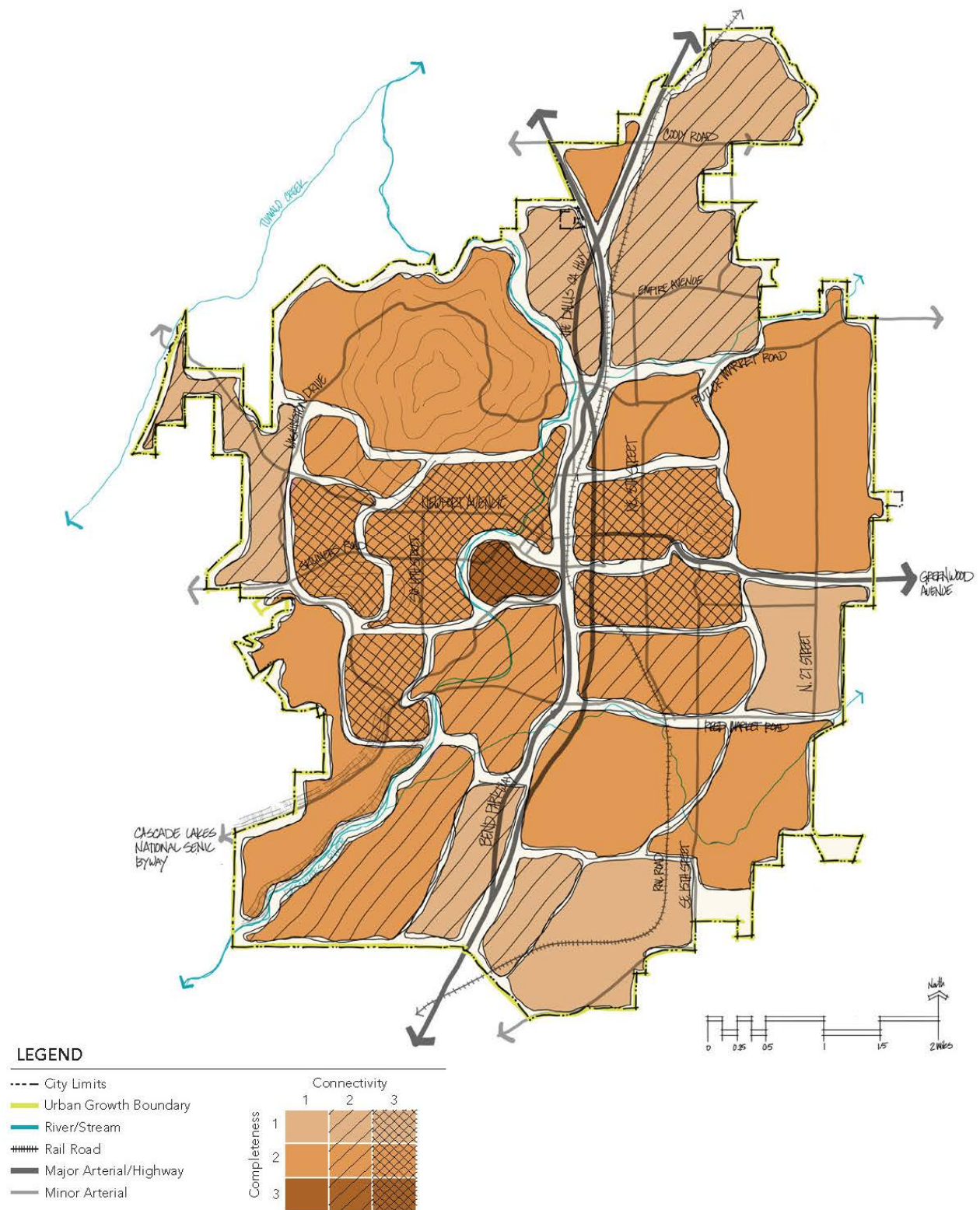


Figure 3: Intersection Density and Connectivity



CONNECTIVITY

Figure 4: Neighborhood Connectivity & Completeness Ratings



Reducing VMT may be achieved by focusing growth in areas that already have the necessary conditions, such as intersection density (grid system of streets), proximity to employment and services, and/or transit corridors. A parallel strategy is to improve conditions in areas that lack one or more of the “D”s and also have vacant land or infill/redevelopment opportunities. For instance, in Bend, the older grid pattern neighborhoods close to downtown tend to lack safe pedestrian and bicycle crossings and other streetscape elements that encourage walking and transit use.

Transportation Demand Management

TDM aims to maximize the efficiency of the urban transportation system by discouraging unnecessary private vehicle use, managing the use of the existing system more efficiently, and promoting alternatives to the single occupant motor vehicle. TDM strategies can be more cost-effective than capital investments in new roads or parking lots.

TDM strategies focus on changing travel behavior – trip rates, trip length, travel mode, time-of-day, etc. – generally in order to reduce traffic during congested (peak) periods. TDM strategies generally focus on reducing travel in automobiles and light-duty trucks. The Federal Highway Administration has conducted studies that demonstrate the effectiveness of various TDM strategies.²⁸

Some TDM measures require large-scale system changes (e.g., new transit routes), while others can be implemented on a local or site-by-site basis. When TDM is implemented on a site-by-site basis through land use and zoning, the focus is typically on creating supportive infrastructure or employer-based incentives. In many communities, some form of TDM is already required by the development code, such as bicycle parking. Because the land use process usually involves a one-time decision, it lends itself more easily to reviewing these types of built improvements. Programmatic TDM measures that require ongoing monitoring are more challenging to implement through land use review.

Examples of Development-Related TDM Measures ²⁹	
TDM-Supportive Infrastructure	Programmatic TDM
Pedestrian or transit oriented design	Subsidized transit passes for employees
Parking maximums	Parking cash-out programs
Minimum bicycle parking standards	Provide bicycle safety education classes
Requirements for transit amenities	Transportation Management Associations

Other TDM program elements can include such strategies as:

- Priced parking
- Free emergency rides home

²⁸ http://www.fhwa.dot.gov/environment/air_quality/conformity/research/mpe_benefits/mpe03.cfm

²⁹ Transportation Demand Management (TDM) Plans for Development. Transportation and Growth Management Program, September 2013.

- Alternative transportation commute planning
- Preferential rideshare parking
- Employee vanpools (may be subsidized by employer)
- Bicycle parking (short- and long-term)
- Financial incentives for transit, biking, walking, or carpooling
- Car-sharing programs

TDM strategies can vary from voluntary to regulatory programs and can be focused on specific areas such as institutions or office parks.

Transportation Management Associations (TMAs) are organizations that are created to implement TDM measures in a coordinated fashion. Commute Options conducted a study for the City of Bend in 2015³⁰, examining five TMAs in Oregon (Go Lloyd TMA, South Waterfront TMA, Swan Island TMA, Westside Transportation Alliance, and Metro Medford). The formation of Go Lloyd, South Waterfront, and Swan Island TMAs were driven by traffic congestion and limited parking. The Westside Transportation Alliance was created to assist Washington County companies to comply with the Department of Environmental Quality Employer Commute Options Rules. Metro Medford's impetus was the availability of federal Congestion Mitigation and Air Quality funds. For all of them, continued and reliable funding is the greatest challenge.

The following suggestions were gleaned from interviews that Commute Options conducted with the five TMAs:

- Business Support: Businesses must believe there is a problem that affects their ability to be successful. Each needs a compelling reason to participate.
- Stable Funding: Having guaranteed funding on a consistent basis is critical. It allows staff to focus on programs and services rather than worrying where the next grant will come from and for how much.
- Geographic Area: Have a small, clearly-defined geographic area. Larger areas generally mean more diverse transportation needs. Having a small area with a common problem to solve has a greater likelihood of success. Downtowns, campuses, and major activity centers are great places for a TMA.
- Create a Non-Profit TMA: A TMA that is housed under another organization is often subject to shared funding and priorities that are not in their best interest. A non-profit is eligible for more grants and can take advantage of discounts in services and products. In a business association where there are multiple members, it can be difficult to get consensus. With a non-profit there is a board of directors that have been chosen because of their expertise and priorities that support the TMA.
- Share Your Successes: Make sure people throughout the community, especially those that questioned the need or value of the TMA, know how well it's working and the programs and services you offer.

³⁰ A Report on Transportation Management Associations, Commute Options, June 1 2015.

A review of literature on the impact of TDM and TMA programs revealed a wide range of trip reduction impacts from less than 5% to over 30% for individual strategies. This is summarized in Attachment 3.

Parking

Managing parking is often a central component of a TDM program and is frequently the reason that a TMA is created. The supply and use of parking are influenced by — and have influences on — development practices, local policies, economic impacts on builders and households, and community goals. The supply and price of parking also have direct relationships with travel behavior. Too much parking correlates with more automobile ownership, more vehicle miles traveled, more congestion, and higher housing costs. In addition, excess parking interferes with the efficient development of urban land, which presents barriers to creating an efficient transit system or increasing land use density and diversity. Parking supply and pricing often have a direct impact on the ability to create compact, healthy communities.³¹

VMT has been demonstrated to be strongly related to measures of accessibility to destinations, particularly the supply of parking.³² Parking strategies such as establishing maximums and pricing, when combined with mode split goals, tend to decrease VMT.

Parking Management is a general term for strategies that encourage more efficient use of existing parking facilities. This reduces total parking demand, shifts travel to other modes, reduces VMT and ensures a minimum number of parking spots are always available, avoiding the “circling” problem adding to congestion. Managing parking helps to reduce the undesirable impacts of parking demand on local and regional traffic levels and the resulting impacts on community livability and design. Parking management can be particularly effective when used in specific areas, such as downtowns or complete neighborhoods. The most effective parking strategies are those that link parking rates more directly to demand or provide financial incentives and/or prime parking spaces to preferred markets such as carpools, vanpools and short term parkers in commercial areas³³.

³¹ Urban Land Institute Northwest, “Right Size Parking,” 2013

³² Ewing R, Cervero R. (2010). Travel and the built environment. *Journal of the American Planning Association* 76(3): 265–294.

³³ Best Practices Transportation Demand Management (TDM), Seattle Urban Mobility Plan, January 2008.

Some key parking management practices that may be applicable to Bend³⁴ include:

- **Ensure right-sized parking.** Older development codes (such as Bend's) can require more parking than is really needed or desired. Setting minimum parking requirements at the lowest level appropriate for a given use and context ensures that excessive off-street parking is not required.
- **Strengthen parking maximums in key areas.** When a limit is imposed on the number of off-street parking spaces provided at new developments, this strategy can help encourage transit use and other alternatives to single-occupant automobile use.
- **Encourage shared parking.** This strategy can shift parking demand into shared facilities rather than a duplicative of dedicated, accessory spaces. This strategy is particularly effective in areas of dense, mixed land uses.
- **Unbundle off-street parking costs.** This strategy allows off-street parking spaces for a development to be leased or sold separately from the rent or sale price. This gives a financial incentive inducing individuals to drive less or own fewer cars for residential uses, and for commercial uses, encouraging companies to increase transit commute rates among their employees. Including the price of parking in an overall lease can increase costs by as much as 25% – and so can have an effect on affordability.
- **Build park-and-ride lots.** Remote lots connected with shuttles, transit, or carpool programs can help alleviate demand for parking in congested areas. This is a strategy being considered by Oregon State University for its new urban Cascades campus to minimize parking demand.
- **Create new parking management districts.** Parking districts, similar to the existing downtown Bend central business district, can provide centralized and coordinated management of parking services. Centralization of management can occur through public/private partnerships between the city and a business association, parking authority, or economic/business improvement district. New parking districts can be a part of a TMA or a separate entity.
- **Institute cost-based parking in appropriate areas.** The most effective parking strategies are pricing measures that charge users to park. Cost-based pricing is appropriate for parking districts, such as downtowns, and for major destinations (such as institutions) with limited parking. Linking parking rates more directly to demand or providing financial incentives and/or prime parking spaces to preferred markets such as carpools, vanpools and short term parkers can further enhance effectiveness. This reduces total parking demand, shifts travel to other modes, reduces VMT and ensures a minimum number of parking spots are always available, avoiding the “circling” problem adding to congestion.

Some examples of successful parking programs include:

- Bellevue, Washington – Shared use, and unbundling parking

³⁴ The City is currently conducting a city-wide parking study that may result in recommendations to change parking requirements in certain zones utilizing some or all of these tools.

- Milwaukie, Oregon – Shared parking in mixed use districts
- Hood River, Oregon – Downtown Parking Pricing
- Portland, Oregon – Variable rate parking depending on location
- Seattle, Washington – Parking maximums instead of minimums

Transit

A solid transit system can be a powerful tool for reducing VMT by offering a viable alternative to automobile use. The “D” factors discussed above have been demonstrated to increase transit use.³⁵ Enhanced transit service such as decreased headways, system improvements such as installing bus-only lanes at intersections and improving pedestrian access increases transit use. Focusing these efforts along transit corridors and between identified destinations such as large employment centers and commercial districts is also effective.

Bend’s transit provider, Cascades East Transit (CET), recognizes that the City’s plans to intensify land uses inside the UGB will support their efforts to grow the system. As funding becomes available, CET plans to implement best practices such as:

- Providing headways of no more than 30 minutes on all routes;
- Providing 15 minute headways on key routes;
- Creating new hubs in quadrants of the City of Bend;
- Providing Sunday service and improving Saturday service; and
- Upgrading buses to coach style with low floors to improve comfort and efficiency.

Longer term, CET plans to create new routes and study the possibility of Bus Rapid Transit.

An example of a mid-sized transit district that has successfully implemented the best management practice is Lane Transit District (LTD) in Eugene. LTD began in 1970 with 18 buses and two vans, and it has grown and changed along with the community. The District continually improved routes and stops, coordinated land use and transit plans, incorporated major transit centers into the comprehensive plan and then constructed the centers, and streamlined routes to eventually form a Bus Rapid Transit system.

Road and System Improvements that Influence Walking and Biking

Walking, bicycling, and transit use become more attractive with street and safety projects such as the addition of bike lanes, buffered bike lanes, bicycle boulevards, and enhanced pedestrian crossings³⁶. In particular, the literature demonstrates that real and perceived safety issues have a strong influence on mode choice. Numerous studies indicate that projects to eliminate or reduce conflicts with vehicles will substantially increase walk and bike modes. In addition, streetscape or complete street projects that satisfy the Design variable will increase walking and

³⁵ Moudon E, Stewart O. (June 2013). Tools for Estimating VMT Reductions from Built Environment Changes. Washington State Department of Transportation.

³⁶ Moudon E, Stewart O. (June 2013). Tools for Estimating VMT Reductions from Built Environment Changes. Washington State Department of Transportation.

biking. For example, bicycle ridership increases between 50%-100% on buffered bike lane corridors and bicycle boulevards.^{37,38} Similarly, good pedestrian-oriented street design, including wide sidewalks, street trees, and safe crossings, can significantly increase walking safety by 50%.³⁹

Bellingham, Washington is an example of a city that regularly commits planning and construction resources to improving bicycle, pedestrian, and transit facilities, and has seen a resulting increase in use of these modes.⁴⁰

The City of Bend has conducted a traffic safety study⁴¹ that found, among other things, that multi-lane (more than three lanes of traffic) higher-volume and higher-speed roadways were significantly more likely to have a higher number of serious pedestrian and biking crashes. The study concluded that the City should focus efforts and funding on high-crash locations on multi-lane roadways. In 2015, the City created a concept plan for implementing safety projects⁴², which summarizes the conceptual design of safety solutions at priority locations in four corridors:

- 3rd Street between Greenwood Avenue and Murphy Road
- Colorado Avenue between Bend Parkway and Bond Street
- Greenwood Avenue West between 3rd Street and Awbrey Road
- Greenwood Avenue East between 3rd Street and 12th Street

Within those four corridors, the City has selected a number of projects for design and implementation. These are noted in Chapter 4, along with the City's other priority pedestrian and bicycle improvement projects (see page 46).

VTM Reduction Efforts in Other Oregon Communities

Portland Metro satisfied the VMT requirement by adopting and implementing the Metro 2040 Plan. Since that time Metro has adopted the Green House Gas Emissions strategy and plan that includes VMT reduction policies and actions such as increasing transit intensity, pricing, and promoting mixed use development.

TransPlan is the Eugene-Springfield land use and transportation plan that adopted VMT reduction policies and strategies for the area. TransPlan centered on a set of land use, transit, demand management, and bicycle strategies and transportation system performance measures.

Rogue Valley MPO has been working with DLCD to draft alternative measures for increasing transit and non-motorized travel mode splits. These measures include increasing the percent of

³⁷ "Evaluation of Innovative Bicycle Facilities," Final Report, Portland Bureau of Transportation (2011).

³⁸ "Traffic Calming: State of the Practice," ITE/FHWA, 1999.

³⁹ Georgia Department of Transportation, Pedestrian and Streetscape Guide, 2003.

⁴⁰ <http://www.cob.org/services/transportation>

⁴¹ City of Bend Multimodal Traffic Safety Study 2012-2014.

⁴² City of Bend Safety Implementation Plan, 2015.

residences within a ¼ mile walk of transit service, percent of collectors and arterials with bicycle and pedestrian facilities, and increasing employment in mixed-use pedestrian-friendly areas.

The Corvallis Area MPO has been working on a Greenhouse Gas Emissions Reduction Project. The resulting plan includes strategies to reduce VMT through pricing, demand management, infrastructure improvements (particularly for non-motorized modes), increasing mixed use land development, and increasing transit investment.

Salem MPO jurisdictions adopted local code and ordinances that set existing and benchmark measures for reducing reliance on the automobile. Pedestrian and biking infrastructure increases and land use actions such as encouraging employment and dwelling units along or near transit stops were some of the general types of measures.

CHAPTER 3. ANALYSIS: METHODS, APPROACH AND RESULTS

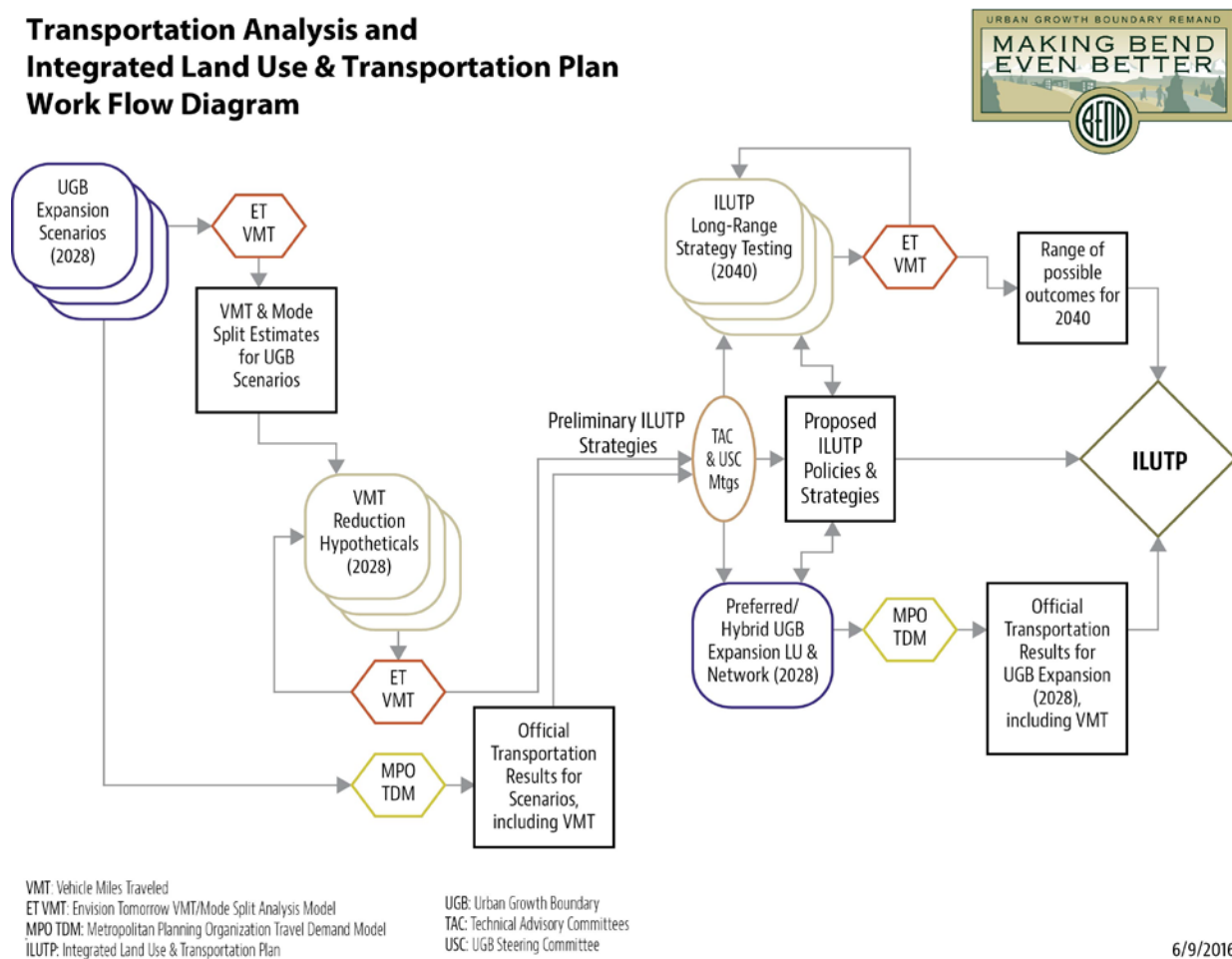
This chapter summarizes the analysis that underlies the strategies and standards proposed in Chapters 4 and 5 of this ILUTP. Note that the analysis for this ILUTP was performed in conjunction with the evaluation of alternative UGB expansion scenarios for the 2016 UGB proposal.

Methodology

The analysis used two primary tools, Envision Tomorrow (ET) 7D Travel Model and the Bend MPO regional travel demand model. These tools were used, in tandem, to assess preliminary outputs from the UGB scenarios, develop a final scenario, and ultimately make findings that address TPR requirements for the Remand (VMT) and changes that may be implemented through the ILUTP.

Figure 5: Analysis process for ILUTP

Transportation Analysis and Integrated Land Use & Transportation Plan Work Flow Diagram



The purpose of ET in the transportation analysis was to assist in identifying and analyzing the land use and transportation strategies that would be required in Bend to achieve the levels of

VMT reduction required by the TPR and Remand. The ET 7D Travel Model is sensitive to changes previously described in the "D" variables, including Density, Design, Destinations, Demographics⁴³ and Diversity of land uses.⁴⁴ The ET model is able to estimate total internal and walking trips resulting from land uses. It does not measure VMT in the precise way suggested by the TPR, but it is well-calibrated to the travel demand model and offers a quick and efficient way to estimate the big picture transportation impacts from different land use and transportation strategies.

The MPO Travel Demand Model was used for formal analysis of transportation system performance and VMT as defined in the TPR. The travel demand model is primarily used and accepted by ODOT to measure VMT; however, it is not as sensitive to measuring transportation performance with the built environment and walking and biking trips that result from a diversity of land uses in an area. The travel demand model was run through the formal four-step process with Transportation Planning and Analysis Unit (TPAU) to analyze the alternative scenarios, and then the proposed UGB expansion scenario. The modeling methodology is documented in the June 15, 2015 memorandum from DKS Associates (see Attachment 2).

Approach

Scenario Testing

In order to evaluate the impact of various VMT reduction strategies, a series of land use and transportation packages, or scenarios, were created and tested. As illustrated in Figure 5, these scenarios included:

- Three UGB expansion scenarios and three "Supplemental Analysis Area Maps" (SAAMs) for 2028 testing different potential growth areas, with consistent assumptions about growth, redevelopment and transit service inside the UGB;
- Two iterations of hypothetical land use and transportation scenarios for 2028 to test the impact of increasing redevelopment in the core, increasing transit frequency, and increasing connectivity⁴⁵ in new neighborhoods;
- The draft and final preferred UGB expansion scenario; and
- Several iterations of hypothetical 2040 scenarios to understand how the policies and strategies identified in this ILUTP may affect VMT over time and determine what it will take to reverse the trend on VMT growth in the long term.

⁴³ The supporting socio-demographic factors for the land use data include household size, household income, and the number of workers in a household. As scenarios are "painted" with ET, these socio-demographic factors are updated based on the type of predicted development.

⁴⁴ Envision Tomorrow Plus (ET+) User manual, Metropolitan Research Center University of Utah, http://www.envisiontomorrow.org/storage/user_manuals/20131029ENVISION%20TOMORROW%20PLUS_USER%20MANUAL_1st%20COMPLETE%20VERSION_updated_sm2.pdf

⁴⁵ Greater connectivity was modeled in Envision Tomorrow by reducing assumed future block sizes below current standards to increase intersection density. There are other ways to get at increased connectivity, particularly for pedestrians and bicyclists, without reducing block size (e.g. stricter mid-block accessway requirements), but those would not be reflected in the model.

The six initial UGB expansion scenarios are summarized in Chapter 5 of the Bend Urbanization Report, as is the final preferred UGB expansion scenario. The 2028 hypothetical scenario was summarized for the Residential and Employment Technical Advisory Committees (TACs) of the UGB Remand project in the presentation provided in Attachment 3. The hypothetical scenarios for 2040 are described in Attachment 5. A full list of the VMT-reduction strategies considered through the analysis is provided in the following section.

Analysis of VMT-Reduction Strategies

This section offers a brief summary of the VMT-reduction strategies considered for inclusion in this ILUTP. Those included in the modeling work to identify the most promising strategies are shown on **bold** below. Those not in bold were considered but could not be adequately captured with the modeling tools available. Instead, they were evaluated in a qualitative manner using the research cited in Chapter 2. The full list of strategies proposed as part of this ILUTP can be found in Chapter 4.

Land Use Strategies

- **Development code efficiency measures (from the UGB Remand project) including increasing the minimum density in the RS zone, making it easier to build a variety of housing types in the RS zone, and increasing density requirements for master planned neighborhoods***
- **Land use changes within Opportunity Areas (from the UGB Remand project) including designating new mixed use centers in central portions of the city that have potential for redevelopment***
- **Implementation of the Bend Central District Multi-Modal Mixed Use Area Plan***
- **Implementation of the Central Westside Plan***
- **The “Complete Communities” approach in expansion areas***
- **Focusing growth along strategic portions of transit corridors***

* Land use strategies were tested using the ET 7D travel model (through the type and intensity of development projected in each area of the city) as well as the regional travel demand model (through the housing and employment allocations at the transportation analysis zone level).

Transit system

- **Increase service frequency in primary transit corridors***
- **New corridors to serve growth areas***
- Capital improvements (e.g. major bus stop improvements)
- Transit priority lanes and queue jumps at major signalized intersections
- Enhancements to connect to transit services (e.g., pedestrian & bike improvements within ¼ mile of bus stops)

* Transit service improvements were tested using the Envision Tomorrow 7D travel model and the regional travel demand model by adjusting the assumed future transit networks and service frequencies.

Transportation Facility Improvements and Policies

- Streetscape improvement policies (looking at intersection and street “completeness” for all modes)
- Alternative transportation performance measures such as safety policies that can trump mobility concurrency requirements
- Planning for 3-lane corridors and minimizing the number of 5-lane corridors in the future
- Consideration of roadway grid completeness (e.g., local and collector street spacing)
- Major bike and pedestrian enhancements at transit nodes and targeted mixed use centers and corridors – implement the city bike and pedestrian priority projects
- **Stronger connectivity standards for new neighborhoods and large developments to increase intersection density***
- Urban Renewal Districts at Juniper Ridge, Murphy Crossing, and consideration of forming new Urban Renewal Districts in the Central Area and other locations to help fund multimodal transportation improvements

* The effect of greater connectivity in new master planned neighborhoods was evaluated through the ET 7D travel model by reducing assumed future block sizes below current standards to increase intersection density. The model takes future intersection density into consideration in estimating mode split and other travel outcomes. There are other ways to get at increased connectivity, particularly for pedestrians and bicyclists, without reducing block size (e.g. stricter mid-block accessway requirements), but those could not be reflected in the model.

Demand Management/Transportation Options

- **TDM programs in key areas/institutions (for example: Juniper Ridge and COCC (existing), OSU Cascades, Downtown Central Business District, Central Area, Medical Overlay District/St. Charles, and/or other opportunity areas)***
- TDM plan requirements in development code (e.g., for site with 50 or more employees)

* The effect of TDM in the key areas noted was estimated through post-processing analysis of the regional travel demand model – adjusting the trip generation from those areas slightly (e.g. 5-10% reduction based on literature review and best practices) to simulate the effect of commute trip reduction programs or other TDM efforts.

Key Findings from VMT Scenario Testing

Key conclusions and findings from the VMT analysis of the alternative scenarios for 2028 described above are summarized in this section.

UGB Scenarios and SAAMs

Testing of the six initial UGB scenarios and SAAMs using the regional Travel Demand Model revealed the following:

- Each scenario increased VMT relative to 2010 (ranging from a 2.9% to a 5.1% increase) due to the amount of growth located outside the center of the city. The increase relative to 2003 ranged from 8.1% to 10.3%. The TPR requires VMT to not rise above a 5% increase.

- Scenarios with an emphasis on complete communities in expansion areas and using growth areas to complete existing neighborhoods generally performed better on VMT.
- Even where there are complete communities in outer neighborhoods, the downtown remains a key destination. As a result, trip lengths and household VMT are generally lower in the central core of the city (see Figure 6 and Figure 7).
- Scenarios that focused growth close to the key transit and multimodal corridors that connect to downtown generally had shorter average trip lengths.
- The UGB scenarios that had the lowest growth in VMT all included better connectivity and more complete communities. (Note that the UGB Steering Committee selected a preferred UGB expansion scenario which had one of the lowest rates of VMT growth for further refinement as demonstrated by the UGB expansion proposal.)
- The ET household VMT estimate correlates closely to the VMT results from the regional travel demand model.

See the Scenario Evaluation Report, dated October 20, 2015, for detailed VMT results from the UGB expansion scenarios and Supplemental Analysis Area Maps.

2028 Hypothetical Scenario

Testing of a hypothetical scenario for 2028 using the ET 7D transport model provided the following insights:

- Shifting roughly 1,000 housing units and 2,000-2,500 jobs from expansion areas to opportunity areas in the core (above and beyond what is identified in Scenario 2.1G), combined with transit service improvements and reduced block size in new master planned neighborhoods, would reduce the growth in household VMT per capita slightly relative to 2014.
- The amount of redevelopment that was assumed in the core in this hypothetical scenario is not reasonably likely by 2028; significant transit service improvements may not be feasible by 2028; and increasing connectivity in master planned neighborhoods through smaller block sizes would have downsides including additional land being used for right of way, greater impervious surface area, and less developable area.
- The ideas tested in the hypothetical scenario are more appropriate for long-range strategies than for implementation by 2028.
- A focused approach to land use and transportation policies, programs, and projects in opportunity areas and the Core area has greatest effect on reducing or maintaining VMT growth.

The 2028 hypothetical scenario that was shared with the Residential and Employment TACs and its results are summarized in the presentation provided in Attachment 3.

VMT Analysis for the Preferred UGB Expansion Scenario

The VMT analysis discussed in this section was done using the Bend MPO Regional Travel Demand Model, in compliance with the specifications in the TPR for such analysis. This represents the official VMT estimate for the Preferred UGB Expansion Scenario.

Key Assumptions

The TPR allows local governments to take credit for “regional and local plans, programs, and actions implemented since 1990 that have already contributed to achieving the objectives specified...”, including that VMT per capita is unlikely to increase by more than five percent.⁴⁶ This has been interpreted to mean that the local government may estimate an amount of VMT reduction that is being achieved through plans, programs and actions taken prior to the planning period but since 1990. The City of Bend implemented several connectivity improvements that would be expected to reduce VMT per capita, such as a new river crossing and an extension of Empire Avenue. The regional transportation model was used to test the impact of these improvements by analyzing 2003 land use with both the 2003 model network and a 1990 network that did not include the connectivity improvements. VMT per capita from these model runs were compared in order to calculate the benefit of the connectivity improvements since 1990. This analysis is documented in Attachment 6.

In addition, based on the literature summarized in Attachment 3, the following reductions in average daily trip generation (i.e. the number of cars entering and leaving) has been assumed for 2028 based on existing and proposed TDM programs and strategies:

- Juniper Ridge: 5% reduction based on the TDM program and requirements in effect there (see Chapter 4 page 41);
- COCC: 10% reduction due to the TDM program in effect there (see Chapter 4 page 41);
- OSU Cascades: 10% reduction based on the proposed Institutional Master Plan requirement to implement a TDM program / strategies.

These reductions have been factored into the projected VMT results for the Preferred UGB Expansion Scenario.

VMT Results

Table 1 summarizes the results of the VMT analysis with the regional travel demand model for the preferred scenario in comparison to both the 2003 and 2010 baseline years. VMT per capita increases by just over 1% relative to the 2010 baseline. Because there was nearly a 5% increase between 2003 and 2010, comparing to the 2003 baseline yields just over a 6% increase in VMT per capita. However, comparing the 2028 VMT to what VMT *would have been* in 2003 without the connectivity improvements that the City has implemented since 1990 (which have been shown to reduce VMT growth) showed a VMT increase of less than 5% relative to the modified 2003 baseline. Thus, with this ILUTP, the City is in compliance with TPR requirements related to VMT, regardless of which baseline year is considered. See TPR Compliance Section in this document (page 56) for further explanation.

⁴⁶ OAR 660-012-0035(5)(b)

Table 1: VMT per Capita in 2003, 2010, and 2028 (preferred UGB expansion scenario)

	2003 baseline	2010 baseline	Preferred UGB Expansion Scenario (2028 projection)
Daily Vehicle Miles Traveled per capita	9.18 / 9.38 ⁴⁷	9.64	9.76
Percent increase relative to 2010	N/A	N/A	1.2%
Percent increase relative to 2003	N/A	5.0%	6.3% / 4.1% ⁴⁷

VTM Performance by Area

VMT, mode share, and average trip length vary throughout the City. The maps on the following pages illustrate the variation in average trip length (Figure 6), based on the MPO travel demand model; household VMT per capita (Figure 7), based on the ET 7D transport model; and mode split (Figure 8), based on the ET 7D transport model. (Note that VMT per capita and mode split data are not available at the TAZ level from the MPO travel demand model.)

⁴⁷ With credit for connectivity improvements since 1990. See Attachment 6 for details.

Figure 6: Average trip lengths from UGB Expansion Scenario 2.1G

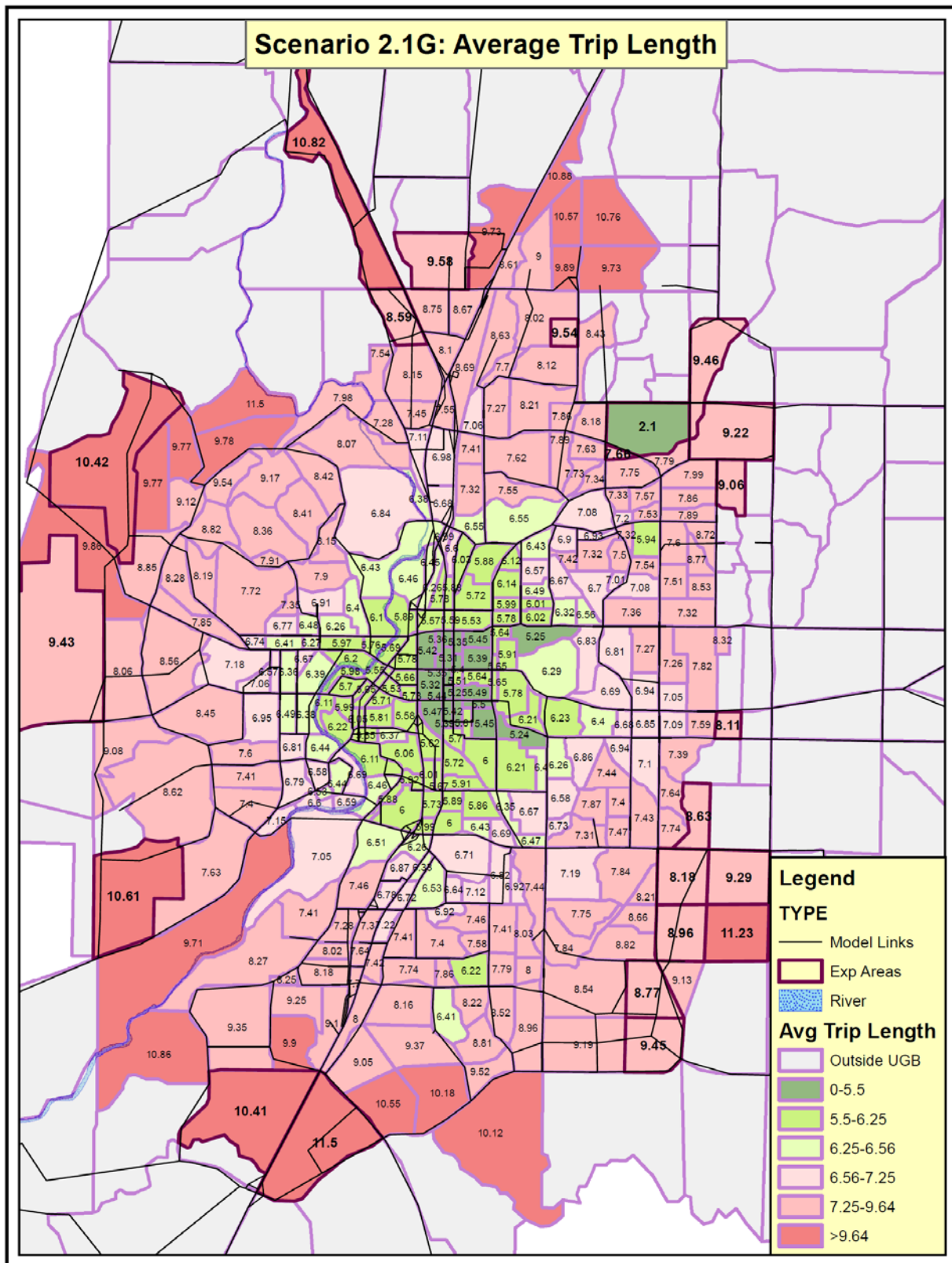


Figure 7: VMT per capita from UGB Expansion Scenario 2.1G

Bend UGB Remand Project

VMT/Capita

Prepared 17-Jun-16

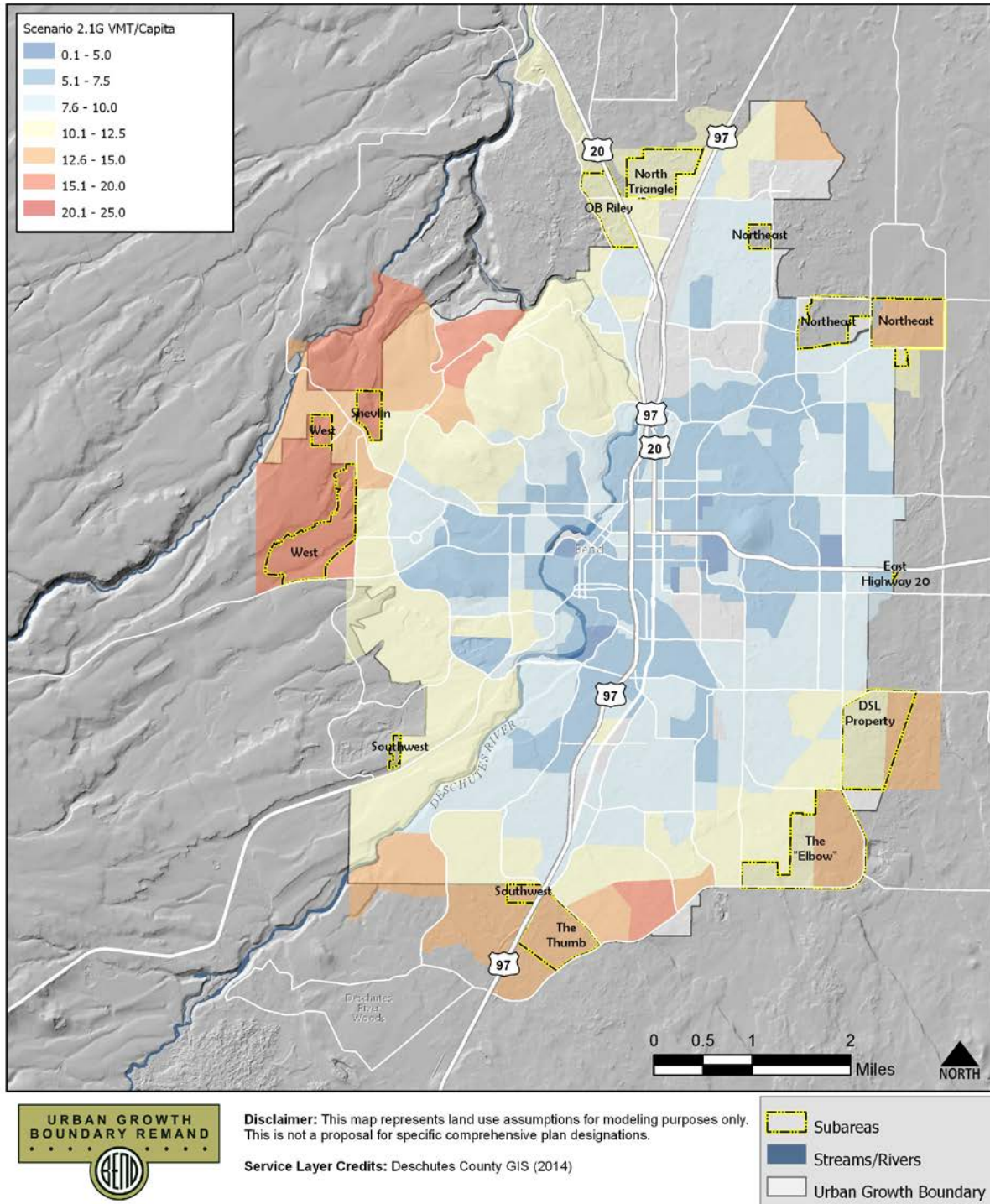
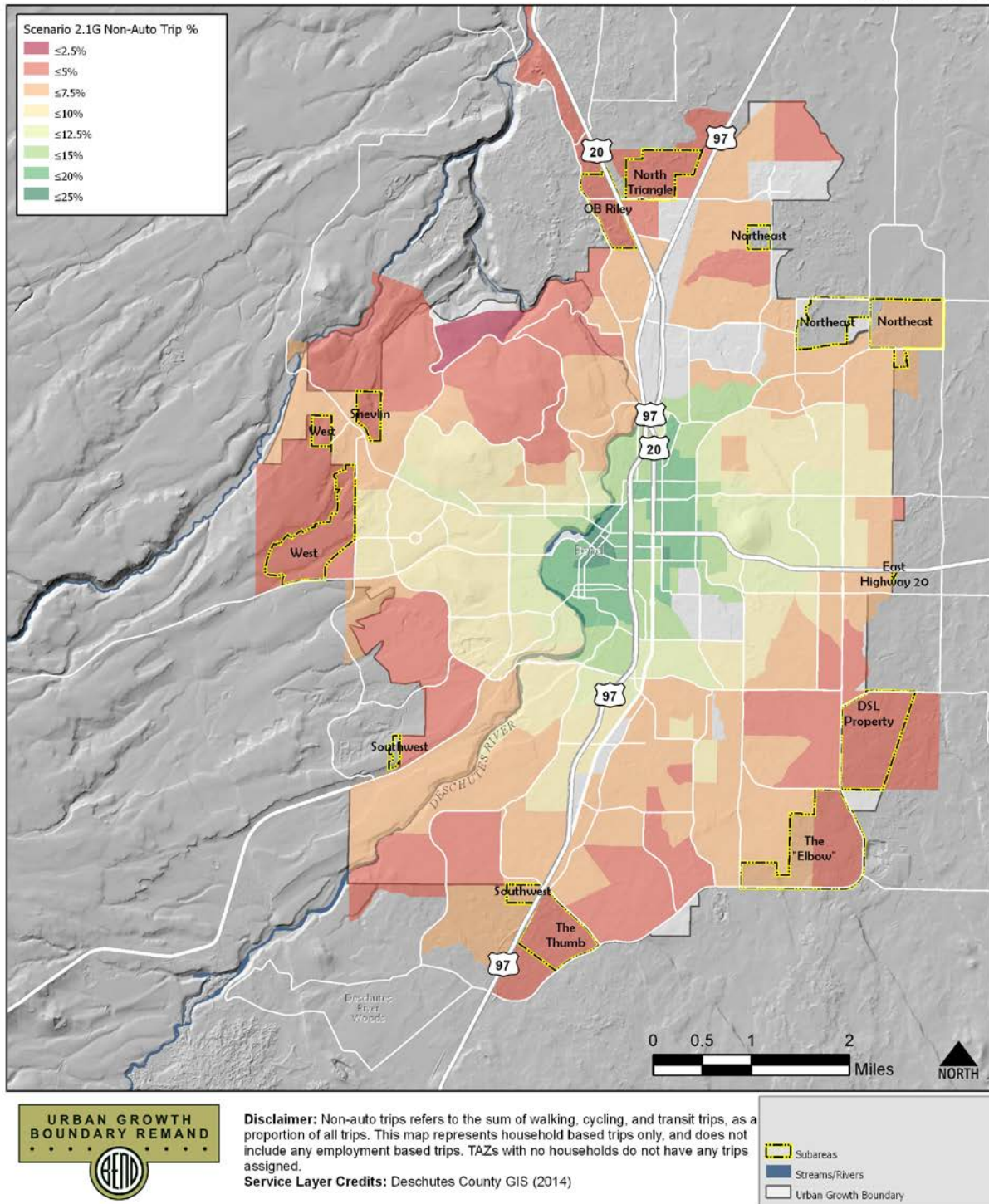


Figure 8: Mode Split from UGB Expansion Scenario 2.1G

Bend UGB Remand Project Mode Split

Prepared 21-Jun-16



CHAPTER 4. EXISTING AND PROPOSED VMT REDUCTION STRATEGIES

Introduction

High Level Outcomes

The high level outcomes intended for this ILUTP are to:

- Support the City's goal to create a balanced transportation system;
- Create a transportation system and facilities that support the City's complete communities goal;
- Implement a transportation system that supports the City's vision for opportunity areas, the Central Core, and UGB expansion areas;
- Increase transportation choices and reduce reliance on the automobile; and
- Over time, reduce VMT per capita in Bend.

This plan takes a comprehensive approach, where land use, transportation, and other tools are integrated to achieve the above-stated outcomes. The plan recognizes that land use and transportation policies and strategies focused on the opportunity and core areas will have the best chances for reducing VMT. This plan also takes an evolutionary approach, recognizing that both short- and long-term strategies are essential, and that time and monitoring of progress will be needed for successful implementation.

The approach to implementation will be to identify corridors and centers (e.g. opportunity areas in the core) that will have the highest likelihood to reduce VMT for a set of costs. Coordination of the transportation system and land use patterns will have the most impact on VMT reduction. The greatest VMT reductions will happen in locations that have some or many of the needed land use and transportation attributes already in place, and which, for modest amounts of funding, can greatly reduce reliance on the automobile. Assessing how the "7 Ds" (see page 11) interact along corridors or in centers will be important as projects and programs are developed and implemented to reduce VMT. For instance, neighborhoods and centers that have an extensive network of gridded streets may only require key pedestrian or bicycle safety projects to greatly increase the potential for walking and biking trips.

Overview and Organization

This chapter is organized by the topic areas identified as elements of an ILUTP under Division 12, Section 0035(5)(C):

- Land use strategies
- TDM strategies⁴⁸
- Public transit planning
- Policies related to review and management of major roadway improvements

⁴⁸ Parking management is combined with TDM in this chapter, since parking management is a component of TDM.

- Additional Plan and Ordinance Provisions (focused on Complete Streets and connectivity investments)

The strategies are grouped into three categories:

- *Efforts to date*: existing policies and work that Bend has done since 1990 to address the topic.
- *Proposed strategies*: the new actions, policies, and plan or code amendments that are proposed at present to address the topic. These are proposed to be included with the 2016 UGB adoption package, unless otherwise noted. All proposed strategies will be implemented within three years.
- *Additional strategies for further consideration*: additional measures that require more detailed planning or additional funding, which may be implemented over the medium- to long-term.

This chapter closes with a summary by topic area of the *proposed strategies* and “medium-term”, and “long-term” levels of implementation of the *additional strategies for further consideration* described in the sections below. The “medium-term” and “long-term” levels of implementation correspond to varying degrees of effort and cost as well as time.

Note that where specific existing policies are cited in this chapter, the numbering is based on the General Plan as of 2016 and also reflects the numbering in the TSP. This numbering may change with updates to Chapter 7 of the newly titled Comprehensive Plan. The policies in the TSP will remain as a record of the original policies, and the policies cited may be found there by their original numbering.

Land Use Strategies

Efforts to Date

- In 2005, Bend established minimum densities for all residential zones.
- The parking code was updated in the mid-2000s to match TGM Smart Code parking standards, establishing parking maximums.
- In 2006, the Bend code was updated to allow the maximum height to be increase by 10 feet above maximum when residential uses are provided above the ground floor in all commercial zones.
- RM zoning is already focused near major employment and retail shopping areas and in proximity to transit corridors.
- The City developed the Bend Central District Refinement Plan in 2014 to bring a greater mix of uses to that area and help it transition to a less auto-oriented development pattern.
- Existing Neighborhood Commercial standards allow small neighborhood commercial services in residential areas without a zone change.
- Current neighborhood masterplan standards require new neighborhoods to provide convenient access to commercial services inside or outside the neighborhood.

Proposed Strategies

The City is adopting a package of “efficiency measures” with the 2016 UGB expansion that also address many of the land use strategies identified in the TPR. The measures proposed that address each of the required categories are summarized below.

“(a) Increasing residential densities and establishing minimum residential densities within one quarter mile of transit lines, major regional employment areas, and major regional retail shopping areas;

“(b) Increasing allowed densities in new commercial office and retail developments in designated community centers;

In Bend, many areas in close proximity to transit, employment, and retail areas that have the most opportunity to increase residential development are currently designated for commercial or industrial uses. The city is proposing a set of land use re-designations in key “Opportunity Areas” identified through the UGB project and other planning studies (e.g. the Central Westside Plan (CWP) project and the Bend Central Multimodal Mixed Use Area study). Many of these are changes from commercial or industrial designations to mixed use designations that allow for and encourage residential development and more compact form. Specifically, new mixed use designations and/or zones are proposed in concert with the 2016 UGB expansion for:

- The Bend Central District, between the Parkway and 4th Avenue from roughly the railroad on the south to Revere on the north (implemented as a special plan district);
- CWP/Century Drive opportunity site (implemented using the new mixed use plan designations developed for the UGB project; the land use designations and projects in the CWP have been predicted through both Envision Tomorrow and transportation demand modeling to result in lower VMT);
- KorPine opportunity site (implemented using the new Mixed Use - Urban plan designation and zone developed for the UGB project);
- East Downtown opportunity site (implemented using the new Mixed Use - Urban plan designation and ultimately the new Mixed Use - Urban zone developed for the UGB project); and
- The Inner Highway 20 / Greenwood Ave opportunity site (implemented using the new Mixed Use - Neighborhood plan designation and ultimately the new Mixed Use - Neighborhood zone developed for the UGB project).

See Figure 9 for a map of these and other opportunity areas.

Legend

- Opportunity
- Proposed Urban Growth Boundary

Service Layer Credits: Deschutes County GIS (2014)

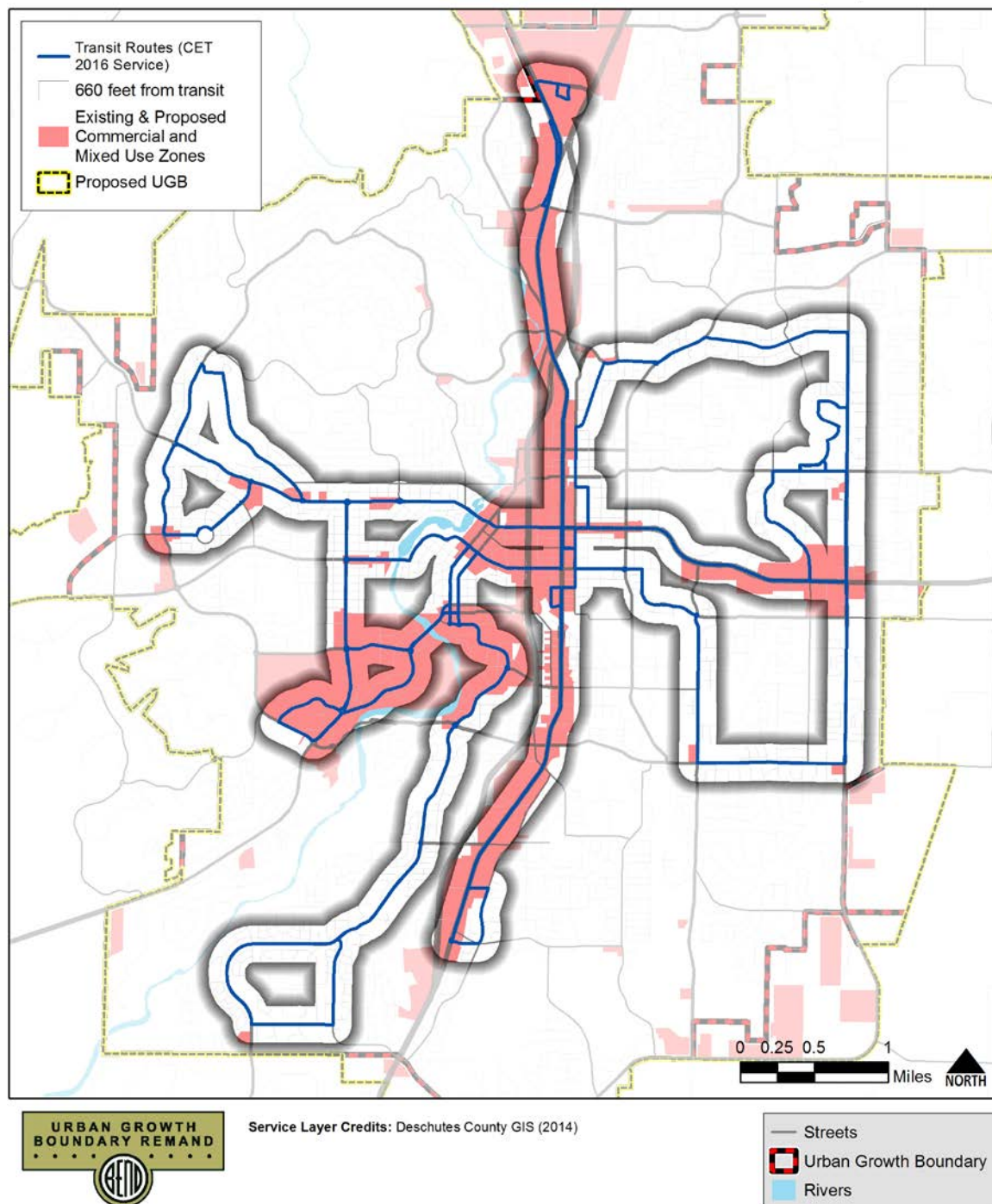
URBAN GROWTH BOUNDARY REMAND

Streams/Rivers
Roads/Highways

By enabling and encouraging mixed use, more residential development will be possible in close proximity to transit, employment, and shopping within Bend's core. In addition, a minimum residential density is proposed for residential development in commercial and mixed use zones within 660 feet of transit (see Figure 10) so that the land is used efficiently and developed at transit-supportive densities.

Figure 10: Commercial and Mixed Use Zones and Transit Routes

Prepared 7/12/2016



The new mixed use zones also reduce parking standards and allow for taller buildings and more urban development patterns that effectively increase allowed density for new commercial office and retail developments.

In addition, because there are many existing low-density neighborhoods near transit, employment, and retail, several of the city-wide modifications to the development code also have the effect of potentially increasing residential densities in those targeted areas. This proposed package of efficiency measure code changes include:

- raising the minimum density in the RS zone (especially for new master-planned neighborhoods);
- allowing a greater mix of housing types outright in the RS zone;
- increasing the maximum residential density in RL zone; and
- removing the cap on net density for multi-family housing in the RM and RH zones to allow greater flexibility in reaching the allowed maximum gross density.

Other proposed code amendments being adopted in the UGB Remand allow for greater densities in the ME zone by removing maximum lot coverage and the minimum front setback, among other changes. This zone is largely applied along major roadway corridors that are also transit routes. Finally, proposed reductions to parking requirements for mixed use development and for development within 660 feet of a transit route also have the effect of slightly increasing allowed densities for new office and retail development, particularly around transit.

“(c) Designating lands for neighborhood shopping centers within convenient walking and cycling distance of residential areas;

“(d) Designating land uses to provide a better balance between jobs and housing considering:

“(A) The total number of jobs and total of number of housing units expected in the area or subarea;

“(B) The availability of affordable housing in the area or subarea; and

“(C) Provision of housing opportunities in close proximity to employment areas.”

All UGB expansion areas include commercial nodes to complete existing and new residential neighborhoods. In addition, new commercial nodes are proposed on the largest vacant residential site in the existing UGB (the 15th Street opportunity area). These new nodes will help provide walkable local services for many more neighborhoods. Over time, as the UGB expansion areas develop as complete neighborhoods, it is assumed that VMT growth could be minimized because of the complete neighborhoods and street patterns.

The expansion areas also help improve jobs/housing balance in many areas, including:

- South and Southeast Bend, where new employment areas are proposed north of Knott Road and east of US 97 to help balance a largely residential area of the city;

- the “North Triangle”, where a mix of housing types, including multifamily housing, is proposed in an area dominated by employment uses with excellent access to jobs; and
- the OB Riley area, where a mix of housing and employment is proposed, providing additional housing opportunities in close proximity to large employment areas.

Furthermore, the adoption of new mixed use designations in opportunity areas within central Bend also helps provide affordable housing opportunities in the central core where there is access to significant employment opportunities.

Additional Strategies for Further Consideration

In order to ensure that the new mixed use areas succeed, the UGB project also identified several longer-range land use strategies that merit additional consideration in the future as the City begins to monitor and measure VMT over time. The focus for the City will be to concentrate land use changes and transportation investments in the Core and Opportunity Areas. These are summarized below.

- The UGB project identified potential for infill and redevelopment over the longer-term future in the Bear Creek & 27th Avenue residential area, in addition to the opportunity areas where mixed use zones and/or plan designations are being adopted along with the UGB. The project team also conducted an evaluation of long-term redevelopment potential in transit corridors outside the UGB project opportunity areas, which is summarized in Attachment 7. The City may consider rezoning selected areas along transit corridors that are identified as having the greatest potential for transit-supportive infill and redevelopment.
- Along transit corridors and in other key pedestrian areas, the City may adopt additional code measures to support pedestrian- and transit-oriented development. Draft development code language related to enhanced pedestrian-/transit-oriented design areas is included in Attachment 8 as an example and a starting point for further refinement.
- The City may consider changes to block size and/or connectivity standards for new master-planned neighborhoods, or other tools to increase bicycle and pedestrian connectivity and intersection density in new neighborhoods.

In addition, the City may identify other amendments which increase densities, destination density and diversity, and good pedestrian design.

Transportation Demand Management

Efforts to Date

Education and Outreach

Currently, the city contracts with Commute Options for implementing a voluntary TDM program (Drive Less Connect), which includes education and outreach about transportation options such as walking, biking, and includes a ridesharing matching tool. Commute Options directs its efforts toward larger employers, and currently has approximately 50 businesses in Bend

participating. In addition, Cascades East Transit and Commute Options offer a group bus pass program.

General Development Code Incentives

The City's Development Code provides existing incentives for TDM:

- Chapter 4.7 allows a reduction of trip generation rates for traffic impact analysis of up to a total of 25% for implementing TDM measures including:
 - o Providing employee showers, lockers and secure indoor bicycle parking ;
 - o Providing no more than the minimum required parking through maximizing the use of permitted on-street parking and shared parking agreements.
 - o Providing a minimum of 5% of the overall required parking as free priority parking for carpools and vanpools
 - o Providing twice as many covered, secured bike parking facilities as required
 - o Being located within ¼ mile of a transit facility and participating in the CET Group Bus Program
 - o Charge the actual cost to provide on-site parking on an annual basis for employee parking (exempting carpool/vanpool)
 - o Participate in a TDM incentive program recognized by the City
 - o Provide other TDM elements as approved by the City
- Chapter 3.3 provides a reduction to off-site parking requirements of up to 10% based on TDM measures, including:⁴⁹
 - o Designating at least 10% of the employee motor vehicle parking spaces as carpool/vanpool parking and placing such spaces closer to the building than other employee parking;
 - o Providing showers and lockers for employees who commute by bicycle;
 - o Providing twice as many covered, secured bicycle parking racks or facilities as required by this code; and
 - o Providing a transit facility (e.g., bus stop) that is approved by the local transit authority, with related amenities. Related amenities include, but are not limited to, a public plaza, pedestrian sitting areas, shelter, and additional landscaping.
 - o Other incentives provided in an approved Employee TDM Plan.

The City's development code also contributes to parking management by allowing credit for on-street parking up to 50% of required parking,⁵⁰ allowing shared parking under certain circumstances,⁵¹ setting parking maximums,⁵² lowering parking requirements in the CB zone (downtown),⁵³ and allowing development within the CB zone to pay a fee in lieu of providing off-street parking⁵⁴.

⁴⁹ BDC 3.3.300(D)(1)(b)

⁵⁰ BDC 3.3.300(B)(2)

⁵¹ BDC 3.3.300(B)(5)

⁵² BDC 3.3.300(E)

⁵³ BDC 3.3.300(A)

⁵⁴ BDC 3.3.200

Area-Specific TDM Requirements

The City currently imposes TDM requirements on two subareas: Central Oregon Community College (COCC) and Juniper Ridge Employment Sub-District, through the Special Planned District section of the Bend Development Code.

Central Oregon Community College

For COCC, Section 2.7.1007 (Transportation) states:

“Trip reducing mitigation measures, including but not limited to a coordinated TDM plan, may be evaluated and credited in connection with each development application. In accordance with [BDC Chapter 4.2](#), applications for the development of Campus Village and Core Campus uses must demonstrate that transportation facilities have adequate capacity to serve the proposed use.”

Juniper Ridge

For Juniper Ridge Employment Sub-District, TDM measures are the result of a trip cap placed on the area through negotiation with ODOT. Codes, Covenants and Restrictions are placed on all lots within the sub-district that require to form a Transportation Management Association (TMA) to:

“...assure a ten percent (10%) reduction in peak hour traffic within the Juniper Ridge Employment Sub-District from the traffic that would otherwise be generate absent the existence or enforcement of TDM provisions...”

Section 2.7.2030(D) of the Bend Development Code requires the creation of a TMA, as follows:

“Transportation Management Association (TMA). A TMA organized to operate in a manner that is consistent with the Transportation Demand Management goals and policies in the City’s Transportation System Plan and BDC 4.7.500 will be developed for the Employment Sub-District. All site development review applications within the Employment Sub-District that are subject to review under BDC Chapter 4.2 shall demonstrate conformance with Employment Sub-District TMA program requirements.”

Commute Options has prepared a TMA guideline for the Juniper Ridge Employment Sub-District businesses to follow in the future. TDM measures are imposed on new businesses developing at Juniper Ridge.

Proposed Strategies

A new policy is proposed that will address the direction and intent for increasing the use of TDM in appropriate areas of the City. The intent is to create an incentives approach to TDM and to focus on businesses and institutions with 50+ employees and/or students and/or specific geographic areas such as downtown, Central Area, portions of the Medical District Overlay Zone around St Charles, Juniper Ridge (existing) and COCC (existing).

In addition, the City is currently in the process of updating regulations for master plans for large institutional uses. As part of that update, the City will incorporate requirements for TDM

measures that will apply to all new institutional master plans, including OSU's Cascades campus.

The City is also committed to conducting an analysis of parking management and pricing options (see below). Depending on the outcomes of the parking study, the City may have additional policies and commitments relating to parking practices and policies that are tied to VMT reductions.

Additional Strategies for Further Consideration

Additional Incentives – SDC Fees

One near-term strategy for further consideration is to apply the trip-generation reductions currently under consideration for traffic impact studies to the Transportation System Development Charge (SDC) methodology. The City will be updating the Transportation SDC methodology next year (2017). At that time, it may consider making the TDM trip generation reduction automatic for those applicants who have been approved to use it for the traffic impact study. This would provide an additional monetary incentive to implement TDM.

Expanded TDM Requirements and Support for TMAs

An expanded TDM program, such as the Commute Trip Reduction Program directed by the Washington Department of Transportation⁵⁵, specifically directed toward larger employers, could be an effective VMT reduction tool, particularly for peak travel times. The City could consider using a regulatory plus incentives approach to TDM, through actions such as:

- Requiring TDM plans for large businesses (in addition to the institutions currently being considered). This could be targeted in a number of different ways, such as:
 - o limited to specific areas, such as within 660 feet of transit;
 - o limited to zones that generally have conditions conducive to successful TDM programs, such as the new mixed use zones and the Central Business District;
 - o limited to large employment developments that go through a master plan process; or
 - o limited to businesses/institutions with more than a certain number of employees or students of driving age (e.g. 50 or 100), or those projected to generate more than a certain number of trips.
- Partnering with employers to create new TMAs in certain geographic areas such as downtown, Bend Central District, portions of the Medical District Overlay Zone around St Charles, and COCC (which has an existing TDM program, but not a separate TMA).
- City incentives and support for small businesses located along major pedestrian corridors (e.g. Newport Avenue, NW 14th Street, or 3rd Street).

The City will also conduct a review of the potential for TMAs and related TDM and parking strategies for the opportunity areas identified in the UGB remand. The strategies would be part of a more comprehensive transportation approach in these areas to broaden travel options and reduce VMT.

⁵⁵ <http://www.wsdot.wa.gov/transit/ctr>

Parking Management

The City of Bend is currently conducting a city-wide parking study, which began in the fall of 2015. The City is required to comply with TPR OAR 660-012-0045(5)(c), which requires the development of a parking plan that would result in a city-wide 10% reduction of per capita parking spaces, among other tools. Currently, the City does not have a citywide parking plan. This project will create new policies and code language that will result in parking programs to support Bend's goals for a livable and economically healthy city.

In 2016-17, the City will also conduct two parking studies to determine the feasibility and appropriate tools for establishing parking management districts and/or transportation management areas. These studies will be conducted for the Galveston Avenue and 14th Street corridors. The City's only existing parking district is in downtown.

Transit

Efforts to Date

The City of Bend has a long range transit plan created in 2012 that included service plans and potential for future routes and services based on broad land use assessments, development opportunities and demographics. Cascades East Transit has recently implemented transit service improvements that were identified in the long-range plan as "mid-term" improvements (e.g. adding new bus routes, extending service hours, and decreasing headways in peak periods). The plan estimated the mid-term improvements (the changes in service that went into effect Sept 21, 2015) to have an annual operating cost of about \$2.4 million.

In addition, the City has existing policies in the transportation section of the comprehensive plan that support transit and encourage transit-supportive land use and street design, including several policies that the city will work with other agencies to plan and seek funding for transit, and a policy regarding transit-supportive land use:

- *To accommodate a fixed-route transit system, land use ordinances and other regulations shall be implemented that establish pedestrian and transit-friendly design along potential or existing transit routes. (6.9.5.5)*

Proposed Strategies

Enhance transit priority corridors in the opportunity areas through a combination of land use codes (i.e. new mixed use zones in opportunity areas) and transportation enhancements that support increased transit use. Propose new and enhanced transit funding.

Include transit policies and enhancements when conducting transportation and land use planning studies within identified opportunity areas.

Additional Strategies for Further Consideration

The long range transit plan includes additional service improvements for the mid- to long-term contingent on funding:

- Add one hour of new service in the morning from 5-6 am (60 minute service during that extra hour)
- Add two hours of new service in the evening from 8-10 pm (would be 60 minute service)
- Extending Saturday service to operate from 7 am to 7 pm (30 or 60 minute service depending on route) – service today is roughly 8 am – 5 pm with 60 minute service
- Add Sunday service from 8 am – 5 pm (currently only limited dial-a-ride service on Sundays)
- Add a new route that would provide service to part of the Butler/Brinson/Empire business area as well as Juniper Ridge
- Decrease headways to 15 minutes during peak periods (6-9 am and 3-6 pm) on primary routes (3rd Street, and Greenwood, Brookswood, and Galveston avenues, and possibly others). During non-peak hours, those routes would operate on 30 minute headways.
- Decrease headways on non-primary routes to 30 minutes during peak periods and either 30 or 60 minute headways during non-peak periods.

The plan estimated the long-term improvements to have an annual operating cost of about \$5.7 million. A potential new route to serve the opportunity area in southeast Bend has also been discussed as part of the UGB project, but requires more detailed evaluation.

Beyond the improvements identified in the long-range plan, additional ideas that need more work include developing new point to point routes and developing additional transit centers. Cost estimates for these types of improvements will be determined during the planning for specific areas and corridors.

The most ambitious and expensive transit plan would include planning, design and construction of a bus rapid transit system along major transit corridors. This could begin with a series of incremental improvements, such as preferred lanes, queue jumps, and transit signal priority.

A description of potential Medium-Term and Long-Term transit service scenarios developed to support modeling efforts for this ILUTP is attached as Attachment 9. These have been discussed informally with COIC and the MPO but are not intended to represent an approved plan.

Roadway Improvement Management and Policies

Efforts to Date

The City's General Plan includes a policy that minor arterials may not be widened for additional travel lanes without first evaluating the potential for eliminating the need to widen by implementing certain transportation demand management and transportation system management measures⁵⁶. This is intended to emphasize community and streetscape design that will continue to foster and enable non-automobile modes of travel. In the text of the TSP,

⁵⁶ Bend Area General Plan, Chapter 7, policy 6.9.6.21.

specific minor arterials in the Central Area of Bend are identified as “not authorized for lane expansion” unless the Plan is amended by Council action.⁵⁷ These include:

- NW 14th Street between Newport and Galveston avenues
- NW Newport Avenue between 14th and Wall streets
- NW Galveston Avenue between 14th Street and Riverside Avenue
- NW Greenwood Avenue between Wall Street and the Parkway
- NW Riverside Avenue between Tumalo and Franklin avenues
- NW Franklin Avenue between Wall Street and the Parkway
- NW Wall Street between Greenwood and Franklin avenues
- NW Bond Street between Greenwood and Franklin avenues
- NE 8th Street between Olney/Penn and Franklin avenues
- NE Olney Avenue between 4th and 8th streets
- NE Franklin Avenue between 4th and 11th streets
- NE Bear Creek Road between Franklin Avenue and 15th Street

Other relevant existing policies in the Transportation System Plan and General Plan include:

- *The City shall adopt land use regulations to limit the location and number of driveways and access points, and other access management strategies on all major collector and arterial streets. (6.9.2.1)*
- *The City and State shall implement transportation system management measures to increase safety, reduce traffic congestion to improve the function of arterial and collector streets, and protect the function of all travel modes. (6.9.2.3)*
- *Access control shall be part of the design standards for major collectors, arterials, principal arterials and expressways to ensure that adequate public safety and future traffic carrying capacity are maintained while at the same time preserving appropriate access to existing development and providing for appropriate access for future development. ... (6.9.6.6)*

The City standards and specifications include Roundabout Design Guidelines which is a comprehensive approach to intersection design, The Guidelines focus on roundabouts as the preferred intersection form in the City. Roundabouts are significantly safer, have lower carbon emissions, and more efficient capacity. These attributes, although not directly related to VMT reduction, roundabouts increase the possibilities for safer pedestrian and biking mode splits in complete communities.

The Bend Development Code, Chapter 10-10, Section 3.1.400, includes standards and procedures for evaluating and managing vehicular access and circulation during development review to maintain adequate safety and operational performance standards, and to preserve the functional classification of roadways as required by the City's TSP.

⁵⁷ Bend Transportation System Plan, Section 6.5.1.4

In addition, the City has updated the Transportation Analysis chapter (Chapter 4.7) of the Bend Development Code. The amended code includes two key changes:

- Allows flexibility in requiring turn lanes or other widening, including analysis of safety, adjacent land uses, and other factors.
- Grants the City Manager the ability to suspend the mobility standard for a particular intersection. This will benefit projects that affect intersections in unique situations, such as on streets within special planned areas, the Central Business District, historic districts, that are identified in the City's TSP as "not being authorized for lane expansion," or where widening might result in unacceptable tradeoffs to other modes of travel, but may exceed the City's operation standards.

Outcomes from the 2012 Safety Study found that roadways larger than three travel lanes have more frequent and serious injury pedestrian and biking crashes. The 3rd Street and Highway 20 corridors were found to have systemic crash issues. These corridors are also in or adjacent to the East Downtown, Central Area Plan, and Central Highway 20 opportunity areas. Because of this, the City recognizes that adding width to roadways to achieve mobility standards might be counter-productive.

Proposed Strategies

The City has been implementing selective "road diets" consisting of lane removal or narrowing in areas where specific safety issues related to lane configuration have been identified through the citywide Safety Implementation Project. The City has identified the following projects:

- Franklin Avenue between 1st Street and 5th Street
- Greenwood Avenue between Awbrey Road and 3rd Street
- Colorado Avenue (Parkway to Bond or Lava Street)
- 3rd Street in vicinity of the RR underpass
- Revere Street in vicinity of Division Signal (Wall Street to 4th Street)

Additional Strategies for Further Consideration

Develop pedestrian and biking safety plans for the opportunity areas that enhance the possibility for higher walking, biking, and transit modal splits.

Additional Plan and Ordinance Provisions: Complete Streets and Connectivity Investments

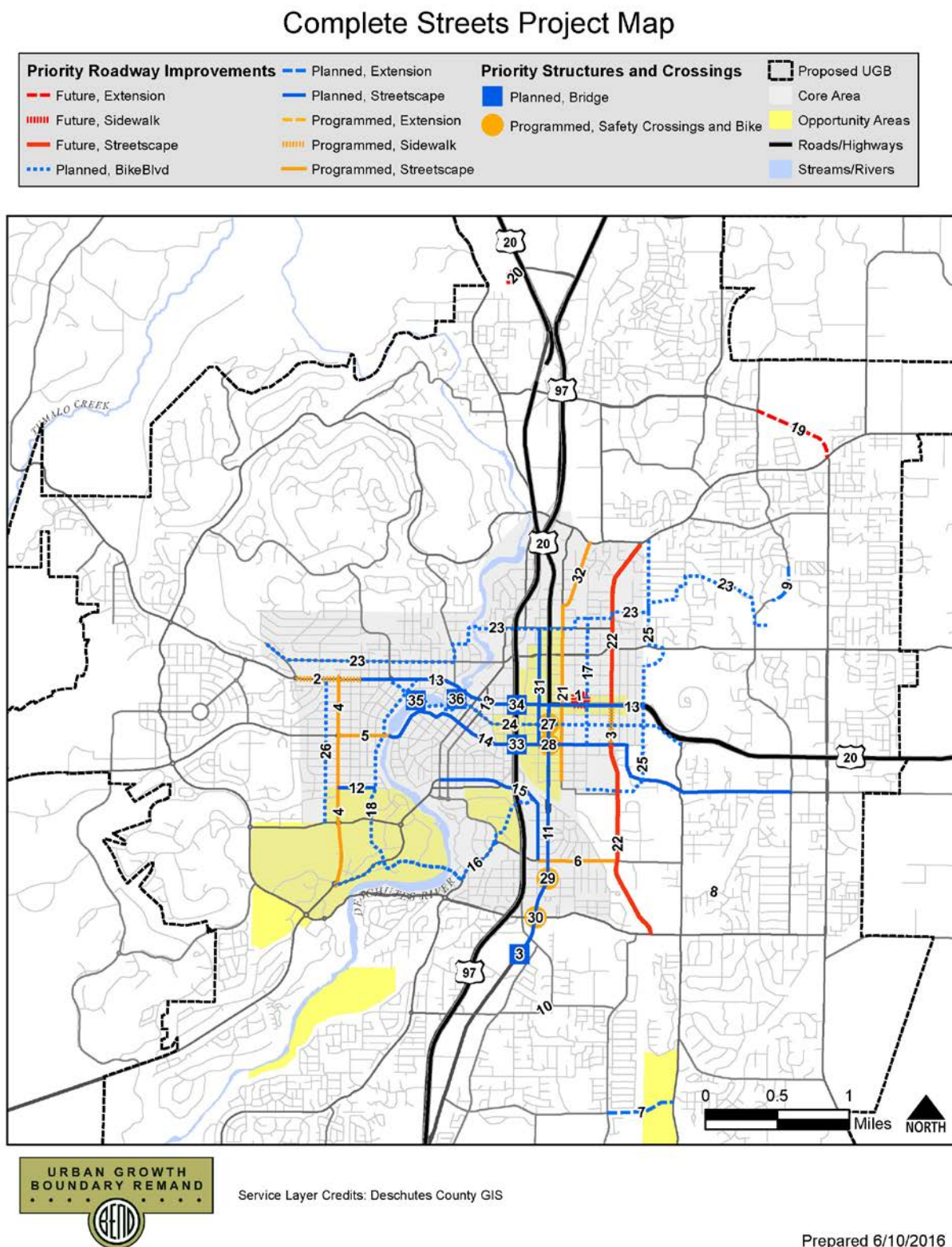
Efforts to Date

The City of Bend has a program for identifying pedestrian and bicycle improvement priorities⁵⁸. There are \$3-5 million for design and construction of pedestrian and bike improvement projects in the current Capital Improvement Program. The City has a list of priority safety crossing projects identified in the 2012 Bend Safety Implementation Plan and another priority list for walking and bicycling corridors, and bicycling and walking structures found in the 2014 Strategic Implementation Plan for Pedestrian and Bike Infrastructure. These projects are identified on

⁵⁸ See "Safety Implementation Plan" 2014; "2014 Strategic Implementation Plan for Walking and Biking"

Figure 11, and listed (along with estimated project costs) in Attachment 10. For instance, there are safety crossing projects on 3rd Street and Highway 20 corridors that are in, adjacent, or lead to and through three opportunity areas: East Downtown, Central Area, and Highway 20. The pedestrian and bike plan priorities were created by identifying existing walkable and biking areas in the City that had the most potential to increase those mode splits. These areas in most cases overlap with the UGB opportunity and core areas.

Figure 11: Complete Streets Projects



Proposed Strategies

The City will review the existing pedestrian and biking plan and priorities for consistency with the opportunity and core areas. This will include an update to the methods and approaches to the priorities.

The City will update the transportation CIP and the transportation system development charge policies and documents within three years after the UGB remand is approved. The updates will include the ILUTP implementation.

In the near-term (by 2028), the City anticipates being able to implement planned and funded (“programmed”) projects from the work described above, including sidewalks, bike lane improvements, and up to six enhanced roadway crossings in or adjacent to opportunity areas. As part of this implementation work, the City recognizes that multimodal traffic data is needed for assessing the effectiveness its complete streets projects. The City has embarked on a program to install both temporary and permanent counters to collect bike and pedestrian trip data before and after the roadway improvement.

The City will also conduct planning and prioritization of streetscape corridors in opportunity and core areas and transit priority corridors and centers. In the near-term, the City anticipates being able to construct two or more streetscape projects in opportunity areas or transit corridors (14th Street, Galveston, and Newport streetscape improvements are scheduled for construction in 2018).

Additional Strategies for Further Consideration

As funding allows, the City can implement additional projects that are planned but not funded, focusing improvements in opportunity areas and adjoining corridors. Examples include streetscape corridor enhancements, canal bridges and key structures (such as Greenwood and Franklin undercrossing improvements) and bike boulevards. The City may evaluate funding mechanisms such as Urban Renewal for areas including Opportunity Areas to provide additional funding for such projects.

Over the long-term, the City can pursue aspirational projects, such as major roadway connections, bike/pedestrian US 97/Parkway crossings, and additional streetscape corridors.

Summary and Implementation

Table 2 summarizes how the city can implement supportive strategies to reduce VMT through implementation of the “Proposed Strategies” associated with the UGB expansion proposal, and also with “Additional Strategies for Further Consideration” over the longer-term future. The second column captures the implementation of the policies and programs that are already in place and those that are proposed for adoption with the UGB. The third and fourth columns capture additional work the city could do to further reduce reliance on the automobile over the long term if staff time and funding allow. There is a time component to the feasibility of implementing the additional strategies in the sense that the actions generally build on one another and greater levels of implementation may be possible and appropriate over time based

on available public funding and private redevelopment proposals. This is reflected in the categorization of the additional strategies as “Medium-Term” or “Long-Term”.

ILUTP implementation is dependent on City Council goals and CIP priorities. The projects and programs that implement the ILUTP will need to be prioritized with other community transportation and land use plans and projects. Funding, staff resources, and community values will have to be constantly weighed and balanced as the ILUTP is implemented and will influence the timing of the ILUTP projects and programs. Another factor that guides how fast and to what degree the ILUTP is implemented is how the private market responds to the UGB remand land use policies, especially in the opportunity areas. Standards or benchmarks to reduce VMT rely on land use strategies such as diversity and density that are dependent not only on land use policies but the national, regional, and local land use market trends that the City does not control. Consequently, ILUTP implementation must be managed with the understanding the City plans to implement the land uses to allow the market to respond in a way that ultimately reduces VMT through a combination of land use and transportation actions.

The UGB Remand has analyzed Bend urban typologies and form in relation to VMT reduction. The initial findings indicate that the Core area of the City, including several identified Opportunity Areas, have the greatest chance for reducing VMT. Therefore, the implementation strategies will also focus transportation projects and programs in these areas and corridors. This does not preclude implementation in other areas of the city which will also support lowering VMT. This approach builds on and supports the goals and policies found in the UGB Growth Management Report and will ensure that limited transportation resources are applied strategically to lower VMT.

Table 2: Summary: VMT Reduction Strategies⁵⁹

ILUTP Element	Proposed Strategies ⁶⁰	Additional Strategies for Further Consideration	
		Medium-Term	Long-Term
Land Use Strategies	Designate and ultimately rezone mixed use opportunity areas identified in UGB project.⁶¹ Adopt city-wide modifications to the development code to increase efficiency and housing mix for new residential development and offer targeted reductions to parking standards.	Designate additional mixed use areas along transit corridors where there is redevelopment potential Adopt design and development standards for key pedestrian areas and transit corridors Strengthen connectivity standards for new master-planned neighborhoods	Consider up-zoning selected residential neighborhoods in the city where there is potential for infill development based on additional analysis and community support
Transportation Demand Management and Parking Management	Set policy supporting incentives approach to TDM and increasing applicability of TDM programs Conduct citywide analysis and feasibility for parking management and pricing Establish TDM requirements for large institutional and employment uses as part of master plan requirements	Consider allowing transportation SDC reductions for TDM measures Require TDM programs for additional large businesses / institutions (e.g. those with over a certain number of employees in certain areas) Partner to establish TMAs for certain areas (e.g. St. Charles Medical Center, downtown, Bend Central District, etc.) Implement parking management programs in key areas based on outcomes of citywide parking study	Parking pricing implemented in key areas, based on outcomes of the parking pricing study (e.g. downtown and Bend Central District).

⁵⁹ This table is a summary. Please see the text in Chapter 4 for the full description of all strategies.

⁶⁰ Proposed strategies will be implemented with the UGB Remand adoption or within three years of adoption.

⁶¹ Zoning may be deferred in some opportunity areas until requested by the property owner.

ILUTP Element	Proposed Strategies ⁶⁰	Additional Strategies for Further Consideration	
		Medium-Term	Long-Term
Transit ⁶²	Support and maintain the recent service improvements as of 2016 Define and enhance transit centers and corridors in opportunity and core areas. Propose new and enhanced transit funding	Implement most components of Bend Transit Plan, including additional hours of service, more frequent peak headways, and two new routes.	Implement further additional hours of service, improved headways on specific routes primarily in opportunity and Core areas, and conversion of 3 routes from bus service to pre-BRT types of service
Roadway Improvement Management and Policies	Implement selective “road diets” where safety issues have been identified	Develop pedestrian and biking safety plans for the opportunity areas that enhance the possibility for higher walking, biking, and transit modal splits.	Continue to develop and implement policies that increase walking and biking safety by modifying street standards
Complete Streets and Connectivity Investment ⁶³	Implementation of programmed projects, which include many projects in or adjacent to opportunity areas. The City will count bike and pedestrian trips before and after as part of project implementation. Conduct planning and prioritization of streetscape corridors in opportunity and core areas and transit priority corridors and centers.	Evaluate funding mechanisms for complete street improvements, such as Urban Renewal for areas including Opportunity Areas Implementation of planned but not-yet-funded projects, focusing improvements in opportunity areas and adjoining corridors.	Refinement and potential implementation of aspirational projects, such as major roadway connections, US 97/Parkway bike/pedestrian crossings, and additional streetscape corridors.

⁶² See attached Explanation of Transit Scenarios and CET Service Schedule for details.

⁶³ See attached Complete Streets and Connectivity – Future Scenarios for details.

CHAPTER 5. POLICIES, STANDARDS AND BENCHMARKS

Proposed ILUTP Policies

The Bend TSP and General Plan include existing goals and policies that call for reducing reliance on the automobile and encourage mixed use development, which support the ILUTP. The policies below are new policies specific to implementing the ILUTP. These policies will be added to Chapter 7 (Transportation) of the City's Comprehensive Plan and included as an amendment to the City's TSP as part of the UGB expansion project.

- The City will implement the land use, transportation demand management, parking management, transit, and complete streets strategies, projects and programs that are identified as Proposed Strategies in Chapter 4 of the ILUTP.
- The City will conduct a planning study to evaluate the potential for Transportation Management Areas for the opportunity areas, transit centers, and public and private institutions and companies.
- The City will include streetscape projects in opportunity and core areas and transit corridors when developing the transportation CIP priorities and projects.
- The City will develop transit priority corridors in the opportunity and core areas that include a combination of land use policies and codes and transportation enhancements that encourage transportation options.
- The City will update the assessments of the ILUTP standards at each update of the Bend MPO regional transportation system plan and the City TSP.

Proposed Standards

In addition to tracking implementation of the strategies identified in Chapter 4, the City proposes to use the standards identified in this section to measure progress towards developing and implementing transportation systems and land use plans that increase transportation choices and reduce reliance on the automobile. The proposed standards focus on outcomes that are not fully within the City's control; they can be thought of as performance measures that provide insights into the effectiveness of the City's ILUTP strategies. They are linked to the "D" variables discussed in Chapter 2 of this ILUTP because those have been shown to be key drivers of travel behavior.

The proposed standards emphasize evaluating performance in certain key areas of the City, including opportunity areas, transit corridors, and the Central Core. This reflects the City's overall approach of focusing the available resources on areas that will have the highest likelihood to reduce VMT. These key areas are shown on Figure 12. Note that there is (intentionally) a great deal of overlap among these key areas; however, because they are each important for their own reasons, the City proposes using the combination of these areas to track progress.

Figure 12: Central Core area, Transit Corridors, and Opportunity Areas

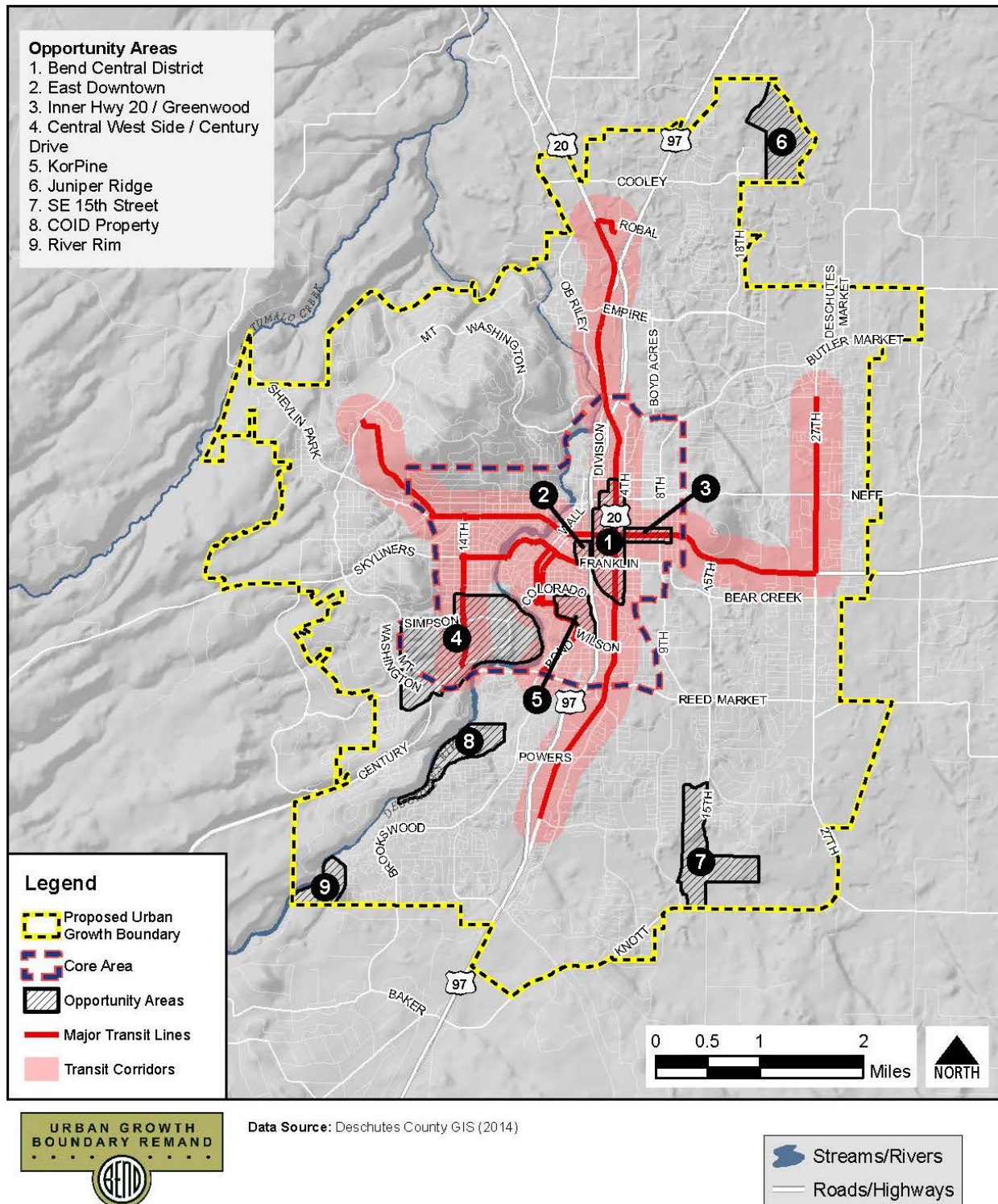


Table 3: Standards for Reducing Reliance on the Automobile

Topic	Measure	Geographic Area ⁶⁴	Current (2014)	2028 – preferred UGB
Density (Land Use)	Activity density (housing units ⁶⁵ plus employment ⁶⁶ over total area in acres) ⁶⁷	Central Core	7.67	9.10
		Core Opportunity Areas	7.64	11.24
		Key Transit Corridors	6.29	7.93
Design (Complete Streets)	Implementation of Complete Streets Projects (see Figure 11 and Attachment 10)	City/UGB-wide	N/A	All programmed projects
Destinations (Transit, Land Use, and TDM)	Household transit access (percent of housing units ⁶⁵ within a quarter mile of transit ⁶⁸)	City/UGB-wide – all transit corridors	55%	At least 49% ⁶⁹
		Key Transit Corridors	45%	At least 41% ⁶⁹
	Employment transit access (percent of employment ⁶⁶ within a quarter mile of transit ⁶⁸)	City/UGB-wide– all transit corridors	82%	At least 65% ⁶⁹
		Key Transit Corridors	81%	At least 64% ⁶⁹

⁶⁴ See Figure 11 for a map of the specific areas in question. Note that “Key Transit Corridors” is limited to primary transit corridors, and does not include all transit routes.

⁶⁵ Existing housing unit locations are based on the Buildable Lands Inventory. Future housing unit locations for the 2028 standard are based on projected future development using Envision Tomorrow. Note that future housing units are inclusive of on-campus student housing at Oregon State University’s Cascades Campus (OSU Cascades).

⁶⁶ Existing employment location is based on the 2013 Quarterly Census of Employment and Wages (QCEW) provided by the Oregon Employment Department. Future employment locations for the 2028 standard are based on projected future development using Envision Tomorrow. Future employment is inclusive of employment at OSU Cascades.

⁶⁷ Activity density is measured using the TAZs that best represent the specified area. Area is based on GIS calculation of the total area of each TAZ in acres.

⁶⁸ Transit routes for both 2014 and 2028 are based on the 2016 Cascades East Transit (CET) routes. Unlike the “Key Transit Corridors”, this measure includes all transit routes. Parcels were selected based on the center point of the parcel being within a quarter-mile buffer from a transit route. Distance to transit is measured as the crow flies from the transit route and does not account for stop locations or barriers such as rivers or highways.

⁶⁹ The standard acknowledges that new transit lines are not included in the “proposed strategies” for 2028, and that the City is not relying on major expansions in transit service by 2028 in order to generate the forecast VMT results. Updates to the Transit Plan will be needed in order to address the land use recommendations of the UGB project. The decline in transit accessibility reflects this lag. The standard is included to ensure that transit accessibility declines no more than expected by 2028, with the intention that transit accessibility (at least for housing) may, in fact, increase by 2028 if transit service is extended to outlying opportunity and/or expansion areas that are currently vacant. The percentage of households with access to transit in 2028 may be lower than today, but over the longer term, as the opportunity areas grow and transit is expanded, the household access to transit percent will increase again.

Topic	Measure	Geographic Area ⁶⁴	Current (2014)	2028 – preferred UGB
	Access to commercial services (percent of total housing units ⁶⁵ within one half mile of existing and planned commercial areas ⁷⁰)	City/UGB-wide	79%	86%
	Active TMAs & institutional TDM programs	City/UGB-wide	2 (Juniper Ridge, COCC)	3 (Juniper Ridge, COCC, OSU)
Diversity (Land Use)	Jobs-housing balance ⁷¹ (ratio of employment ⁶⁶ to housing units ⁶⁵)	Central Core	2.23	2.05
		Core Opportunity Areas	17.82	5.33

TPR Compliance

These standards comply with the TPR requirements as demonstrated below.

(A) Achieving the standard will result in a reduction in reliance on automobiles;

The standards listed in Table 3 have been selected because they have been shown to be linked to less driving (see Chapter 2). Achieving the standards will reduce reliance on automobiles as follows:

- An increase in activity density in the Central Core, Core Opportunity Areas, and Key Transit Corridors will put more households and more jobs in areas that are walkable, bikeable, and accessible by transit, facilitating use of alternate modes and reduced reliance on automobiles. It will also help provide the level of activity density needed to make transit operate more efficiently and help support additional businesses that are focused toward foot traffic rather than vehicle traffic.
- Implementation of all programmed Complete Streets Projects will increase pedestrian and bicycle safety and convenience, supporting the choice to walk or bike around town.
- Increasing the percentage of households and employees with access to transit means that more people have the choice to take transit to work, to school, or to key destinations such as downtown and medical appointments.

⁷⁰ Existing and planned commercial areas for 2014 are based on current General Plan designations: CB, CC, CG, CL and MR. Existing and planned commercial areas for 2028 are based the current General Plan designations as well as commercial and mixed use development types used in Envision Tomorrow, including: CB, CC, CC2 (a more walkable version of the CC zone), CG, CL, ME, MR, MU 1 (now called MN for zoning and plan designations), and MU-2a (now called MU for zoning and plan designations).

⁷¹ Jobs-housing balance is measured using the TAZs that best represent the specified area.

- Implementing an additional TMA or institutional TDM program at OSU Cascades will reduce reliance on the automobile by ensuring that students and faculty have incentives and information to support using alternative modes to access the campus.
- Achieving a more even balance of jobs and housing in the Central Core and Core Opportunity Areas will mean that more people live in employment-rich areas, and that there are more opportunities to live and work within the Central Core.

(B) Achieving the standard will accomplish a significant increase in the availability or convenience of alternative modes of transportation;

Achieving the standard will significantly increase the availability or convenience of alternative modes as follows:

- An increase in activity density in the Central Core, Core Opportunity Areas, and Key Transit Corridors will put more households and more jobs in areas that are walkable, bikeable, and accessible by transit, making alternative modes more convenient and available to those households and employees.
- Implementation of all programmed Complete Streets Projects will increase pedestrian and bicycle safety and convenience.
- Increasing the percentage of households and employees with access to transit means that more people have the choice to take transit to work, to school, or to key destinations such as downtown and medical appointments. Transit is significantly more convenient to use for those who live within a quarter mile of service.
- TMAs or institutional TDM programs often provide subsidies for transit passes, shuttle service, or other incentives to use alternate modes. Expanding these programs will help make alternative modes more convenient and desirable for those participating in the TMA or TDM program.

(C) Achieving the standard is likely to result in a significant increase in the share of trips made by alternative modes, including walking, bicycling, ridesharing and transit;

The regional travel demand model is closely calibrated for vehicle trips, because of its focus on the vehicular transportation network. There is less focus on bicycle and pedestrian modes in that model. Compared to the regional travel demand model, the Envision Tomorrow 7D transport model is more focused on reflecting the impacts of land use and built environment changes on mode choice. Using ET 7D, the preferred scenario is projected to result in a 7.8% non-auto share and a 92.2% auto share for all household trips, UGB-wide. This is essentially unchanged from the ET model estimate of existing conditions (using 2014 built environment and demographic data and 2016 transit service), which estimates an 8.5% non-auto share and a 91.5% auto share for all household trips UGB-wide (including existing population in proposed UGB expansion areas). However, these results do not capture all of the City's proposed strategies in this ILUTP. The reasons for this include:

- The 2016 transit service expansion was factored in to the existing mode split evaluation, although it was not in place as of 2014. Thus, the impact of this recent transit improvement is already captured in the existing mode split data.

- While the land use efficiency measures proposed with the 2016 UGB expansion are significant, their impact on redevelopment in the Central Core is projected to be relatively modest through 2028.
- Even the ET model, which is sensitive to the built environment, does not account for the quality of the street environment in a connected area (e.g. the presence of street trees, sidewalk width, or the availability of bike lanes), nor does it fully account for gaps and barriers in the bicycle and pedestrian network, such as unsafe crossing points of major roads. As a result, the model is not reflecting the benefits of the complete streets improvements that the City has committed to funding and building by 2028.
- The ET model does not account for existing or proposed TDM programs at OSU, COCC, or Juniper Ridge. These would tend to shift travel in these areas to alternative modes (including ride sharing and shuttles, which are not identified as separate modes in ET) beyond what the built environment and demographic factors would suggest.

While the overall mode split UGB-wide shows little change from 2014 to 2028, analysis of the rates of non-auto trips per household reveals that the complete communities approach to UGB expansion will encourage greater walking, biking, and transit usage in many peripheral areas inside the current UGB and adjacent to UGB expansion areas. These areas will have new opportunities to walk and bike to parks, schools, and commercial services. The areas where the number of daily walking, biking, or transit trips per household is projected to increase are shown in green on Figure 13. Lighter green areas show an improvement on one of these three modes; brighter green areas show improvement in two or even all three modes.

Note that rate of walking, biking and transit usage per household within the Central Core is not expected to improve relative to existing conditions because those areas are already highly complete and connected and have the best transit service in the city. The households already living in those areas enjoy these conditions today. And, as noted above, the complete streets improvements are not reflected in the mode split estimates by the ET model.

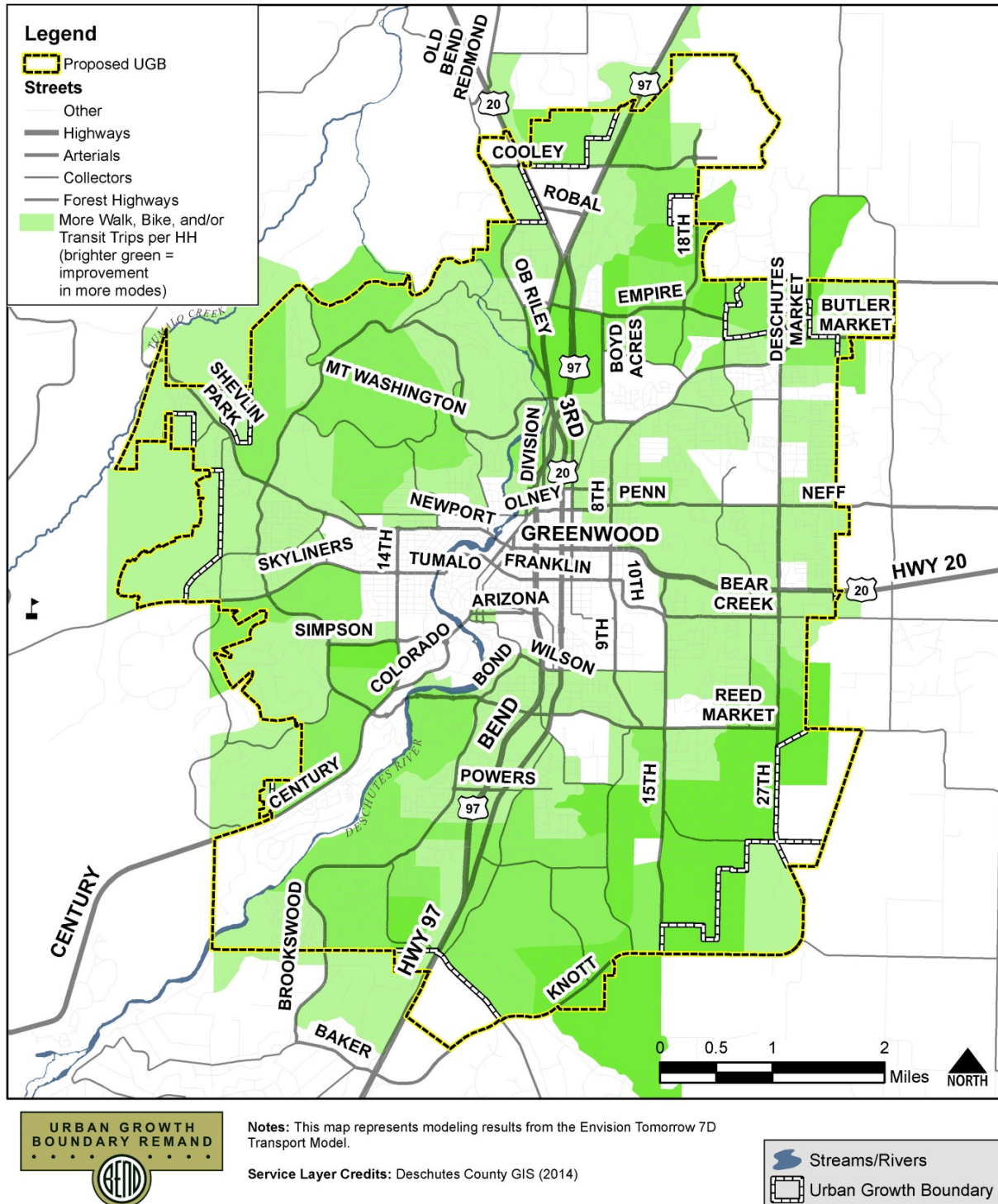
In order to more accurately reflect the impact on walking and biking due to the City's proposed Complete Streets improvements, the City will be installing permanent pedestrian and bicyclist counters at key locations in the Central Core (e.g. Newport, Portland, Colorado, Reed Market, Greenwood, and Franklin bridges). These will provide baseline data prior to complete streets improvements as well as on-going bicycle/pedestrian count data following the improvement.

Figure 13: Areas with Increases in Non-Auto Modes

Bend UGB

Scenario 2.1G: Areas with More Non-Auto Trips per Household

Prepared 7/1/2016



(D) VMT per capita is unlikely to increase by more than five percent; and

As shown in Table 1 on page 29, based on evaluation using the regional travel demand model to measure VMT per capita as specified in the TPR, the preferred UGB Expansion Scenario (2.1G) is expected to result in a 1.2% increase in VMT relative to the 2010 baseline that best reflects the 2008 starting point of the 20-year planning horizon for the UGB Remand. Because of the roughly 5% increase in VMT estimated between the 2003 model and the 2010 model, this translates to a 6.3% increase relative to 2003. However, OAR 660-012-0035(5)(b) allows that “In reviewing proposed standards for compliance with subsection (a), the commission shall give credit to regional and local plans, programs, and actions implemented since 1990 that have already contributed to achieving the objectives specified in paragraphs (A)–(E) above.”

As documented in detail in Attachment 6, the City of Bend implemented several connectivity improvements between 1990 and 2003 that would be expected to reduce VMT per capita, such as a new river crossing (Healy Bridge) and an extension of Empire Avenue. To measure the benefit of these improvements, 2003-level demand was applied to both the base 2003 model network and to a 1990 network that did not include these connectivity improvements. VMT per capita from these model runs were compared in order to calculate the VMT benefit of actions implemented in the intervening 13 years. This analysis showed that VMT per capita in 2003 would have been roughly 2.2% higher if not for the connectivity improvements made since 1990. When the 2028 VMT results are compared against the VMT that would have resulted in 2003 without the benefit of those connectivity improvements, the increase is 4.1%. Given this, the evidence demonstrates that VMT per capita is unlikely to increase by more than 5% over the 20-year planning horizon of the UGB Remand, especially when considering the actions (connectivity improvements) that the City has implemented since 1990 that have already contributed to reducing growth in VMT.

(E) The standard is measurable and reasonably related to achieving the goal of increasing transportation choices and reducing reliance on the automobile as described in OAR 660-012-0000.

The standards listed in Table 3 are measurable, given Census data, data from the Oregon Employment Department, and GIS data on transit routes, all of which the City has access to. The standards are reasonably related to achieving the goal of increasing transportation choices and reducing reliance on the automobile as described in response to (A) and (B), above.

ATTACHMENT 1 COMPARISON OF 2003 AND 2010 REGIONAL TRAVEL DEMAND MODELS

Memorandum

July 18, 2016

To: Karen Swirsky, Nick Arnis

From: Chris Maciejewski, PE, PTOE, DKS Associates
Aaron Berger, DKS Associates

Re: Base Year Travel Demand Model Selection for VMT Evaluation



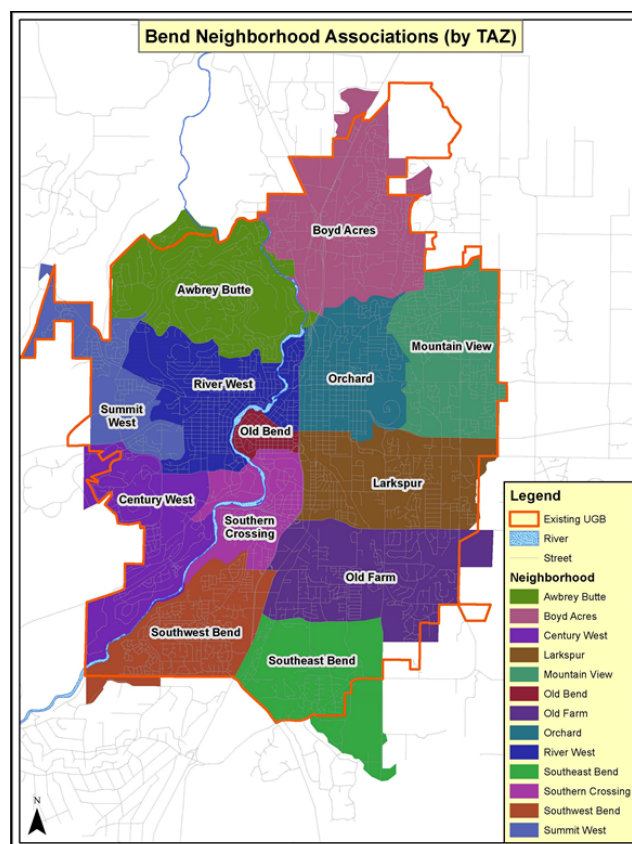
The purpose of this memo is to describe why we recommend the UGB project team use the newer base year 2010 model scenario (as opposed to the prior 2003 base year model scenario) to measure VMT per capita to represent year 2008 conditions. In summary, the travel demand model scenario for 2003 described in the UGB Remand does not account for the increases in population, the new roadway network additions, and the new transit system that occurred between 2003 and 2008. These factors affect the amount and location of trips, mode choice, and trip distribution/assignment, which significantly affects the VMT per capita calculation. Therefore, the 2003 model scenario is not a valid predictor of 2008 VMT per capita conditions compared to the 2010 model scenario.

Background

The UGB Remand described using the regional travel demand models for year 2003 and 2030, which were the model years available at the time of the prior UGB evaluation to approximate the 2008 to 2028 planning horizon. Since the time of the UGB Remand, the Bend MPO and ODOT TPAU have since updated the regional model scenarios to base year 2010 and future year 2028. This memo discusses the differences between the 2003 and 2010 base year model scenarios and how closely they relate to 2008 conditions.

Land Use

The year 2010 base model scenario is proposed for use over the 2003 base model scenario as it provides a much closer comparison to 2008 land use conditions. The



2010 base model scenario was developed for the Metropolitan Transportation Plan (MTP), and includes updated land use reflecting the 2010 development conditions in Bend. Between 2003 and 2008, the population of Bend increased from 59,646 to 77,181¹, an annual growth rate of 5.3%/year. With the economic downturn occurring in 2008, the population of Bend remained virtually the same between 2008 and 2010, dropping slightly from 77,181 to 76,639². The population growth between 2003 and 2008 was verified through comparison of historical aerial imagery of housing units in each Neighborhood Association in Bend. Figure 1 shows the Neighborhood Association mapped to the TAZs used in the travel models.

The growth in each neighborhood was verified against the household growth between the 2003 and 2010 base model scenarios. The residential land use changes between the 2003 and 2010 base model scenarios are summarized by neighborhood Table 1.

Table 1: 2003/2010 Model Residential Comparison

Neighborhood Association	2003 Model Households	2010 Model Households	2003-2010 Model Household Growth	Locations of primary residential growth between 2003 and 2008 verified in the model
Awbrey Butte	1,291	1,645	354	North of Farewell Dr
Boyd Acres	1,524	2,434	910	Along Boyd Acres Rd and Morningstar Rd
Century West	961	1,412	451	West of Cascade Middle School
Larkspur	3,173	3,498	325	Along the 27 th St corridor
Mountain View	4,975	5,405	430	West of 27 th St
Old Bend	1,024	945	-79	Did not experience residential growth
Old Farm	2,505	3,108	603	Multi-family units along Hwy 96 and single family units on the Brosterhouse Rd corridor
Orchard	2,535	3,095	560	Multi-family units near Pilot Butte and single family units north of Butler Market Rd
River West	3,906	3,899	-7	Did not experience residential growth
Southeast Bend	1,050	1,147	97	Did not experience significant residential growth
Southern Crossing	915	983	68	Did not experience significant residential growth
Southwest Bend	1,893	2,954	1,061	West of Brookwood Blvd
Summit West	644	1,305	661	Fairly distributed but very high growth
Totals	26,396	31,830	5,434	20.6% increase in households between models

Employment totals did not change significantly between the 2003 and 2010 model scenarios.

¹ U.S. Census Bureau; American Community Survey, 2008 Vintage Population Estimates

² U.S. Census Bureau; American Community Survey, 2008 and 2012 Vintage Population Estimates

Roadway Network

The 2010 base model scenario network was also updated to reflect following projects constructed between 2003 and 2010:

- American Lane Re-alignment with Brosterhous Road
- NW Crossing Drive Connection between Shevlin Park Road and NW Morningstar Road
- NW Hunnell Road Connection between Cooley Road and Robal Road

Each of the projects listed were constructed prior to 2008. Therefore, the 2010 base model scenario is a more accurate representation of the roadway network in 2008

Transit Network

The 2010 base model scenario network includes transit service that exists today in Bend, but was not present in 2003. The 2010 base model scenario transit network detail closely matches the transit service that was in place in 2008. Therefore, the 2010 base model scenario is a more accurate representation of the transit network in 2008

Conclusions

Due to the updated land use, roadway network, and transit network developed for the 2010 base model scenario, the UGB project team believes it is necessary to use the 2010 base model scenario over the 2003 base model scenario for VMT per capita analysis to estimate 2008 conditions. These model scenario inputs for 2010 are a much better and accurate representation of the land use and transportation in Bend in 2008. As stated, these inputs affect the amount and location of trips, mode choice, and trip distribution/assignment, all of which significantly affect VMT per capita analysis.

ATTACHMENT 2 SCENARIO EVALUATION METHODOLOGY MEMO



720 SW Washington St.
Suite 500
Portland, OR 97205
503.243.3500
www.dksassociates.com

MEMORANDUM

DATE: June 15, 2015

TO: Bend UGB Project Team

FROM: Chris Maciejewski, DKS Associates
Garth Appanaitis, DKS Associates

SUBJECT: **Bend UGB Remand Phase 2**
Task 9.10.1-2– Scenario Evaluation Methodology

P#14073-000

The purpose of this memorandum is to summarize the scenario evaluation methodology that will be applied for the Bend Urban Growth Boundary (UGB) analysis. The following sections describe the tools that will be used to evaluate transportation impacts, with a specific focus on analysis of Vehicle Miles Traveled (VMT) per capita and integration of land use and transportation strategies. This is a draft methodology intended for coordination with the City, Bend Metropolitan Planning Organization, ODOT, DLCD and others involved in the transportation evaluation process.

BACKGROUND AND CONTEXT

The City of Bend has entered the next phase of its UGB expansion to chart a path for Bend's future growth. The City is working with a team of planning experts and advisors to address requirements of a "Remand" of the City's previously proposed UGB expansion. This two-year process – scheduled to end April 2016 – is addressing specific technical issues and planning requirements established by the Oregon Land Conservation and Development Commission (LCDC) in the Remand. Work related to satisfying the Remand and proposing a new UGB is using a planning horizon of the year 2028, consistent with state law. The City is also planning for the longer term for some policy-related strategies, such as the integration of land use and transportation. The end result of this planning process, for both short and long term needs, will be to meet local objectives and Remand requirements, including those related to compliance with the Transportation Planning Rule (TPR)¹ and state-mandated VMT reduction requirements. Specifically, in order to achieve a comprehensive look at land use and transportation, the following three requirements will be addressed through this process:

- Goal 14 (Alternatives Analysis) – Use transportation tools and evaluation metrics to compare potential UGB expansion scenarios including boundary location, arrangement of land uses, and supporting transportation system improvements.
- TPR Section -0035 (VMT Analysis) – Use transportation planning tools to determine whether the growth scenarios and the proposed UGB expansion will achieve the VMT reduction requirements stated in the UGB Remand, or what other measures are needed to achieve the required VMT reduction in the long-term.

¹ Oregon Administrative Rule (OAR) 660-012 is commonly referred to as the Transportation Planning Rule.

- TPR Section -0060 (Plan Compatibility) – If applicable, determine if specific changes to the Comprehensive Plan would have a significant effect on the transportation system and identify potential system improvements to mitigate those effects.

PROCESS OVERVIEW

The process for developing and justifying a new UGB will require a range of integrated land use and transportation scenarios and analyses. Figure 1 summarizes the general scenario development and analysis process that will be applied for the UGB analysis. The process begins with the development of alternative land use and transportation scenarios that are consistent with the initial technical findings and policy framework that have been developed during the project to date. The process will then make use of two primary tools, Envision Tomorrow (ET) and the travel demand model (TDM). These tools will be used, in tandem, to assess preliminary outputs from and refine scenarios, develop a final scenario, and ultimately make findings that address TPR requirements for the Remand (VMT) and changes that may be implemented through the ILUTP. These specific stages (as shown in Figure 1) include:

June

- UGB Expansion Scenarios (2028) –Develop alternative UGB expansion scenarios based on preliminary Goal 14 evaluation of study area land and TAC input

July

- ET VMT and Mode Split Estimations – ET will be used to estimate VMT and mode split for the UGB expansion scenarios that will provide an initial indicator of whether an Integrated Land Use and Transportation Plan (ILUTP) will be necessary.

July/August

- VMT Reduction Hypotheticals – VMT reduction strategies will be grouped and tested as hypothetical scenarios to determine reduction potential.
- ET VMT Analysis – ET will be used to conduct preliminary VMT analysis of the hypothetical scenarios, which will create an iterative approach to hypothetical scenario development based on these preliminary findings.
- TDM Analysis of UGB expansion scenarios – The TDM will be used to evaluate and compare the UGB expansion scenarios formally for the purposes of Goal 14 alternatives analysis, including VMT as well as transportation performance measures.

August/September

- Preliminary ILUTP Strategies – The evaluation of VMT hypotheticals in ET will identify preliminary ILUTP strategy recommendations to share with the TAC.
- Official Transportation Results – Formal analysis results comparing the UGB expansion scenarios, including VMT, transportation performance, and planning-level cost estimates, will be prepared for the TAC using the TDM, ET results, and other qualitative assessments.

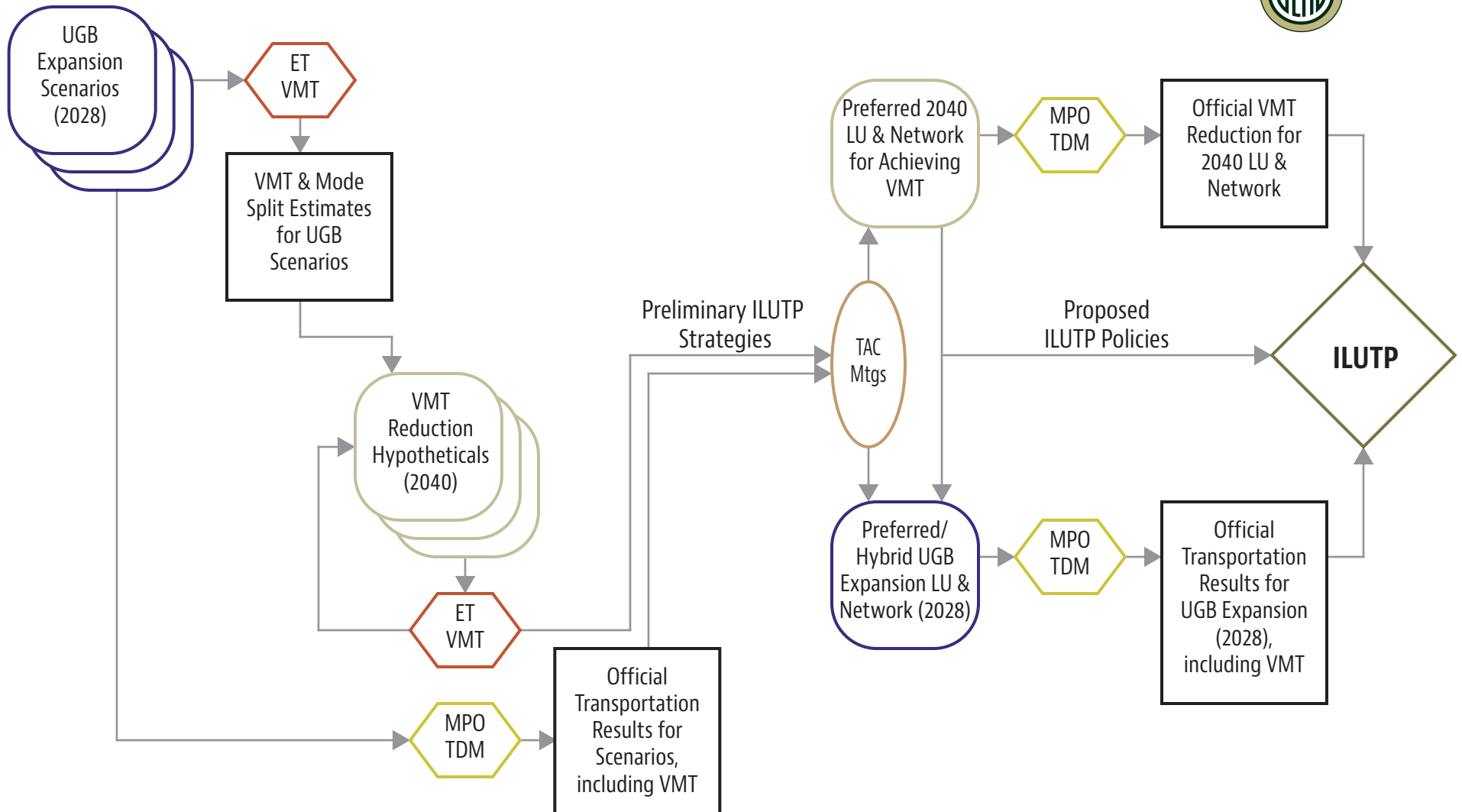
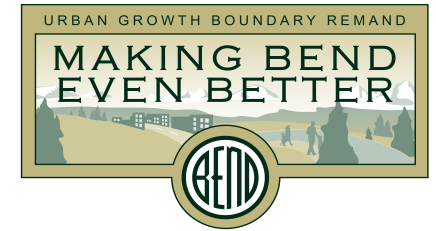
October/November

- Preferred/Hybrid 2028 UGB Scenario – The Goal 14 analysis of the UGB expansion scenarios, including TDM model findings, along with TAC input and the preliminary ILUTP strategies, will be used to develop a preferred UGB expansion scenario. The travel demand model will be used to analyze the preferred expansion scenario and report transportation system performance findings.
- Preferred 2040 Land Use and Network - The preliminary ILUTP strategies will be refined with TAC input and used to shape a preferred 2040 VMT reduction scenario, which will be analyzed with the TDM to develop the official VMT results for Remand and TPR compliance.
- Integrated Land Use and Transportation Plan (ILUTP) Policies – Based on the preferred 2040 VMT reduction scenario, a set of ILUTP policies will be developed to begin transitioning to the preferred plan.

December

- ILUTP – The findings and components from the 2040 preferred VMT reduction scenario, the 2028 UGB expansion scenario, and the ILUTP policies will be used to develop the ILUTP.

Transportation Analysis and Integrated Land Use & Transportation Plan Work Flow Diagram



JUN	JUL	AUG	SEP	OCT	NOV	DEC
-----	-----	-----	-----	-----	-----	-----

ET VMT: Envision Tomorrow VMT/Mode Split Analysis Model

MPO TDM: Metropolitan Planning Organization Travel Demand Model

ILUTP: Integrated Land Use & Transportation Plan

VMT: Vehicle Miles Traveled

UGB: Urban Growth Boundary

TAC: Technical Advisory Committees

Timing is approximate and subject to change

DRAFT: 6/11/2015

Table 1 summarizes the roles for each party in the analysis processes.

Table 1: Analysis Roles for Team Members

Team Member	ET	TDM
City of Bend	• Scenario Development • Identify potential VMT reduction strategies to test • Review ET Findings	• Participate in scenario evaluation • Confirm conclusions from scenario evaluations • Confirm/provide direction for proposed UGB and potential Integrated Land Use and Transportation Plan
Consultant	• Scenario Development • Identify potential VMT reduction strategies to test • ET Model Runs • Review ET Findings	• Coordinate evaluation process • Interpret Results of TDM • Prepare Final Scenario • Prepare products for Committee and public review
TPAU / MPO	• Provide Base TDM Land Use and Travel Network for use in calibrating the ET Tool (complete)	• Run Final Scenarios in TDM and Provide Output to Project Team

The process concludes with the reported findings that will be derived from the travel demand model and other analysis tools. The following sections describe each of these tools in more detail.

KEY ENVISION TOMORROW (ET) METHODS

The purpose of Envision Tomorrow in the transportation analysis is to assist in identifying and analyzing the land use and transportation strategies that would be required in Bend to achieve the levels of VMT reduction required by the TPR and Remand. The team will develop a series of “what if” scenarios for testing. For example, “What if significant redevelopment along transit corridors occurred?” Envision Tomorrow is a key tool for the analysis because it is a quick and efficient way to estimate the big picture transportation impacts from the scenarios. The City’s buildable lands analysis, General Plan designations, and working Central Westside Plan recommendations are all calibrated into ET.

Envision Tomorrow Overview

The ET 7D Travel Model² is sensitive to changes in a variety of variables, commonly referred to as the “D” variables. These variables include Density, Design, Destinations, Demographics³ and Diversity of land uses. The

² Envision Tomorrow Plus (ET+) User manual, Metropolitan Research Center University of Utah, http://www.envisiontomorrow.org/storage/user_manuals/20131029ENVISION%20TOMORROW%20PLUS_USER%20MANUAL_1st%20COMPLETE%20VERSION_updated_sm2.pdf

model uses these inputs to run the 7D Model predictive equations, which result in neighborhood-level predictions of several daily, household-level travel metrics including:

- Vehicle Miles Traveled (VMT)
- Auto Trips
- Transit Trips
- Bike Trips
- Walk Trips

Envision Tomorrow Comparison to Travel Demand Model

The information in Table 2 provides a comparison overview of Envision Tomorrow and how it differs from the travel demand model.

Table 2: Comparison of Envision Tomorrow to Travel Demand Model Tools

Tool Element	Envision Tomorrow (ET)	Travel Demand Model (TDM)
Purpose	Scenario development and analysis, including preliminary VMT reduction analysis	Provide more rigorous tool for analyzing the impacts to the transportation network for the final set of scenarios
Methodology	1. Populate Tool with Base Data (Network, Land Use, etc.) 2. Create Scenarios (Land Use or other Policies) 3. Extract Regional Indicators for Each Scenario 4. Advance/Modify Scenarios based on Indicators	1. Create Scenarios (TAZ Land Use and Transportation Network) 2. Run Model to Determine Transportation System Impacts 3. Determine Transportation System Improvements Required to Complement/Mitigate Scenario 4. Rerun Model with Identified Transportation System Improvements to Verify Benefit (If Needed)
Input Data	• Travel Network • Land Use Patterns (Specific TAZ Land Use Data or Policies) • Existing and Future VMT (for calibration)	• Travel Network (with capacity and service characteristics) • Land Use by TAZ
Output Metrics	• Land use – Density and Type of New Housing or Jobs • Mode Split • Network VMT (preliminary)	• Vehicle Trips by Zone • Traffic Volumes on Corridors • Trip Routing by Corridor • Corridor Congestion

³ The supporting socio-demographic factors for the land use data include household size, household income, and the number of workers in a household. As scenarios are “painted” with ET, these socio-demographic factors are updated based on the type of predicted development.

Tool Element	Envision Tomorrow (ET)	Travel Demand Model (TDM)
	- Fuel Consumption - Caloric Energy Expended through Walking and Biking (full list of potential indicators attached)	Network VMT
Strengths	- Quick Comparison of Scenarios as the Scenarios are Developed - Indicators Populated with National Assumptions (Reduces Input)	- Traffic Routing Accounts for Network Constraints - Transportation Mitigation Can be Tested at Regional Level
Limitations	- No Consideration for Road Capacity - Does not Identify Road Congestion - Indicators Populated with National Assumptions (Reduces Specificity)	- Network and Land Use Scenarios Must be Well Defined - Network Setup can be Laborious

Initial Scenario Development and Preliminary Evaluation

Envision Tomorrow will be used to develop land use inputs for the TDM based on the 2028 UGB expansion scenarios approved for analysis by the TAC. The ET 7D Travel Model will also be used for preliminary evaluation of the UGB expansion scenarios. Some of the measures that will be considered to address Goal 14 include:

- VMT/capita
- Mode split
- Housing & jobs within ¼ mile of transit corridors (# and %)
- Intersection density
- # of new lane miles
- Rough costs for transportation improvements (\$ per lineal foot) by scenario
- Roll up of cost per acre for UGB expansion area associated with each scenario

This mix of measures will be used to provide a comprehensive view of the system to guide the decision-making process in a flexible fashion, rather than dictating actions based on individual measures. Other types of qualitative measures that may be considered (potentially outside ET using other tools such as GIS), may include:

- Job accessibility by transit
- Job within one mile
- Distance to downtown and/or other key attractors
- Variables for Diversity (land use mix-distance to a store) and Design (intersection density-4 way intersections)

In addition, there are other qualitative methods and approaches that may be used that are not quantifiable in Envision such as measuring walking and biking safety.

Testing VMT Reduction Strategies

Envision Tomorrow will provide a preliminary analysis of VMT impacts and will use a short term time horizon of 2028 and a longer term time horizon of 2040/General Plan build-out (consistent with the Bend MPO MTP). The longer term time horizon is important to evaluating redevelopment, transit enhancement, and other strategies that may not be fully implemented/realized by 2028. The following is an initial list of strategies to be evaluated in the Envision Tomorrow analysis of VMT reduction hypotheticals:

- Redevelopment within transit corridors
- Implementation of the (working) Central Westside Plan
- Implementation of other sub-area plans or significant site specific projects
- Transportation demand management strategies for larger institutions (e.g. St Charles Medical Center and medical overlay area, OSU-Cascades and COCC)

The preliminary analysis using Envision Tomorrow will be used to inform: (1) whether the City will likely need to prepare and adopt an Integrated Land Use and Transportation Plan (ILUTP, as referenced in the Remand) and what strategies should be within the ILUTP; and, (2) potential General Plan policies and map designations that would support an ILUTP or other growth management goals in Bend. The VMT reduction conclusions will be preliminary because they will be generated by the ET model. The team recognizes that the transportation modelling performed using the Travel Demand Model will provide VMT analysis that will serve as an important part of the official evaluation and factual base for Remand compliance and an ILUTP. The team will be able to utilize the TDM to expand upon the measurable impacts with indicators such as congestion, time of travel and identifying capacity deficiencies. In addition, the land use and socio-demographic outputs of the ET model runs will be utilized for creating formal TDM model run inputs.

KEY TRAVEL DEMAND MODEL METHODS FOR VMT EVALUATION

The travel demand model will be run through the formal four-step process with TPAU to analyze the alternative scenarios, and then the proposed hybrid scenario (proposed UGB). These scenarios will include network characteristics that are not captured in the ET tool, including:

- Specific land use by TAZ consistent with the MPO model input types (demographics and bins)
- Specific transportation network and facility sizing
- Transit routes and service

The project team will develop the TDM scenarios and coordinate with TPAU to obtain full model runs. The results of the model runs will be used to assess the impacts on the transportation system for each scenario.

Model and Network Assumptions

The travel demand model network will be based on the Bend Metropolitan Planning Organization (MPO) Metropolitan Transportation Plan (MTP), inclusive of motor vehicle facilities and transit service that is included in the financially constrained system. City of Bend Transportation System Plan (TSP) improvements at the local

level that were not identified in the MTP will be incorporated as needed. For the year 2028, the project team and MPO staff will continue to coordinate with local transit service providers to determine appropriate assumptions for the 2028 transit system.

The Bend MPO travel demand model that was used for the MTP development will initially be used for model runs and analysis. A combined Bend-Redmond model is currently in development and may be available later in the process for the final scenario analysis.

VMT Analysis Methodology

The following sections describe the process for evaluating the VMT changes using the Bend MPO EMME travel demand model. This process was developed with input from Department of Land Conservation and Development (DLCD)⁴ staff. This methodology is specific to the EMME software that ODOT's Transportation Planning Analysis Unit (TPAU) utilizes to assign trips as part of the Bend MPO regional travel demand model. If TPAU converts the regional model to VISUM software as part of developing the combined Bend-Redmond model, the same process would be applied (with different software terminology). The VMT analysis will take place only within the Bend UGB versus the MPO regional model area, which is larger than the Bend UGB.

Evaluation Tool

The regional travel demand model (EMME software platform) developed by TPAU for the Bend MPO will be utilized for the evaluation. For each land use alternative that will be formally evaluated, TPAU will complete a full 4-step model run. The trip assignment component of the model run will be utilized by the consultant team to extract VMT information.

Model Scenarios

The average daily weekday demand scenarios⁵ developed for base year (2010) and future year (2028) conditions will be utilized for this evaluation. The daily traffic volume is assigned to the roadway network utilizing a 16-hour link capacity, which approximates some congestion impacts in peak periods on the route choice for the trips.

While the DLCD clarification letter described using the regional travel demand models for year 2003 and 2030 (which were the model years available at the time to approximate the 2008 to 2028 planning horizon), the MPO and TPAU have since updated the regional models to base year 2010 and future year 2028. The updated models provide the following benefits for assessing the Remand requirements:

- Year 2010 base update

⁴ RE: Questions relating to the Bend Urban Growth Boundary *UGB) Vehicle Miles Traveled (VMT) Analysis, Letter from DLCD, November 10, 2011.

⁵ These scenarios represent average weekday volumes – which are equivalent to typical spring or fall conditions, not summer peak conditions.

- Updated base 2010 travel demand model includes enhancements that better reflect conditions in Bend
 - Updated base land use developed for the Metropolitan Transportation Plan (MTP), which more closely aligns with 2008 land use patterns in Bend compared to the prior model base year of 2003
 - Updated transportation network to reflect what was built between 2003 and 2010, which more closely aligns with the 2008 network in Bend compared to the prior model base year of 2003
 - Includes transit model component that now exists in Bend but was not present in 2003
- Year 2028 scenario
 - Includes update to model components consistent with year 2010 model (noted above)
 - Analysis year that aligns with Remand (as opposed to prior model year 2030)

Due to the enhancements made to the updated regional travel demand model, we propose using the base 2010 and future 2028 models for the VMT analysis. DLCD and TPAU will need to approve this recommendation prior to utilizing this approach.

Isolating Internal-Internal Trips

The Transportation Planning Rule (TPR) definition⁶ for VMT analysis specifies that only internal-internal, non-freight (i-i) trips (i.e., trips both starting and ending in the UGB) are included in the evaluation. To isolate the i-i trips in the travel demand model, the following steps will be taken:

- Determine which TAZs should be included as part of the UGB
 - TAZs with any significant portion within the UGB will be included
 - A different set of TAZs will be used for the base and future year scenarios, corresponding to the UGB boundary at that time
- Create an ensemble of TAZs included in the UGB (e.g., gc01)
- Create an i-i trip table by copying original trip table (MF0x) to new trip table (MF0y)
 - From matrix: MF0x
 - subset including origins=gc01 and destinations=gc01
 - To matrix: MF0y
 - subset including origins=gc01 and destinations=gc01
- Run a new trip assignment with additional demand
 - Fixed demand traffic assignment

⁶ OAR 660-012-0005 (41) and DLCD interpretation included in RE: Questions relating to the Bend Urban Growth Boundary *UGB) Vehicle Miles Traveled (VMT) Analysis, Letter from DLCD, November 10, 2011.

- Single class assignment on auto mode (MF0x), which populates the link attribute "volau"
- Assign additional demand (additional options assignment) (MF0y), which populates the link attribute "volad"
- No additional path attributes calculated

Calculating Internal-Internal VMT per Capita

To calculate the VMT for i-i trips based on the new assignment, the following steps will be utilized:

- Calculate VMT (volad*len) for all links, which is the VMT for inter-zonal trips
- Calculate VMT for intra-zonal trips (i.e., trips that start and end in the same TAZ, and aren't assigned to the roadway network)
 - Matrix calculation to determine minimum trip distance for each zone (i.e., the distance to the nearest TAZ)
 - Multiply the minimum trip distance * 0.50 to approximate an intra-zonal trip distance
 - Multiply the intra-zonal trip distance by the intra-zonal trips
- Divide the total network i-i inter-zonal and intra-zonal VMT by population within UGB (based on population estimates provided with the TAZ -level land use)

KEY GOAL 14 AND TPR 0060 TRAFFIC EVALUATION METHODS

The results from the TDM and ET will be used to support Goal 14 scenario evaluation. The following measures may be utilized:

- Scenario balances VMT between highway and other street classifications and between trip types (local, city-wide, regional)
- Scenario supports system that provides logical connections and progression of system hierarchy (local street – collector – arterial – highway)
- Scenario balances flow across available facilities and improves utilization of under-capacity roadways (congestion analysis)
- Scenario better balances number of system lane miles for both state and local system
- Scenario improves grid system for pedestrian/bicycle travel
- Scenario supports efficient transit corridors
- Types and costs of transportation improvements, including the need for new transportation facilities, such as highways and other roadways, interchanges, arterials and collectors, additional travel lanes, other major improvements (identified by scenario and UGB expansion area associated with each scenario). This will include the use of travel model link volume-to-capacity ratio data, similar to the development of the Bend MPO MTP.

Other measures, some of which may be GIS-based or qualitative, may be identified through continued work in scenario refinement.

In addition, the TDM results related to the types and costs of transportation improvements and the need for new transportation facilities, and volume-to-capacity ratios may also be used to support findings to address TPR section 0060 regarding significant effects from comprehensive plan changes. It is assumed that intersection level operations will not be needed to support Phase 2. If needed to support adoption, additional operational measures such as intersection capacity analysis may be addressed in Phase 3 of the analysis.

ATTACHMENTS

The following items provide additional details about the information provided in this memorandum.

- Envision Tomorrow Indicators – Full List with Web Link Descriptions

ATTACHMENT 1: ENVISION TOMORROW INDICATORS

The comprehensive list of ET indicators, which may not all be used in the Bend UGB study, include:

- [Urbanized Acres](#)
- [Infill Development or Redevelopment](#)
- [Cost of New Infrastructure](#)
- [Building Value and Revenue](#)
- [Housing Affordability and Demand](#)
- [Housing Mix](#)
- [Parking Spaces Costs](#)
- [Jobs-to-Housing Ratio](#)
- [Distribution and Employment Space](#)
- [Regional Density](#)
- [Connectivity](#)
- [Urban Parks per Capita](#)
- [Loss of Agricultural Land and Rangeland](#)
- [Acres of Impervious Surface](#)
- [Impervious Cover in Special Areas \(e.g. Aquifers\)](#)
- [Building Energy Use](#)
- [Carbon Emissions](#)
- [Internal Water Consumption](#)
- [Landscaping Water Consumption](#)
- [Solid Waste Production](#)
- [Waste Water Production](#)
- [Enhanced ROI](#)
- [Balanced Housing](#)
- [Building Energy Consumption App](#)

ATTACHMENT 3 TDM AND TMA PROGRAM IMPACTS

TDM AND TMA PROGRAM IMPACTS

TDM Program	Description	Primary Agency Responsible	City Implementation mechanism	Recommended Application / Context	% Trip Reduction	Factors	Source
Trip Reduction Requirements							
Set trip reduction requirements for multifamily residential or commercial development	Require as a condition of approval for developments (either commercial, multifamily residential, or both) that certain TDM measures are implemented on an ongoing basis, or that specified vehicle trip reduction requirements are met.	Cities	Planning code or other municipal ordinance	Any urban area with good transit service; suburban downtowns, commercial and mixed use areas; transit stations. (particularly in high-growth areas)	5%-15%; Enables other strategies	Effects of this strategy depend on the location/accessibility of the development site(s), demographics of the project's residential/commercial occupants/tenants and the type of measures required. The US EPA notes that "reasonable initial targets for the programs established under a trip reduction ordinance (TRO), might be a 5-10 percent reduction in single occupant vehicle (SOV) trips, with somewhat larger reductions (perhaps 15 percent) if substantial fees for parking are imposed."	http://www.epa.gov/otaq/stateresources/policy/transp/tcms/trip_reduction.pdf
Establish a Transportation Management Association	Establish an organization to assist businesses in reducing vehicle trips, either by administering programs, providing services (such as shuttle service), or providing technical assistance to businesses. Often implemented together with a trip reduction requirement.	Cities or business associations	Planning code or other municipal ordinance; or voluntary action by business association	Commercial area or other major business or employment districts	6%-7%	The TDM Resource Center (1996) estimated that just by improving coordination, and providing information on travel alternatives, establishment of a TMA can reduce commute-related vehicle trips by 6%-7%, with greater impact when implemented in concert with other trip reduction, TDM and parking management programs and services.	TDM Resource Center (1996), Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov), as cited in the Victoria Transportation Policy Institute's TDM Encyclopedia (http://www.vtpi.org/tdm/tdm44.htm).
Implement an employee-trip reduction program for municipal employees.	Appoint an employee commute coordinator, and implement incentive programs to reduce single-occupant vehicle commuting among municipal employees. Elements may include: Subsidized transit passes; employee parking and/or parking cash-out programs; commuter checks; Direct financial incentives to bike, walk, carpool or take transit; Ride sharing; Shuttles; Vanpools	Cities	Modify agency procedures	Any	4-20%	Management support and the presence of an on-site employee transportation corridor are important factors in the success of a program. Mandatory employee/commute trip reduction (CTR) ordinances often require employers with more than 50 or 100 employees at a given employment site to implement a CTR program. This reduces the costs of administering TDM programs and compliance with survey and reporting requirements, but prevents such programs from reaching the majority of employees in a given city/region who work for small to mid-sized firms and organizations with less than 50 employees.	Marlon G. Boarnet, Hsin-Ping Hsu and Susan Handy (2010), Draft Policy Brief on the Impacts of Employer-Based Trip Reduction Based on a Review of the Empirical Literature, for Research on Impacts of Transportation and Land Use-Related Policies, California Air Resources Board http://arb.ca.gov/cc/sb375/policies/policies.htm ; Philip Winters and Daniel Rudge (1995), Commute Alternatives Educational Outreach, National Urban Transit Institute, Center for Urban Transportation Research, University of South Florida; Tom Rye (2002), "Travel Plans: Do They Work?," Transport Policy, Vol. 9, No. 4 (www.elsevier.com/locate/transport), Oct. 2002, pp. 287-298.
Safety Net							
Guaranteed/Emergency Ride Home program	Provide a guaranteed ride home for people who do not drive to work alone to ensure they are not stranded if they need to go home in the middle of the day due to an emergency, or stay late for work unexpectedly.	Cities/ Employers		Any	9%-38%	Coupled with active program marketing by employers, including marketing of other TDM programs and financial incentives, such as parking pricing, the Alameda County Guaranteed Ride Home program has been shown to reduce drive alone vehicle trips to participating employment sites by as much as 38% (Draft Alameda County Guaranteed Ride Home Program Evaluation (Nelson\Nygaard 2012).	Draft Alameda County Guaranteed Ride Home Program Evaluation (Nelson\Nygaard 2012)
Parking Management							
Demand-responsive pricing of on-street spaces	Set on-street parking prices based on parking demand in area to achieve parking availability targets. Recommend use parking revenue to increase transportation options	Cities	Municipal code; capital project	Urban or suburban downtowns, commercial and mixed use areas; transit stations.	4%-18%	One of the most significant factors affecting motorists' choice of whether to drive or travel by another mode is the price of parking at the destination. Moreover, up to 28% of traffic in mixed-use districts is attributable to cruising for parking. By encouraging use of alternative modes and reducing parking search related delays for transit, demand responsive pricing can significantly reduce vehicle trips to major destinations/districts. The impact of parking pricing depends on the overall supply and availability of both on-street and off-street parking and the extent to which employers subsidize such parking.	Low-end estimate per Harvey and Deakin (1997), who estimated that parking pricing for work and non-work trips would reduce regional vehicle trips by 2.8% (Greig Harvey and Elizabeth Deakin (1997), "The STEP Analysis Package: Description and Application Examples," Appendix B, in Apogee Research, Guidance on the Use of Market Mechanisms to Reduce Transportation Emissions, USEPA (Washington DC; www.epa.gov/omswww/market.htm)). High end estimated based on the Victoria Transportation Policy Institute, Trip Reduction Tables (http://www.vtpi.org/tdm/tdm41.htm).Additional resource: http://www.spur.org/publications/library/report/critical_coolingoption27

TDM AND TMA PROGRAM IMPACTS

TDM Program	Description	Primary Agency Responsible	City Implementation mechanism	Recommended Application / Context	% Trip Reduction	Factors	Source
Reduced or eliminated minimum parking requirements	In areas that are well-served by transit and other alternatives to driving, allow developers to build residential and commercial buildings with fewer parking spaces or no parking.	Cities	Modify planning code	Any area with quality transit service	9%-16%	This policy reform does not directly influence vehicle travel demand associated with existing development, although elimination of minimum off-street parking requirements does remove a barrier to changes of use, and/or the lease or sale of underutilized private off-street parking constructed in accordance with previous requirements, supporting the development of market-based parking pricing that in turn reduces vehicle travel.	Range of vehicle trip reduction impact of eliminating minimum parking requirements on Los Angeles' Westside, as incorporated in the vehicle trip reduction impact analysis conducted for the Los Angeles Westside Mobility Plan (http://www.westsidemobilityplan.com/transportation-demand-model/)
District-based parking management	Manage parking supply in a defined area as a unified whole in order to better manage parking demand between different facilities to eliminate cruising for parking and improve the customer experience.	Cities	Modify city agency procedures;	Urban or suburban downtowns, commercial and mixed use areas; transit stations.	Enables compact development	As with shared parking facilities, the coordinated provision and management of a shared, publicly accessible supply of on-street and off-street parking at a district-scale can reduce vehicle trips by facilitating dense/compact, clustered, and mixed-use development and by reducing expenditure of land and financial resources on off-street parking, thereby reducing an effective subsidy for auto access and mobility.	
Incentivize shared parking.	Facilitate the sharing of parking among multiple land uses that have complementary schedules (e.g. an office with greater demand during the day and restaurant with greater demand at night).	Enabled by cities, brokered by private businesses or developments	Modify planning code	Urban or suburban downtowns, commercial and mixed use areas.	Enables compact development	Shared parking facilities can reduce vehicle trips by reducing the need for construction of dedicated off-street parking facilities for each land use/activity commensurate with the peak parking demand for that use. By so doing, shared parking facilities can enable dense, clustered development that facilitates a greater share of trips by walking, cycling and public transit..	Shared Parking does not directly reduce vehicle travel if it substitutes for increased parking supply. To the degree that it increases the available supply of parking and reduces parking prices it can encourage automobile travel. To the degree that Shared Parking allows more Clustered Development it can encourage use of alternative modes.
Improved parking wayfinding signage	Install wayfinding signage to make parking easier to find. This can help to shift parking demand away from overfull spaces to underutilized areas and can help reduce local traffic impacts caused by searching for parking.	Cities	Capital project	Urban or suburban downtowns, commercial and mixed use areas; transit stations.	Not available.	Enhanced wayfinding, signage and provision of real-time information about parking supply and availability can reduce Vehicle Miles Traveled (VMT), and traffic congestion by reducing parking search time, but impacts on total vehicle trips are unclear.	
Urban Form and Land Use							
Compact, mixed use development and "park once" districts	Encourage development of districts that allow people to park just once if they drive to reach the district, and walk to destinations within the area once they are there.	Cities are responsible for zoning, land use planning, and development permissions	Amending general plans and zoning codes to plan for and facilitate compact, mixed-use development in appropriate areas. Support implementation of compact, mixed-use development by establishment of public development commissions and other mechanisms to support public investment.	Urban; suburb and downtown; transit station	20% to 40%	Recent literature indicates that compact development can reduce VMT per capita by 20%-40% compared to conventional "sprawl type" development characterized by low density and segregation of land uses and activities (vehicle trips are assumed to be reduced by a corresponding 20%-40%). Cumulative effects depend on the pace of new development in the County relative to the base of existing development (at a more rapid pace and extensive geographic scale, compact/mixed-use development/redevelopment can lead to greater reduction in vehicle trips.	Ewing, R, K. Bartholomew, S. Winkelman, J. Walters, and D. Chen (2008). Growing Cooler: The Evidence on Urban Development and Climate Change. Washington, DC: Urban Land Institute (ULI), p. 33
Multi-Modal Infrastructure							
Bicycle sharing services	Bicycles are available to members for short-term rental and can be returned at any bike share station. Bike share may be offered in city neighborhoods, near transit hubs, or at major employment centers.	Cities or private bicycle sharing companies (usually at invitation of a city)	Urban; suburban downtown; transit station		2% to 8%	The impact depends on the larger bike network and bicycling conditions. This research does not state if the shift from automobile trips to bicycle trips is for commute or non-commute trips, nor does the research state at what time of day these trips occur, i.e. peak or non peak trips.	Victoria Transport Policy Institute (2008), Public Bike Systems: Automated Bike Rentals for Short Utilitarian Trips, www.vtpi.org/tdm/tdm126.htm .
Enhanced transit service	Improve transit service to better serve potential riders and shift travel from driving trips.	Transit agencies, funded by cities, counties, TMAs, BIDs, regional agencies	Any		5% to 30%	Impacts depend on the level and quality of improvements. The elasticity of transit use with respect to transit service frequency is about 0.5, which means that a 1.0% increase in service (measured by transit vehicle mileage or operating hours) increases average ridership by 0.5%. Not all persons will be shifting from auto to transit so the relationship is not one to one.	Richard Pratt (2000) Traveler Response to Transportation System Changes, Interim Handbook, TCRP Web Document 12. http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_webdoc_12.pdf .

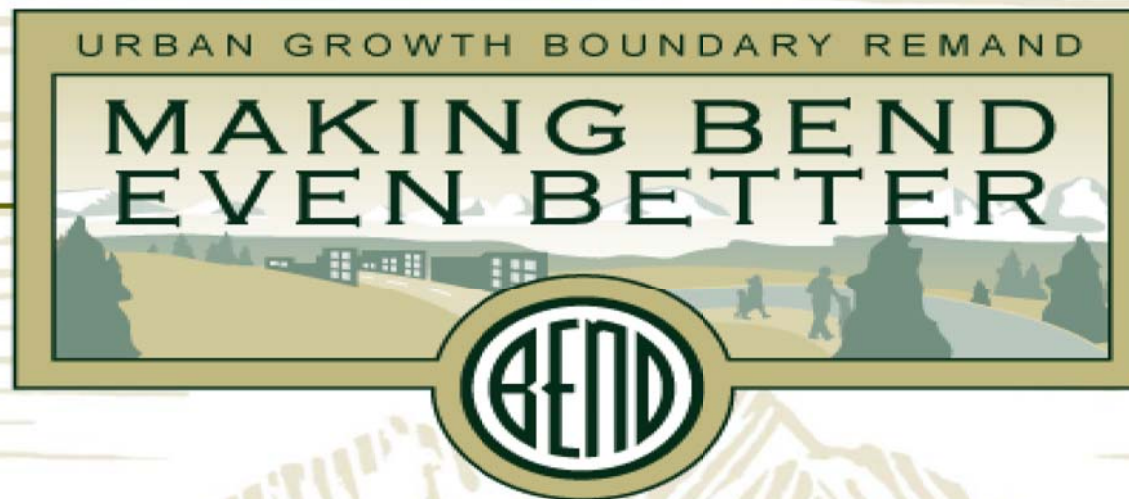
TDM AND TMA PROGRAM IMPACTS

TDM Program	Description	Primary Agency Responsible	City Implementation mechanism	Recommended Application / Context	% Trip Reduction	Factors	Source
High Occupancy Vehicle/Toll (HOV/HOT) lanes	Implement a system of express lanes for high-occupancy vehicles, transit, and/or people who pay a toll. This provides a time savings to people who commute by modes other than driving alone.	Highway districts, often led by counties or regional agencies	Freeways, any context		2% to 30%	Comsis (1993) and Turnbull, Levinson and Pratt (2006) find that HOV facilities can reduce vehicle trips on a particular roadway by 4-30%. Ewing (1993) estimates that HOV facilities can reduce peak-period vehicle trips on individual facilities by 2-10%, and up to 30% on very congested highways if HOV lanes are separated from general-purpose lanes by a barrier. (Turnbull, Levinson and Pratt, 2006) suggests that HOV highway lanes are most effective at reducing automobile use on congested highways to large employment centers in large urban areas with 25 or more buses per hour during peak periods, where transit provides time savings of at least 5 to 10 minutes per trip.	Comsis Corporation (1993), <i>Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience</i> , USDOT and Institute of Transportation Engineers (www.ite.org); available atwww.bts.gov/ntl/DOCS/474.html. Katherine F. Turnbull, Herbert S. Levinson and Richard H. Pratt (2006), HOV Facilities – Traveler Response to Transportation System Changes, TCRB Report 95, Transportation Research Board (www.trb.org); available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c2.pdf.
Financial Incentives							
Subsidized transit passes	Employers/developers provide discounted or free transit passes to employees/residents; transit agencies sell passes at reduced rates based on purchase of passes for all employees/residents regardless of transit use (e.g., universal pass programs).	Employers, housing developments or TMAs/Business Improvement Districts are the most common distributors of discounted transit passes; agreements are made with transit agencies. Cities sometimes include distribution of transit passes as a part of a development's conditions for approval or in zoning	Direct grant to workers or residents	Urban or suburban areas with high quality transit	4% to 20%	Depends on level of transit service	Alameda CTC Issue Paper: Transportation Demand Management (TDM) and Parking Management
Pricing employee parking and/or parking cash-out programs	Charge employees for parking or, if parking is free, pay employees who do not drive the cash value of the parking space.	Employers are responsible, but parking cash-out can be mandated by cities, regions or states	Direct grant to workers or residents	Any	5% to 30%	Depends on the rate of parking pricing and location as it is more effective in denser locations with more transportation options	Victoria Transport Policy Institute (2008), <i>Land Use Impacts on Transport</i> , http://www.vtpi.org/landtravel.pdf
Commuter checks	Provide direct payment or pre-tax discounts to employees who commute to work by transit, biking, walking, carpool, or vanpool.	Employers	Direct grant to employees	Any	Not available	Impact of transit subsidies depend upon robustness of existing transit network. Tax subsidies alone provide a moderate incentive for transit use.	
Direct financial incentives to bike, walk, carpool or take transit	Provide a direct financial incentive to people who commute by bike, walk, carpool, vanpool, or take transit. Commute benefit programs that result in tax savings for employers and employees are the most typical.	Any organization, public or private;	Direct grant to or other stakeholders	Any	5% to 40%	Depends on the amount of the subsidy, location (suburban, urban), transit options, and if there is a fee for parking and if so what that fee is	http://www.vtpi.org/tdm/tdm41.htm
Time off with Pay for Alternative Mode Use	Employees are offered time off with pay as an incentive to use alternative modes.	Employers			1-2%		
Shared Vehicle Services							
Encourage ride sharing	Encourage workers to carpool to work instead of driving alone. Public agencies may encourage this by providing rideshare matching websites.	Any organization, public or private	Provide ridematching web site (public agencies or employers); Provide preferential parking (employers)	Any	5% to 30%	5-15% if they consist solely of educational efforts, and up to 30% if combined with cash incentives such as parking cash out or vanpool subsidies	Reid Ewing (1993), TDM, Growth Management, and the Other Four Out of Five Trips Bryon York and David Fabricatore (2001), Puget Sound Vanpool Market Assessment, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov).
Facilitate Vanpools	Commute to work in a shared van with 7-15 people. Public agencies may facilitate vanpooling by providing rideshare matching websites and the van or other subsidies or incentives.	Any organization, public or private	Provide ridematching web site (public agencies or employers); Subsidize vans or provide preferential parking (employers)	Any	5% to 30%	5-15% if they consist solely of educational efforts, and up to 30% if combined with cash incentives such as parking cash out or vanpool subsidies	Reid Ewing (1993), TDM, Growth Management, and the Other Four Out of Five Trips Bryon York and David Fabricatore (2001), Puget Sound Vanpool Market Assessment, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov).

TDM AND TMA PROGRAM IMPACTS

TDM Program	Description	Primary Agency Responsible	City Implementation mechanism	Recommended Application / Context	% Trip Reduction	Factors	Source
Provide Shuttles	Operate a free or subsidized shuttle service to major employment centers or schools to reduce demand for driving and parking. Often financed wholly or in part by contributions from businesses along route.	Any organization, public or private	Provide or contract service	Any	0-13%	The design of a shuttle services varies greatly, from last mile/first mile connections to and from transit centers, to long distance employer shuttle, to local circulator services. As a general proxy the elasticity of transit use with respect to transit service frequency can be used	California Air Pollution Control Officers Association (2010), Quantifying Greenhouse Gas Mitigation Measures
Alternative Commute Schedule							
Telecommuting	Employers allow employees to work one or more days from home in order to reduce the number of automobile trips to work.	Employers		Any	2% to 10%	The range is large depending on the study examined. Also one study found that telecommuting and compressed work weeks together generate larger trip reductions	Reid Ewing (1993), TDM, Growth Management, and the Other Four Out of Five Trips. Center for Urban Transportation Research (1998), A Market-Based Approach to Cost-Effective Trip Reduction
Compressed work weeks	Employers allow employees to compress their work week by working fewer but longer days. For example, instead of working 5, 8-hour days, an employee may work 4, 10-hour days.	Employers		Any	2% to 10%	The range is large depending on the study examined. Also one study found that telecommuting and compressed work weeks together generate larger trip reductions	Reid Ewing (1993), TDM, Growth Management, and the Other Four Out of Five Trips. Center for Urban Transportation Research (1998), A Market-Based Approach to Cost-Effective Trip Reduction Program Design, http://ntl.bts.gov/lib/3000/3600/3633/cashdoc.pdf . Apogee (1994), Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature, National Association of Regional Councils, www.narc.org . Amy Ho and Jakki Stewart (1992), "Case Study on Impact of 4/40 Compressed Workweek Program on Trip Reduction," Transportation Research Record 1346, TRB, www.trb.org , pp. 25-32 Genevieve Giuliano (1995), "The Weakening Transportation-Land Use Connection, ACCESS, Vol. 6, University of California Transportation Center, www.uctc.net , Spring 1995, pp. 3-11.
Promotional Activities							
Travel marketing programs	Promote awareness of alternative travel modes through campaigns.	Any organization, public or private		Urban or suburban areas with high quality transit	5% to 8%	There is often a greater increase alternative mode share than reduction in vehicle trips given that some individuals switch between alternative modes or shift from driving alone to ridesharing. One study estimates that marketing increases the effectiveness of other TDM strategies by up to 3% (Shadoff, 1996)	Steven Spears, Marlon G. Boarnet and Susan Handy (2011), Draft Policy Brief on the Impacts of Voluntary Travel Behavior Change Programs Based on a Review of the Empirical Literature, for Research on Impacts of Transportation and Land Use-Related Policies, California Air Resources Board (http://arb.ca.gov/cc/sb375/policies/policies.htm). John Shadoff (1996), Transportation Demand Management; A Guide for Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov/Mobility).
Personalized Travel Planning	Promote awareness of alternative travel modes through personalized travel planning.	Any organization, public or private		Urban or suburban areas with high quality transit	5% to 15%	Effectiveness depends upon the travel options available and the level of investment into personalized marketing. Ongoing investment may be required to maintain effectiveness over time.	Transport Today, Issue 334, pg 10 (2002) http://www.vtpi.org/tdm/tdm23.htm
On-site transportation coordinators	Employers hire dedicated staff member to oversee TDM programs and/or provide one-on-one employee travel education/training.	Employers, housing developments		Any	Not available	The presence of a transportation coordinator can help increase the effectiveness of other TDM programs	
Bike/ped maps, education, and promotion	Maps of safe biking/walking routes, educational classes on safe biking/walking, and promotional activities such as Bike to Work Day; usually provided by public agencies or non-profit organizations.	Any organization, public or private		Any	Not available	This strategy has limited impact if implemented alone. Most effective if implemented as part of a comprehensive TDM strategy.	

ATTACHMENT 4 DOCUMENTATION OF 2028 VMT HYPOTHETICAL SCENARIO



ILUTP

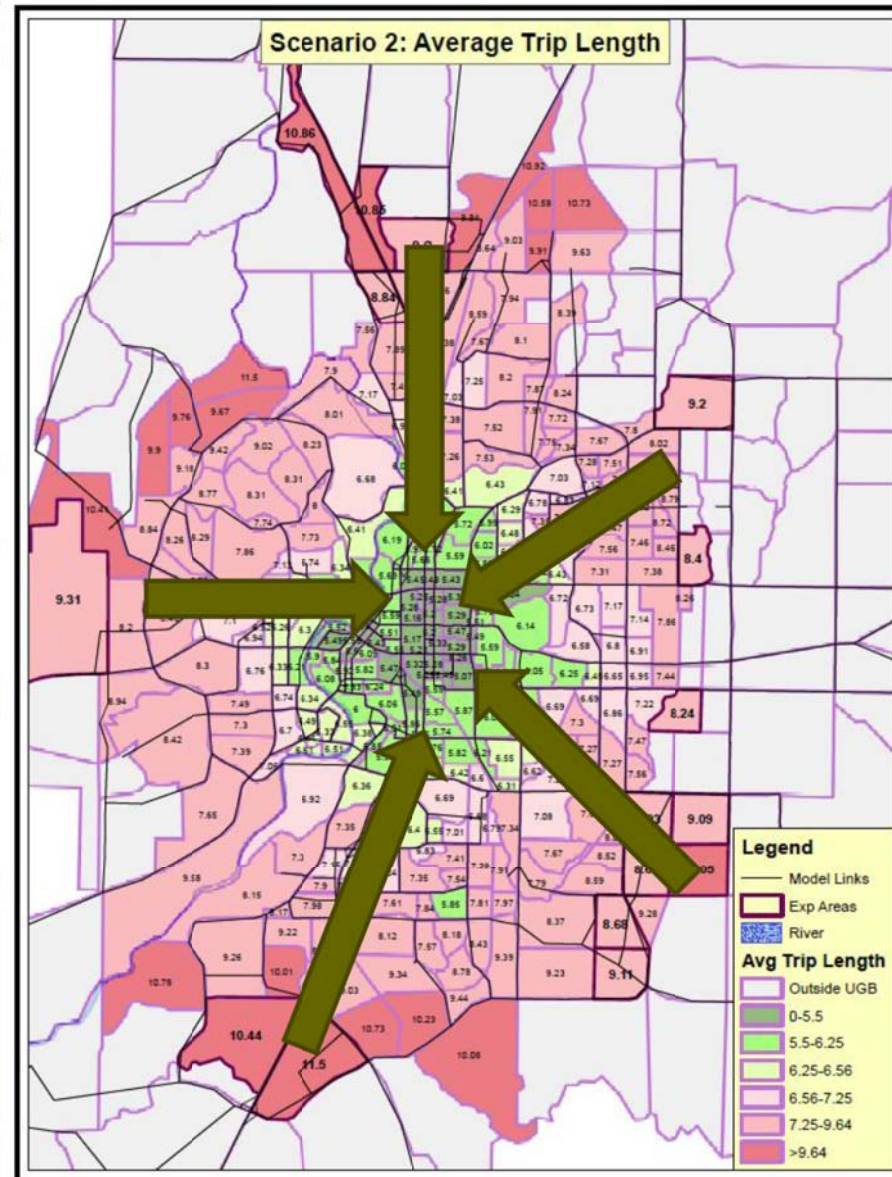
Land Use & Transportation Changes

Alex Joyce - Fregonese Associates Inc.

10/07/15

General Philosophy

- Reallocate growth from high VMT areas to Low VMT areas
 - *From “red areas to green areas”*
- Primary focus:
 - Multifamily
 - Creative office and industrial (“maker space”)



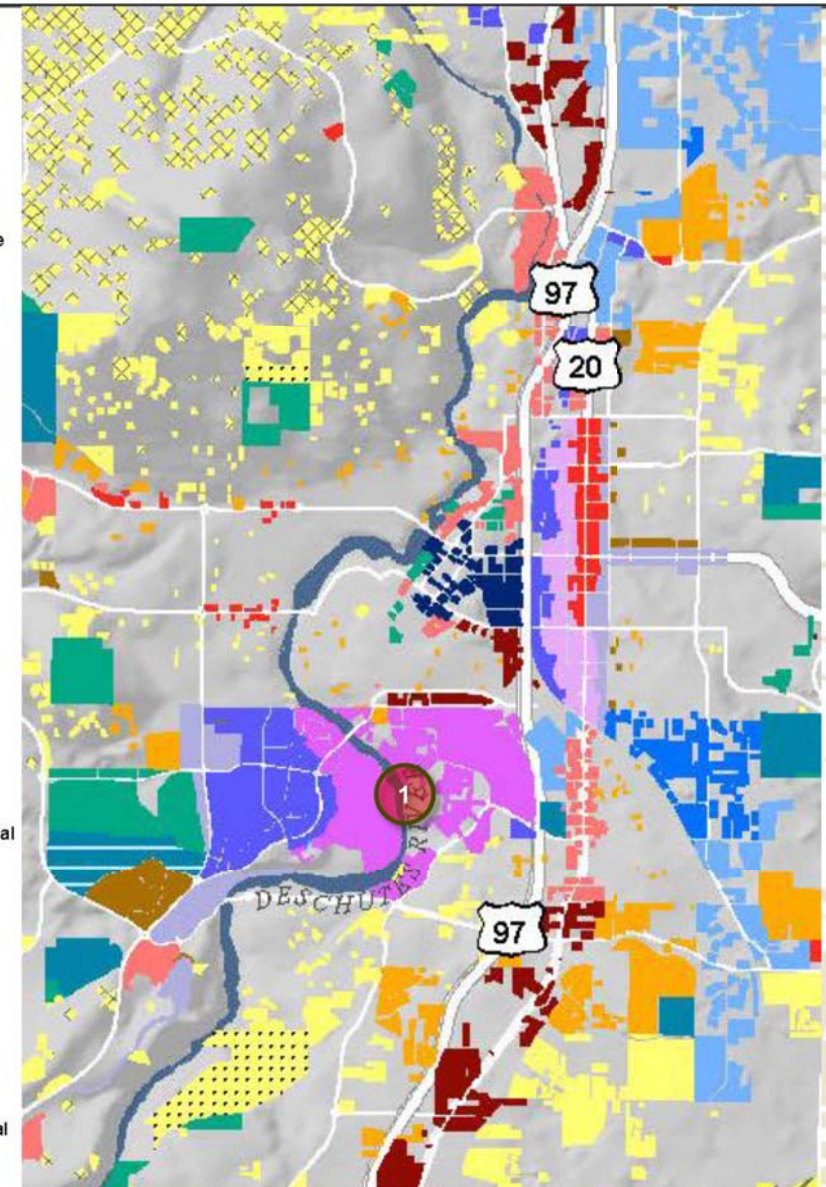
Proposed Land Use Changes for ILUTP

#1: Old Mill District

- **Today:** Mixed Riverfront (MR) Plan designation
 - Height: 35' max, except with variance
 - Allows single family and multifamily housing outright
 - Allows office, manufacturing, small- to medium-scale retail, etc.
- **Scenarios:** Mixed Riverfront (MR) Development Type
 - Primarily office with some retail and industrial
 - Small amount of single family and multifamily housing
 - 1-3 story buildings
- **ILUTP test:** MU-1 (Neighborhood Mixed Use) Development Type
 - Mix of retail and office, multifamily housing, some single family attached
 - Up to 4 story buildings

Dev Types

Scenario 1



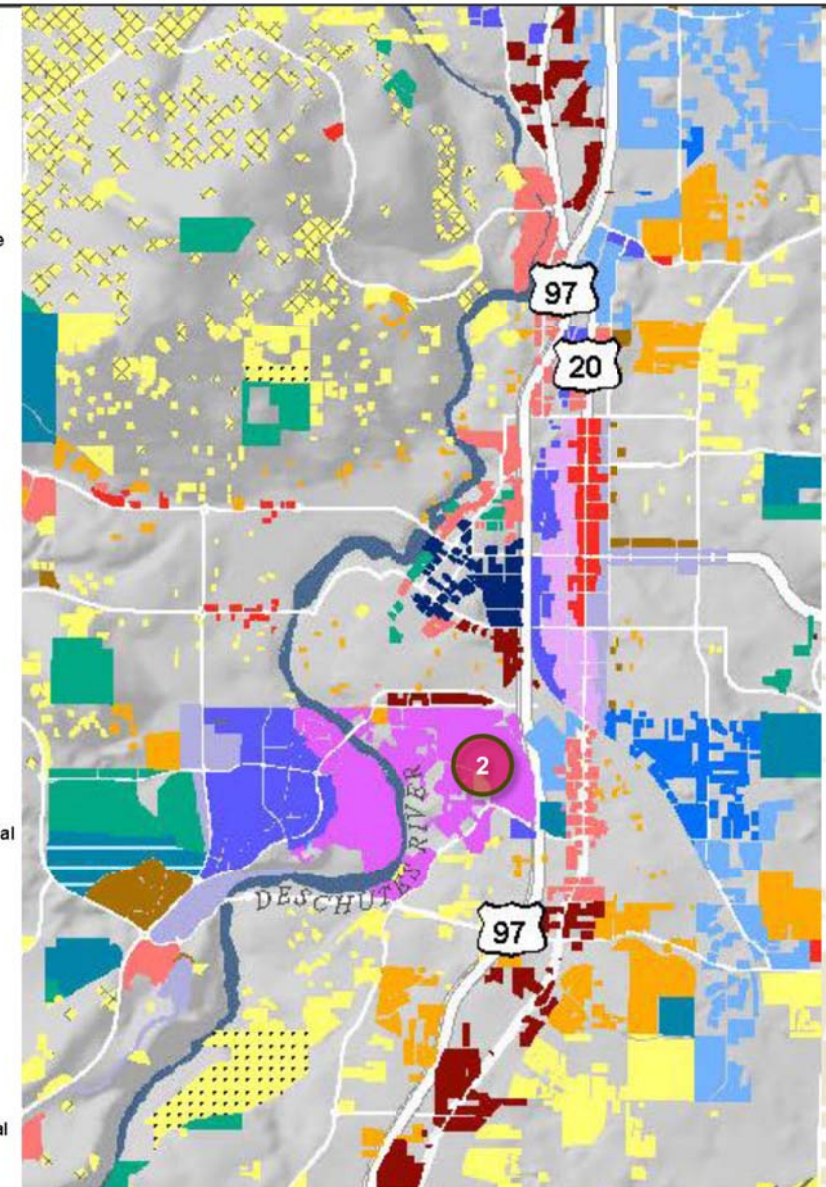
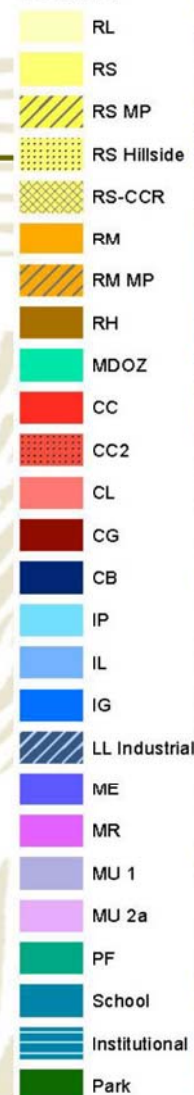
Proposed Land Use Changes for ILUTP

#2: Core Pine

- **Today:** Light Industrial (IL) Plan designation
 - Height: 50' max, except with variance
 - Prohibits nearly all residential
 - Allows a range of industrial & manufacturing, limited office, very limited retail
- **Scenarios:** Mixed Riverfront (MR) Development Type
 - Primarily office with some retail and industrial
 - Small amount of single family and multifamily housing
 - 1-3 story buildings
- **ILUTP test:** MU-2a (Urban Mixed Use) Development Type
 - Mix of retail and office, multifamily housing, some single family attached
 - Up to 5 story buildings

Dev Types

Scenario 1



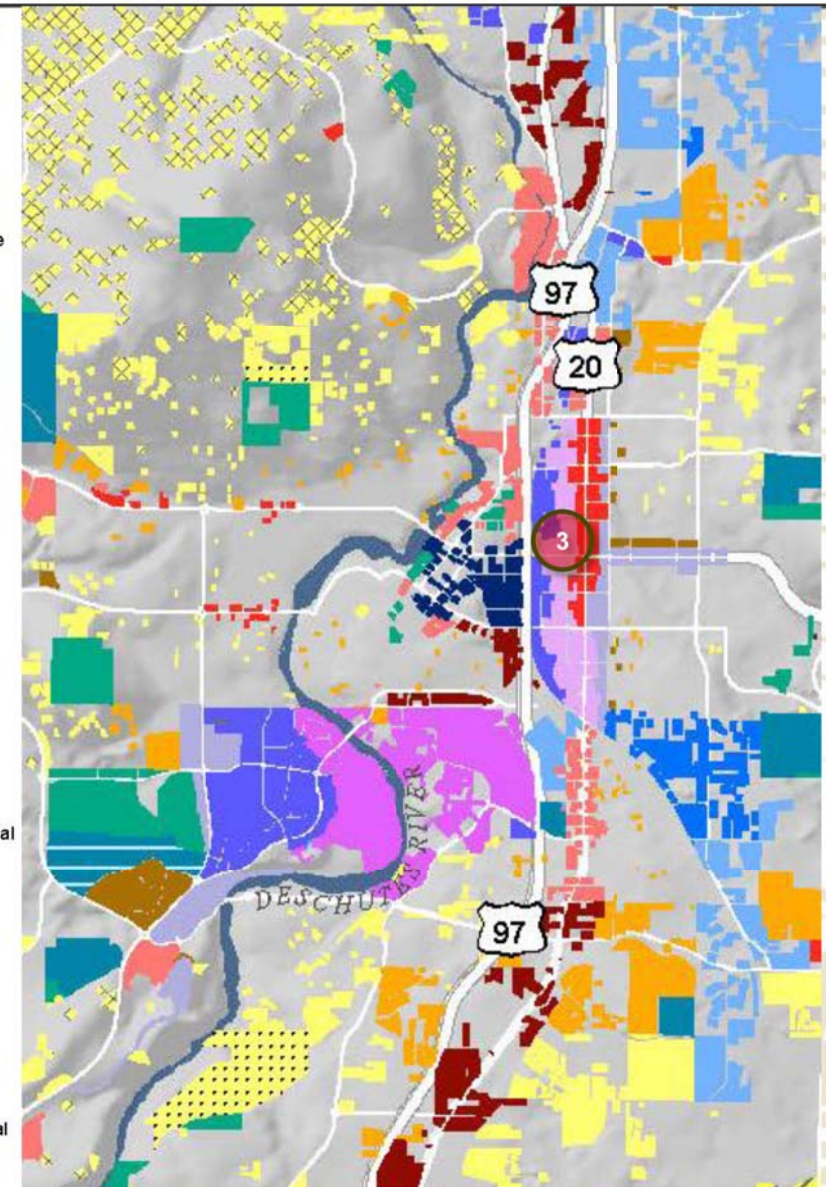
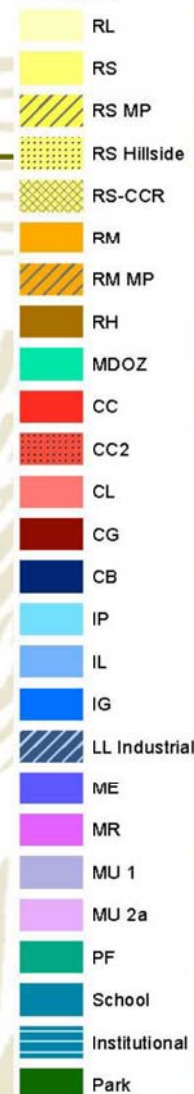
Proposed Land Use Changes for ILUTP

#3: Central Area Plan

- **Today:** Mixed Employment (ME) and Limited Commercial (CL) Plan designations
 - Height: 45'-55'
 - Residential allowed as secondary use / part of mixed use
 - Allow office, auto-dependent retail, some manufacturing and industrial
- **Scenarios:** follows CAP land uses
 - roughly: ME along 1st, MU2a along 2nd, CC along 3rd, MU1 along 4th
 - Up to 5 story buildings along 2nd, lower elsewhere
- **ILUTP test:** Replace CC along 3rd with MU2a and ME along 1st with Urban Industrial / Maker Space

Dev Types

Scenario 1



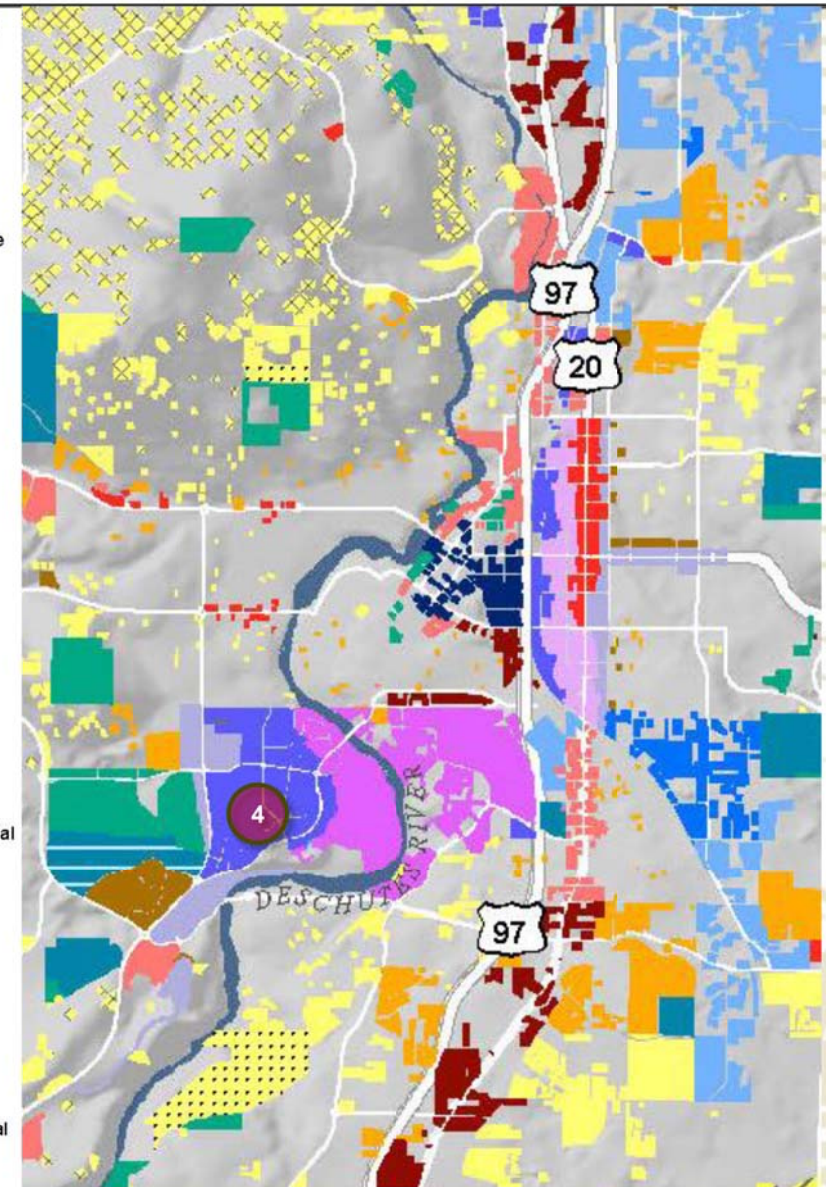
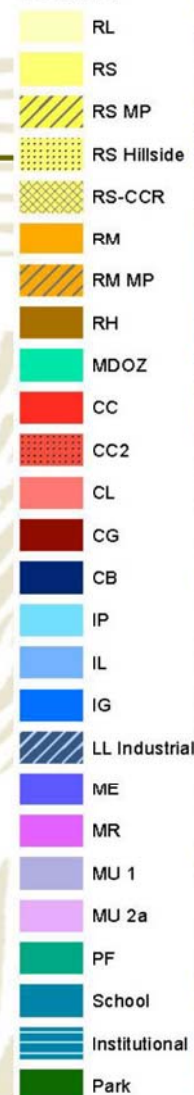
Proposed Land Use Changes for ILUTP

#4: Central Westside

- **Today:** Community Commercial (CC), General Commercial (CG) along Century; Light Industrial (IL) and Mixed Employment (ME) west of Colorado; and Limited Commercial (CL) north of Mt. Washington
 - Height: 35'-55' (varies by zone)
 - Residential allowed as secondary use / part of mixed use in some areas, prohibited in others
 - Allow office, auto-dependent retail, manufacturing and industrial
- **Scenarios:** MU1 along Century; ME west of Colorado; some RH north of Mt. Washington
- **ILUTP test:** MU2a west of Colorado (otherwise same as scenarios)

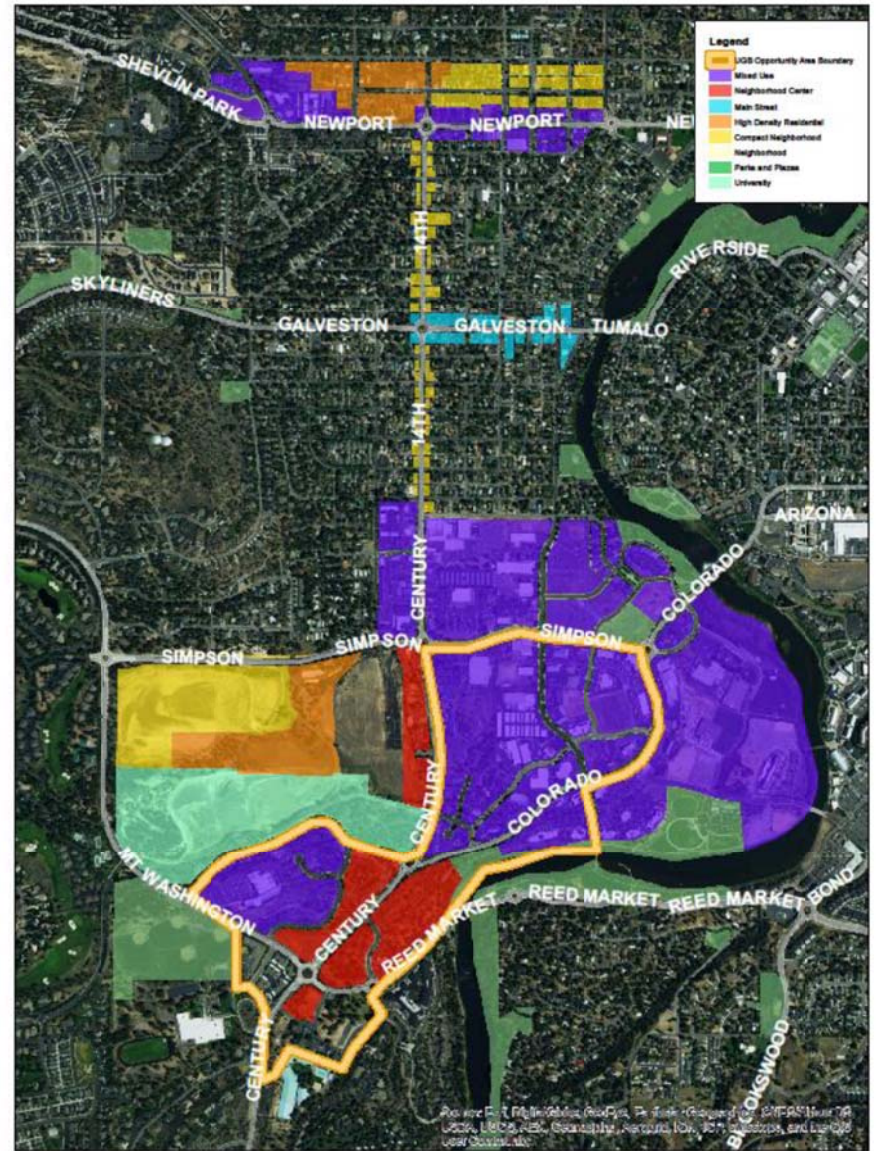
Dev Types

Scenario 1



Central West Side

- Orange boundary is UGB Opportunity Area
- Central West Side Plan considered larger area
- ILUTP changes limited to purple (mixed-use) area



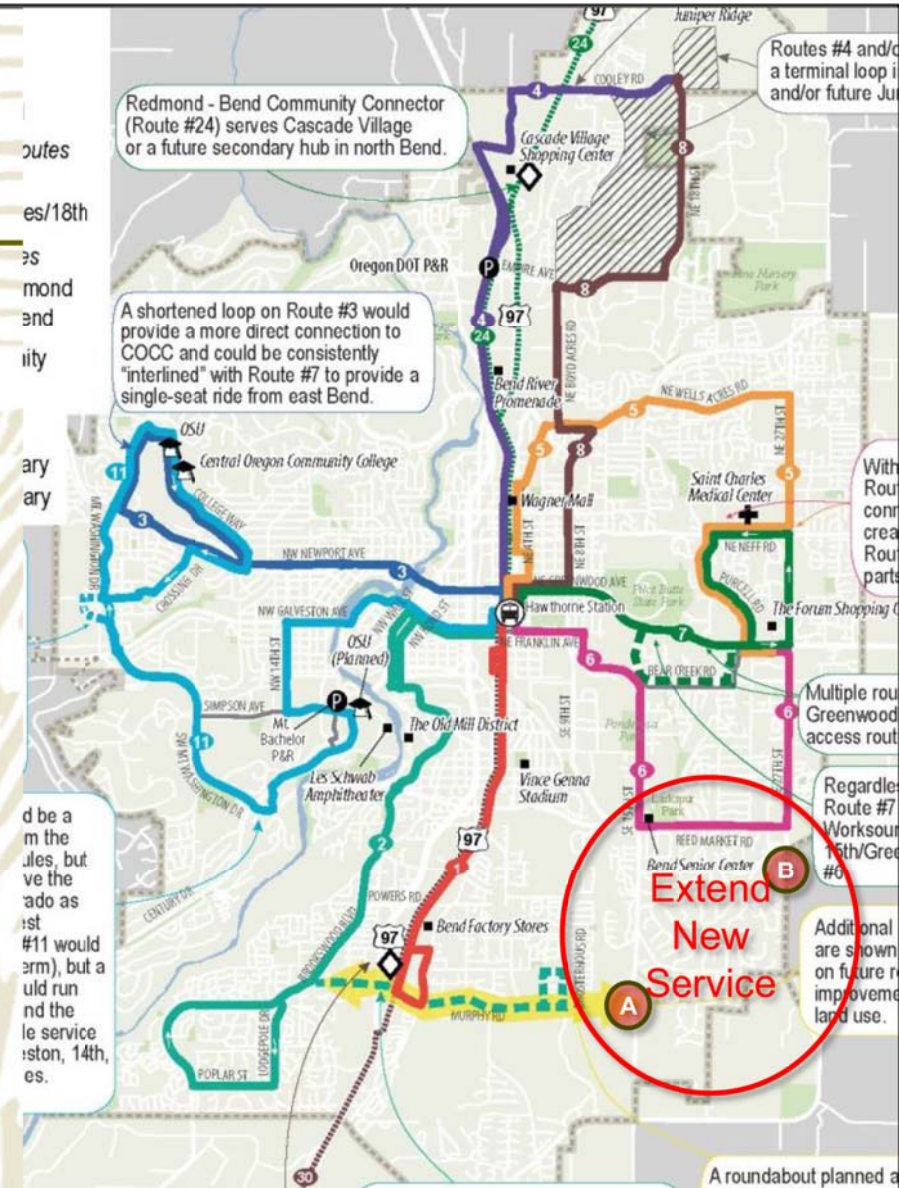
Transportation Changes

Transit

- Use mid- to long-range service concept as starting point
- Increase priority transit corridor bus frequency by reducing headways to 15 minutes
- Additional route options
 - A. Murphy / 15th Ave
 - B. 27th Ave extension

Street Connectivity

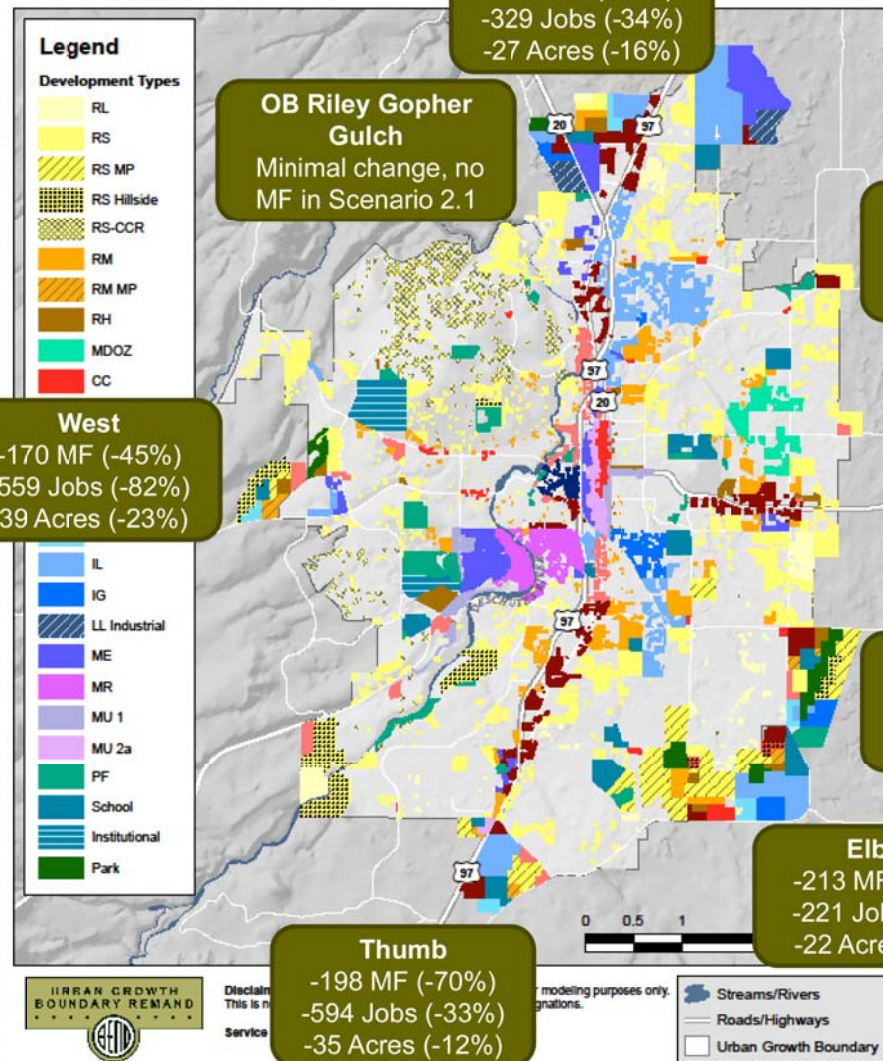
- Increase street connectivity (intersection densities) in master planned areas
- Increase walkability



Reductions in Expansion Subareas

- Generally: MU1 removed or converted to CC2; RH removed
- MU1 is a modest density, vertical mixed-use place type, that contains apartments, retail and mixed-use
- CC2 is a walkable retail and office place type -- residential uses generally surround those areas, so would be "horizontal mixed-use"

**Bend UGB
Scenario 2.1**



Changes to Expansion Areas



Expansion Area - Subareas	Total Acres				MF				OFF				IND			
	Pre	Post	Diff	% Change	Pre	Post	Diff	% Change	Pre	Post	Diff	% Change	Pre	Post	Diff	% Change
DSL Property	362	333	(29)	-8%	369	170	(198)	-54%	530	336	(194)	-37%	677	498	(178)	-26%
Elbow	427	405	(22)	-5%	452	239	(213)	-47%	830	646	(184)	-22%	1,086	916	(169)	-16%
North Triangle	172	145	(27)	-16%	346	162	(184)	-53%	319	157	(163)	-51%	502	274	(228)	-46%
Northeast Edge	114	108	(6)	-5%	75	68	(7)	-10%	93	50	(43)	-46%	15	8	(7)	-44%
OB Riley Gopher Gulch	120	116	(4)	-4%	6	8	2	25%	143	137	(6)	-4%	260	263	3	1%
Thumb	289	254	(35)	-12%	282	84	(198)	-70%	634	288	(347)	-55%	735	532	(203)	-28%
West	171	132	(39)	-23%	373	204	(170)	-45%	324	50	(274)	-85%	241	2	(239)	-99%
Total	1,656	1,495	(161)	-10%	1,904	934	(969)	-51%	2,874	1,663	(1,211)	-42%	3,515	2,493	(1,022)	-29%

Opportunity Areas	Total Acres				MF				OFF				IND			
	Pre	Post	Diff	% Change	Pre	Post	Diff	% Change	Pre	Post	Diff	% Change	Pre	Post	Diff	% Change
Central District Mixed-Use Multimodal Area (MMA)	137	129	(8)	-6%	534	571	37	7%	349	379	29	8%	13	47	34	267%
Central Highway 20	19	19	-	0%	35	51	16	45%	40	16	(24)	-60%	-	-	-	-
COLD Property	90	90	-	0%	24	21	(2)	-10%	6	6	-	0%	-	-	-	-
East Downtown	8	8	-	0%	-	25	25	-	181	102	(79)	-44%	-	-	-	-
Juniper Ridge	219	219	-	0%	5	6	1	25%	488	1,121	633	130%	677	873	196	29%
Mill District/Core Pine	61	61	-	0%	11	367	357	3247%	68	202	134	198%	12	1	(11)	-90%
River Edge	69	69	-	0%	21	19	(2)	-10%	1	1	-	0%	-	-	-	-
SE 15th St	274	274	-	0%	295	236	(59)	-20%	61	56	(6)	-9%	-	-	-	-
SW Century Drive	138	103	(36)	-26%	310	780	470	151%	313	404	91	29%	94	14	(79)	-85%
Total	1,016	973	(43)	-4%	1,235	2,077	842	68%	1,508	2,287	779	52%	795	936	140	18%

Big Picture Shifts



Acres:

- 161 fewer acres developed in expansion areas (-10%)
- No new acres “painted” in Opportunity Areas
 - Increased capacity assumed on existing “painted” lands (i.e.- up-zone)

Housing and Jobs:

- 1,000 MF units shifted to green areas (53%)
 - 1,900 multifamily units currently assumed in expansion areas
- 1,000 industrial jobs shifted
 - New place type created; 1 and 2 story flex employment (i.e.- “maker space,” for tech, light fabrication, brewing, etc.)
- 1,200 office jobs shifted
 - Office jobs increased in new and up-zoned mixed-use areas

Expansion Area Housing Mix			
Scenario	SF	TH	MF
ILUTP	52%	15%	33%
Scenario 2.1	40%	14%	46%

How to Think About the Magnitude



- 1,235 vs. 2,077 **OR** 88 vs. 148 units per year on average
- Typical single site, urban apartments have 20-40 units
 - 1-2 additional apartments or mixed-use buildings annually compared to Scenario 2.1?
- Hypothetical annual MF unit pipeline in Opportunity Areas (2015 – 2028)





1,500 new apartments on the way in Bend

Apartment-building boom might be coming

By [Joseph Ditzler](#) / The Bulletin / [@josefditzler](#)

Published Oct 4, 2015 at 12:01AM / Updated Oct 4, 2015 at 05:57AM

New plans for apartment complexes in Bend submitted this year bring the total number of proposed units in a rental-starved market to more than 1,500.

However, most of those applications remain on the drawing board, or in some phase of plan review at the city Community Development Department. Two projects are under construction and a third, a public housing project, opened its doors to tenants this summer.

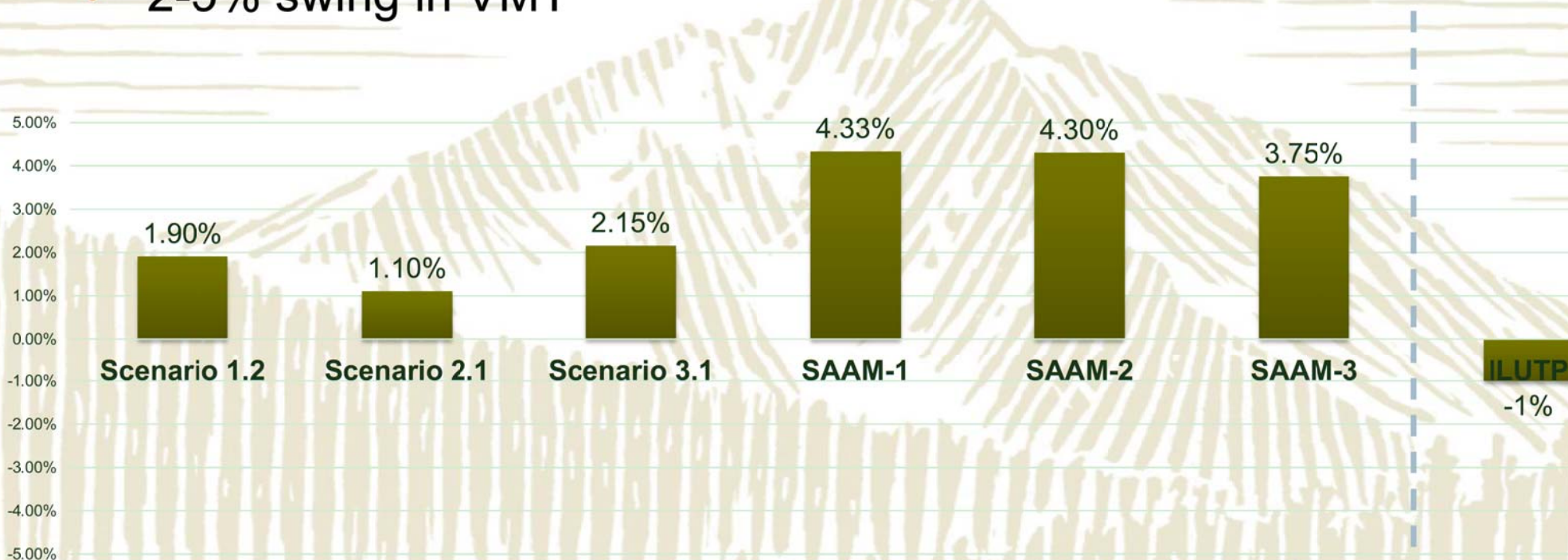
One project, filed by Monte Vista Homes, would erect a five-building apartment complex of 136 units on Empire Avenue. The developer, SGS Development, of Bend, in August applied for five building permits for the project, valued at nearly \$17 million. A company representative did not return calls seeking comment.

Other projects have shown little progress beyond the first meeting with city planning staff and would-be

Transportation Impacts



- Reversal of VMT trends (-1% VMT)
- 2-5% swing in VMT



ATTACHMENT 5 EVALUATION OF LONG-RANGE VMT TRENDS AND STRATEGIES

Memorandum



July 18, 2016

To: Bend Growth Management Team
Cc: Project Team
From: Angelo Planning Group and Fregonese Associates
Re: 2040 Long-Range Evaluation of Integrated Land Use and Transportation Plan (ILUTP) Strategies

PURPOSE

The purpose of this memorandum is to evaluate the potential impact of a select set of strategies identified in Bend's Integrated Land Use and Transportation Plan (ILUTP) over the long-range future, beyond the 2028 planning horizon of the Urban Growth Boundary (UGB) Remand. The following ILUTP Scenarios (A, B and C) go out to 2040. There are three reasons for evaluation the strategies. First, this work is intended to provide insights for long-range City transportation and growth management planning and policies, particularly implementation of the following overarching outcomes and goals from the UGB process:

ILUTP High Level Outcomes

- Support the City's goal to create a balanced transportation system;
- Create a transportation system and facilities that support the City's complete communities goal;
- Implement a transportation system that supports the City's vision for opportunity areas, the Central Core, and UGB expansion areas;
- Increase transportation choices and reduce reliance on the automobile; and
- Over time, reduce vehicle miles traveled per capita in Bend.

Comprehensive Plan Growth Management Chapter Goals

- Encourage the city's evolution from small town to livable city, with urban scale development, amenities, and services in appropriate locations, while preserving and enhancing the natural environment and history of the community;
- Use Bend's existing urban land wisely, making efficient use of land inside the boundary, with infill and redevelopment focused in appropriate areas within the Central Core, along transit corridors, and in key opportunity areas;
- Create new walkable, mixed use and complete communities by leveraging and complementing land use patterns inside the existing boundary and using expansion to create more complete communities;

- Locate jobs in suitable locations, where there is access to transportation corridors, larger parcels, and good visibility for commercial uses;
- Plan Bend's infrastructure investments for the long term;
- Meet state requirements for growth management and the UGB while achieving local goals;
- Lay the groundwork for the future growth of Bend by taking into consideration the context of lands beyond the UGB;
- Utilize best practices (e.g. cluster development, transect planning) in appropriate locations to reinforce the City's urban form, reduce risk of wildfire, and recognize natural features that present "hard edges" for urbanization; and
- Implement an overall strategy to "*Wisely grow up and out*".

Secondly, this memo will roughly measure out to 2040 three possible housing and employment development patterns and growth with broad intensities and transit improvements. The three scenarios described below establishes "what if" scenarios about development which gives the City some insight about what it would take in terms of land uses and transit to stabilize or begin lowering VMT.

Finally, this evaluation is also intended to inform the City's next TSP update, which will have a new 20-year planning period to consider, and will need to demonstrate compliance with the Transportation Planning Rule (TPR) standards documented in the ILUTP, including section - 0035. This evaluation will frame the type of work scope needed to assess the ILUTP during the TSP update.

HORIZON YEAR

The analysis summarized in this memo predicts how key policies and measures included in Bend's ILUTP may affect Vehicle Miles Traveled (VMT) in the year 2040. 2040 was selected as the long-range future year because it aligns with the Bend Metropolitan Transportation Plan (MTP). It may also align reasonably well with the 20-year planning horizon for Bend's TSP when it is updated in the next several years. Population and employment forecasts from the MTP were used as the control totals for the 2040 analysis work. Table 1 provides a summary of the growth forecasts (rounded to the nearest 1,000 for the sake of simplicity).

	2014 (Estimated)	2028 (Projected)	2040 (Projected)
Population	84,000 <i>Source: Census Population Estimate</i>	115,000 <i>Source: Bend Housing Needs Analysis</i>	141,000 <i>Source: Bend MTP</i>
Employment	43,000 <i>Source: Quarterly Census of Employment and Wages</i>	67,000 <i>Source: Bend Employment Opportunities Analysis</i>	81,000 <i>Source: Bend MTP</i>

ABOUT THE 2040 SCENARIOS

Three scenarios for 2040 were tested. Each was built from the modeling work for the UGB, taking the UGB expansion and set of "efficiency measures" (map amendments and changes to the development code to increase land use efficiency within the existing UGB) proposed for the

2028 planning horizon as a starting point. The scenarios were intended to test different levels of implementation of the strategies set forth in the ILUTP. Due to the limitations of the Envision Tomorrow model, the main strategies that were evaluated are changes to modelled land use / development assumptions and changes to transit service.

The 2040 scenarios were created using the 2028 UGB Scenario as the base to allocate more employment and housing in the existing and proposed UGB.¹ Table 1 provides an overview of the three scenarios. Scenario A allocates relatively more housing and employment outside the UGB whereas Scenario C locates more housing and jobs within the existing UGB --- these are the bookends. Scenario B growth assumptions fall in between Scenario A and C. This is explained in more detail below. “Heat maps” that illustrate generally where employment and housing growth is focused in each scenario are provided in Figure 1, on the following page.

All scenarios share similar basic land use assumptions, including:

- Continuation of efficiency measures to be adopted with UGB in 2016, with increased redevelopment in core opportunity areas.
- Increased density and redevelopment, in some transit corridors (beyond opportunity areas), including some vertical mixed use development. Densities and development assumptions are consistent with upper limits of what is allowed by current commercial plan designations, but beyond what has been seen historically.
- Modest amounts of residential redevelopment and ADUs in existing neighborhoods where allowed by existing zoning / plan designations.
- Density for new growth past 2028 assumed to increase relative to assumptions used for 2028 UGB work (still within allowed ranges).

The primary differences between the scenarios in terms of land use are redevelopment rates, housing and employment densities, and degree of additional UGB expansion beyond the 2028 UGB.

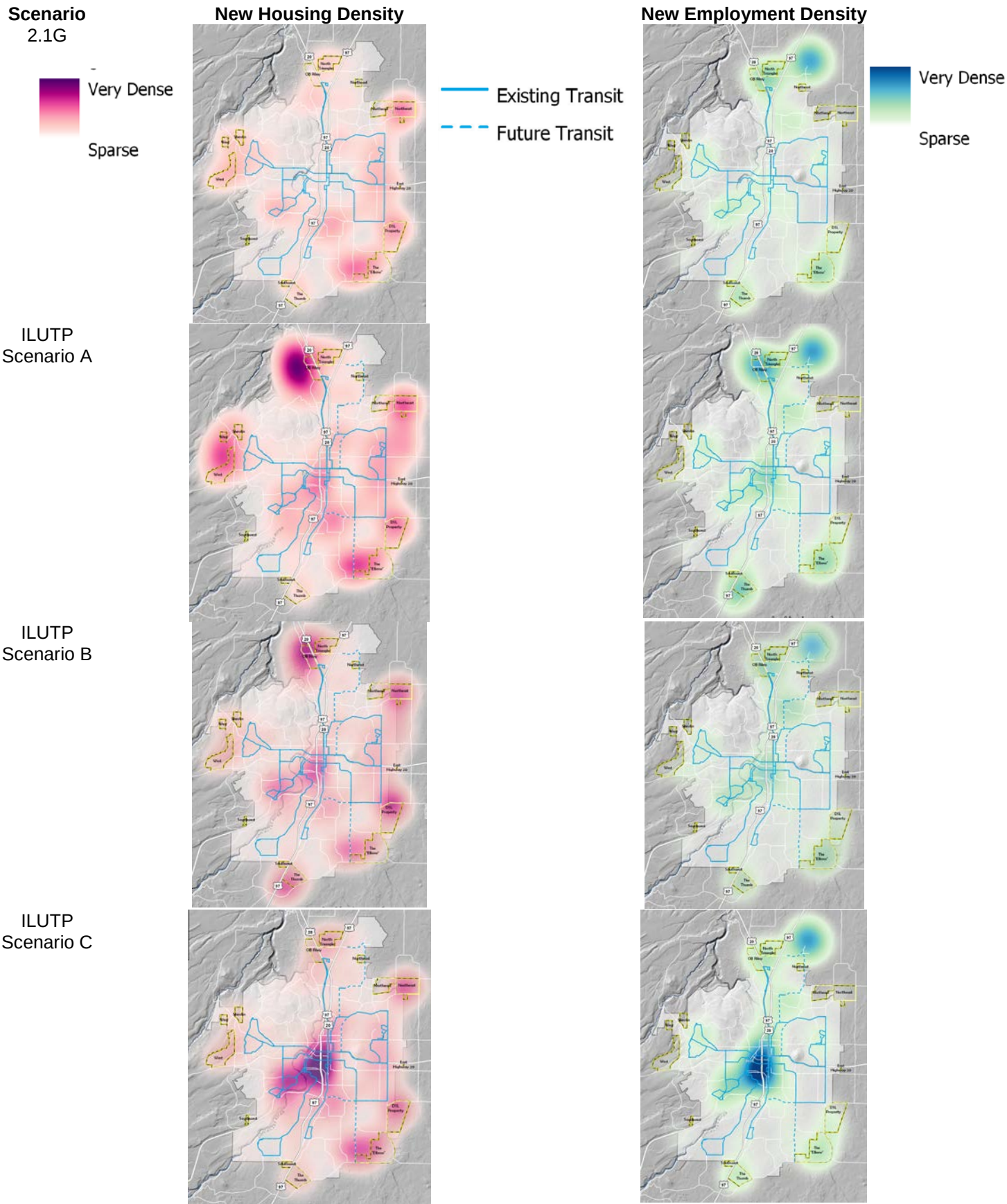
Table 1: Summary of 2040 ILUTP Scenarios

Scenario	Land Use	Transit
ILUTP Scenario A	Redevelopment rates nearly double relative to Scenario 2.1G for core opportunity areas and transit corridors. Increase in residential development & density in mixed use zones and CB UGB expansion assumed on high-performing land that was not included in the proposed 2028 UGB	Two new routes (southeast and northeast), same frequency as today

¹ Due to timing, only ILUTP Scenario B uses UGB Scenario 2.1G as the 2028 base. Other ILUTP scenarios, prepared before Scenario 2.1G was finalized, use earlier, slightly different (though largely similar) versions of the preferred UGB scenario as the base.

Scenario	Land Use	Transit
ILUTP Scenario B	Redevelopment rates more than double relative to Scenario 2.1G for core opportunity areas and transit corridors. Increase in residential development & density in new mixed use zones and CB Limited UGB expansion assumed on high-performing land that was not included in the proposed 2028 UGB	“Medium” long-range transit service (2 new routes, plus improved frequency)
ILUTP Scenario C	Significant increase in redevelopment in core, opportunity areas and transit corridors (redevelopment rates more than four times as high as in Scenario 2.1G). Significant increase in residential development & density in mixed use zones and CB No additional UGB expansion assumed beyond proposed 2028 UGB	“High” long-range transit service (2 new routes, improved frequency and pre-BRT service on key corridors)

Figure 1: Housing and Employment Heat Maps by Scenario

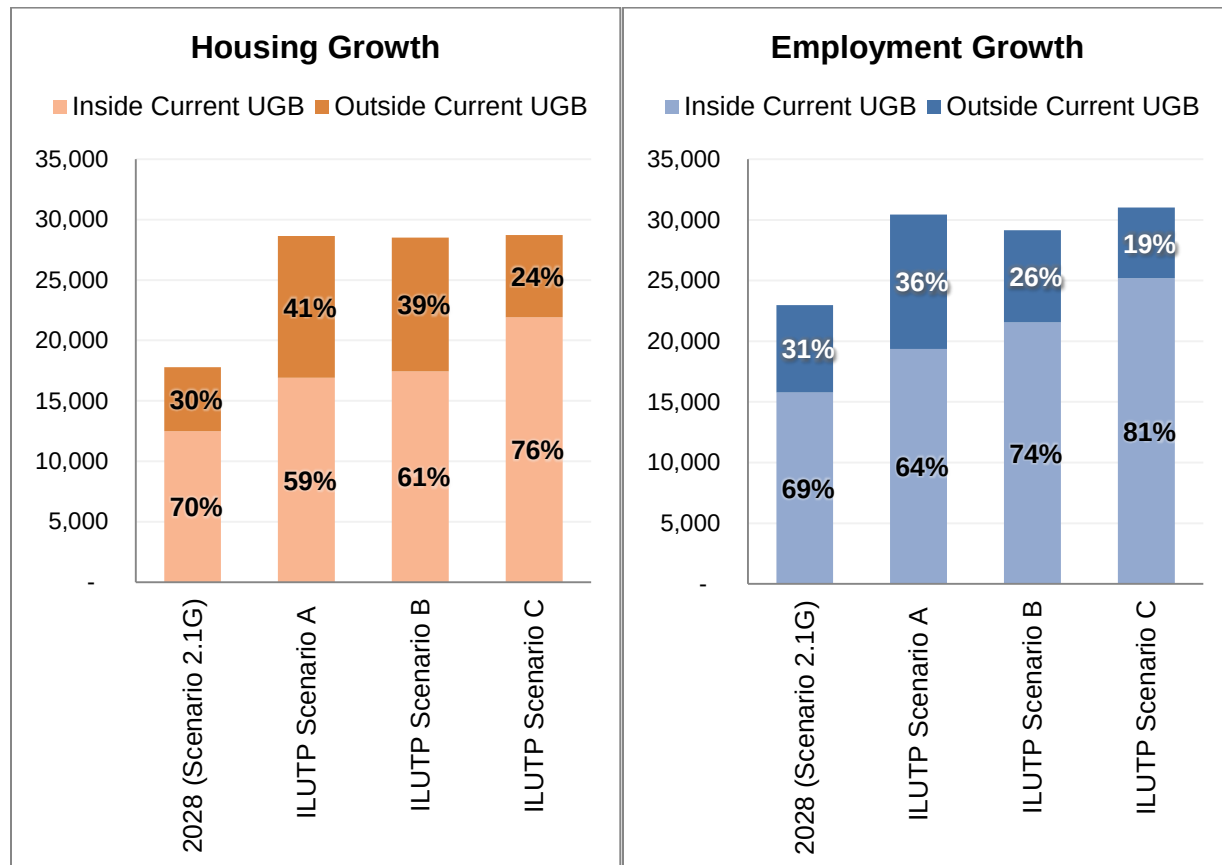


GROWTH PATTERNS FOR ILUTP SCENARIOS

The charts in Figure 2 illustrate the share of growth from 2014 to the horizon year that is accommodated inside the current UGB and in UGB expansion areas for Scenario 2.1G and each of the 2040 scenarios.

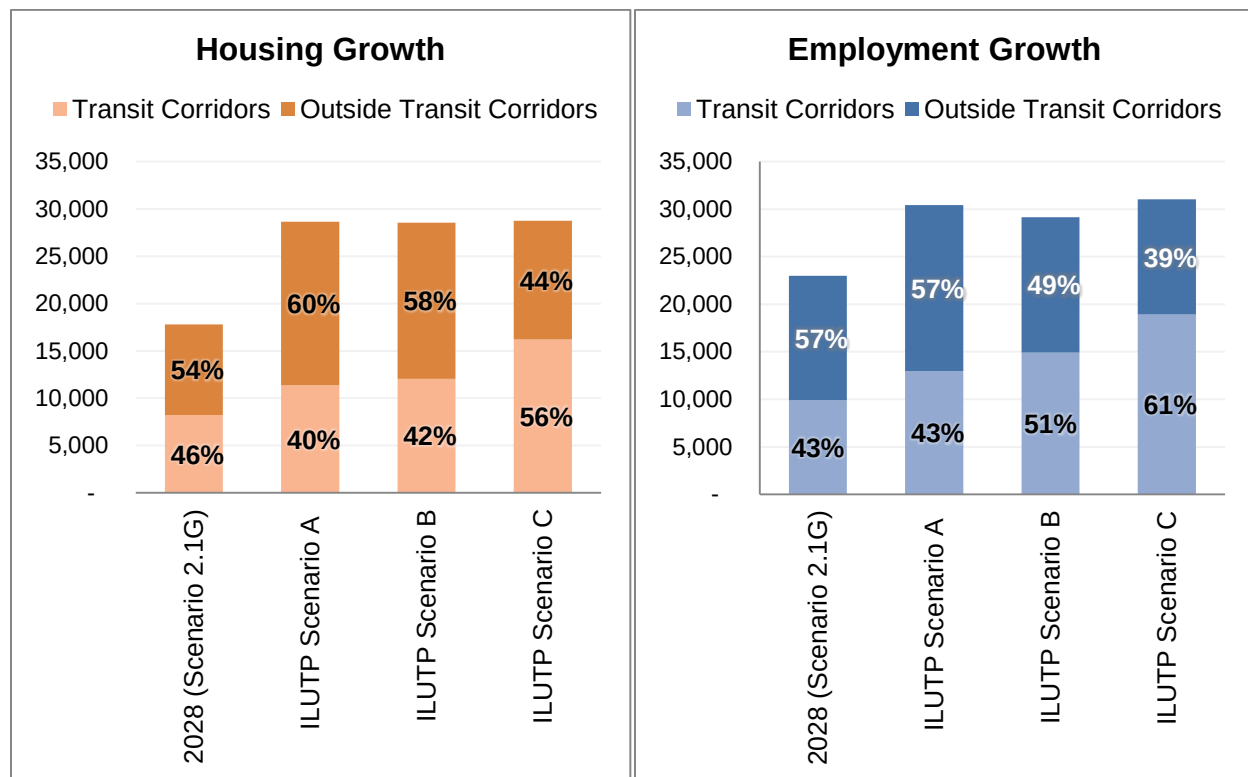
Figure 2 shows that all of the ILUTP scenarios accommodate additional housing and employment within the current UGB relative to the 2028 Preferred UGB Scenario. Because most of the remaining vacant land within the current UGB is projected to develop by 2028, this additional growth inside the UGB through 2040 is primarily due to additional redevelopment and infill, along with some increases in the intensity of future development (i.e. density of new development increasing over time). The amount of additional housing and employment growth projected within the current UGB increases from ILUTP Scenario A to C as the assumed redevelopment rate and intensity of development increases. In ILUTP Scenario C, the residual housing and employment growth outside the current UGB for 2040 is nearly the same in absolute terms as in the preferred scenario (2.1G) for 2028, meaning that little or no additional UGB expansion would be needed beyond that being proposed in 2016. In contrast, ILUTP Scenario A assumes further UGB expansions, with nearly twice as much housing and roughly 50% more employment outside the current UGB as projected for 2028. ILUTP Scenario B falls between these two extremes.

Figure 2: Housing and Employment Growth Inside and Outside Current UGB



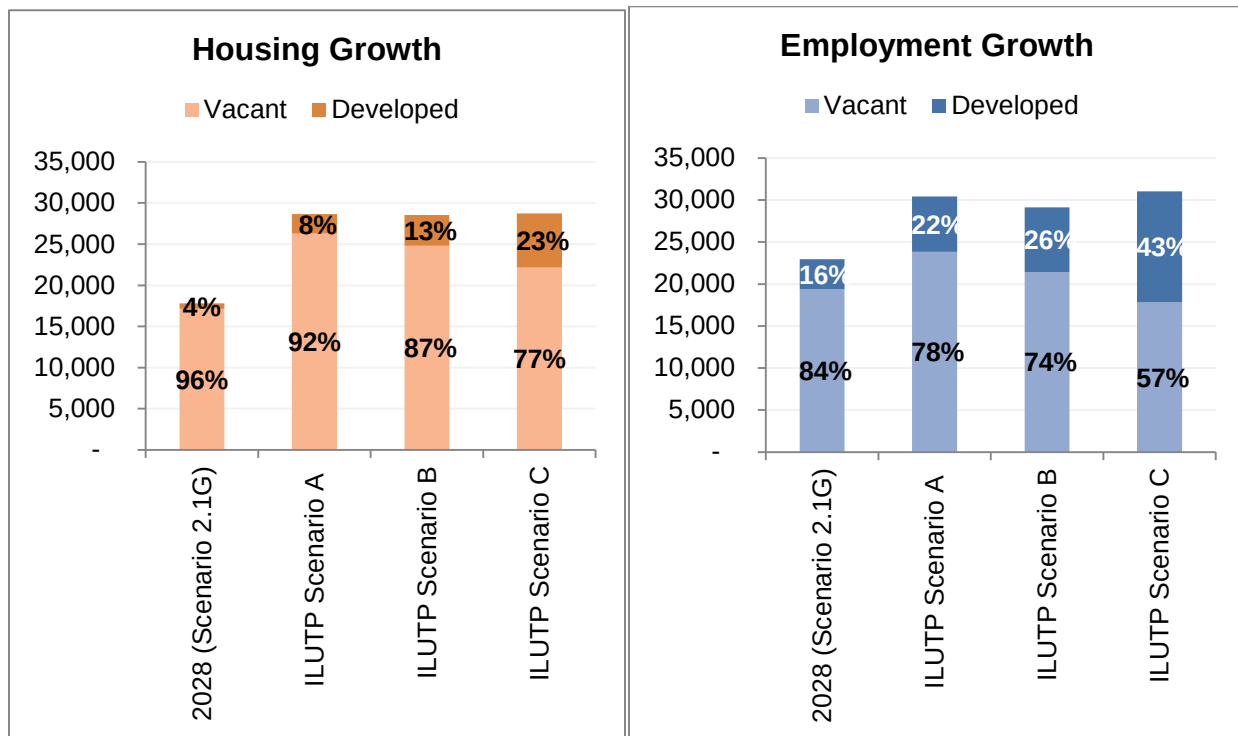
The 2040 scenarios also differ in the degree to which they focus development around transit, as shown in Figure 2. All three of the 2040 scenarios share the same transit route locations (which include two new routes not assumed to operate as of 2028), although the frequency of service varies. ILUTP Scenario C accommodates a majority of total forecast housing and employment growth within a quarter mile of existing and future transit corridors.

Figure 3: Housing and Employment Growth Inside and Outside Transit Corridors



As with growth inside the current UGB, maintaining or increasing the share of growth in proximity to transit as the City grows requires substantial infill and redevelopment. This is illustrated on Figure 4.

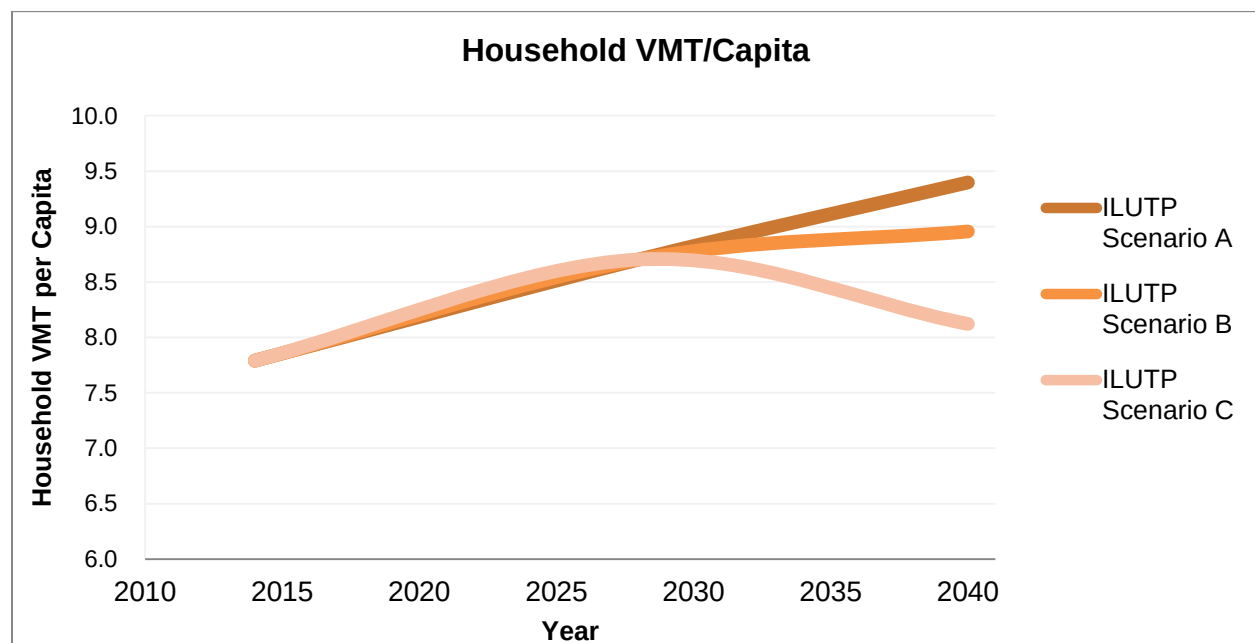
Figure 4: Housing and Employment Growth on Vacant vs. Developed Land



ILUTP SCENARIO VMT RESULTS

The range of potential outcomes for VMT per capita is illustrated on Figure 3, below. Note that the VMT results reported below are for household VMT per capita, as estimated by the Envision Tomorrow “7D” transport model. This metric measures only trips that begin or end at home. The Bend area regional Travel Demand Model calculated total VMT per capita (all trips) and is used for official analysis of VMT under the Transportation Planning Rule. The analysis below is intended as an indicator of the magnitude and direction of VMT changes rather than as a precise estimate of the future VMT. As mentioned above, the 2040 scenarios only used a set of the possible strategies identified in the ILUTP. Figure 3 illustrates a constant set of assumptions for existing VMT and for 2028 VMT based on Scenario 2.1G (the preferred UGB expansion scenario), with a range of possible outcomes for 2040 depending on the land use and transit assumptions in each of the scenarios.

Figure 5: Household VMT per Capita Trends



As shown in Figure 3, Scenario C significantly bends the curve relative to 2028, but still does not reach a decline relative to existing VMT per capita. Scenario A continues the trend line established with 2028, while Scenario B flattens the line somewhat, but continues upward.

SUMMARY: VMT AND FUTURE LAND USE PATTERNS AND TRANSIT IMPROVEMENTS

The 2040 scenarios in this evaluation memo explored how housing and employment located inside and outside the proposed UGB influences VMT. The scenario also assumed transit improvements to support the land uses. The City will at some point in the near future update the TSP which includes an update of the VMT strategies, goals, and requirements. Using only housing and employment growth and levels of transit improvements, it appears, with no other

factors, that most of the new development out to 2040 would have to occur within the proposed UGB Scenario 2.1G boundary for VMT to be reduced relative to existing (2014) conditions. In order for that to happen, the City would have to invest in a significant amount of transit funding to implement a much higher level of transit service that includes Bus Rapid Transit. Similarly, further changes to the development code and increased investment in parks, open space, schools and other amenities would be needed to support the infill and redevelopment projected in Scenario C. Additional financial support or other incentives for redevelopment and higher density might also be needed in order to generate that level of redevelopment. The 2040 analysis presented in this memo is a first attempt to understand what it would possibly take to bend VMT downward, without detailed analysis about rates of redevelopment, costs, household incomes, household mode preferences over time, and other factors that influence and limit or enhance development within the UGB. It is intended to inform further evaluation of the additional strategies identified in the ILUTP and the City's upcoming TSP update.

ATTACHMENT 6 ANALYSIS OF BENEFIT OF CONNECTIVITY IMPROVEMENTS SINCE 1990



DRAFT MEMORANDUM

DATE: October 20, 2014

TO: Nick Arnis, City of Bend

FROM: Chris Maciejewski, P.E., PTOE
Ray Delahanty, AICP
Aaron Berger, EI

SUBJECT: DRAFT Bend VMT Study Process Summary

P#11123-000

The purpose of this memorandum is describe the framework developed for analyzing strategies for Vehicle Miles Traveled (VMT) reduction for the City of Bend. The process for developing methodology and assumptions is discussed, and the scenarios analyzed are described as well.

BACKGROUND

In 2012, the City of Bend embarked on an effort to develop a future land use and Urban Growth Boundary (UGB) scenario that would meet both (1) the City's future growth needs and (2) state planning requirements laid out by the Department of Land Conservation and Development (DLCD). Scenario development was in response to a remand from the Land Conservation and Development Commission (LCDC) regarding the City's proposed UGB expansion. The primary goal of this exercise was to identify a combination of land use and transportation strategies that would achieve a reduction in daily VMT per capita – ideally 5% or more.

Transportation Planning Rule (TPR)

The TPR requires metropolitan planning organizations (MPOs) to assess the likely change in VMT per capita over a 20-year planning period. If VMT per capita increases over the 20-year period, then jurisdictions within the metro area will be directed to prepare an integrated land use and transportation plan. Land use and transportation strategies should not result in a likely increase of 5% or more. In assessing the change in VMT per capita, LCDC shall give credit to regional and local plans, programs, and actions implemented since 1990 that have already made progress toward VMT goals. VMT, as defined in the TPR, refers only to trips that begin and end within the MPO boundary, and transit, heavy truck, and commercial vehicle miles are not included.

DEVELOPING A FRAMEWORK

Project Chartering

To keep the project on course for an outcome that would fulfill City growth objectives as well as state policy, a project charter was developed. The charter outlined the following elements:

- Project purpose and members, including the City of Bend, Bend MPO, DLCD, and ODOT
- Project goals, including strategies for addressing VMT/capita supported by project charter members
- Key project milestones
- Project roles and responsibilities
- Decision making process, including dispute resolution
- Project communication

Analysis Approach

To satisfy the requirement of a 20-year analysis, the base and horizon years of 2008 and 2028 were selected. The Bend MPO travel demand model was used to estimate VMT in these two years, using a daily demand and a 16-hour roadway capacity assignment to represent daily VMT (assignment methodology developed in coordination with ODOT's Transportation Planning Analysis Unit and DLCD). The project team agreed that the travel demand model's base and future years of 2003 and 2030 were appropriate proxies for 2008 and 2028, respectively. The analysis included the following steps:

- 1. Credit for actions implemented since 1990.** The City of Bend implemented several connectivity improvements that would be expected to reduce VMT per capita, such as a new river crossing and an extension of Empire Avenue. To measure the benefit of these improvements, 2003-level demand was applied to both the base 2003 model network and to a 1990 network that did not include these connectivity improvements. VMT per capita from these model runs were compared in order to calculate the credit due to actions implemented in the intervening 13 years.
- 2. Accounting for the Bend Parkway.** Because the Bend Parkway is an improvement of a much larger magnitude than others constructed between 1990 and 2003, and because it was oriented toward statewide rather than local travel, an additional version of the 1990 network was created with the Parkway in place. This allowed the team to isolate the effect of the Parkway on VMT per capita.
- 3. Measuring likely changes between 2008 and 2028.** Model runs were performed for the proxy years of 2003 and 2030. The total length of all trips internal to the set of transportation analysis zones (TAZs) that lie within or overlap the UGB was divided by the population assumed for those TAZs. This resulted in a VMT per capita calculation for each scenario.

In addition to the 2008 and 2028 scenarios, recently created scenarios for the MTP Update (including a 2010 base year and 2040 horizon year) were analyzed for the MPO boundary as part of the MTP Update process. The information from that analysis is presented in the following section to provide information regarding the changes in VMT that could be attributed to updated census data and new land use growth forecasts and development patterns for a 2040 horizon year.

SUMMARY OF SCENARIOS

Model scenarios evaluated are summarized in the table below, along with the VMT per capita results.

Scenario	Network	Land Use	VMT	Population	VMT per capita
1990 without Parkway	1990 travel demand model network	2003	600,553	64,007	9.38
1990 with Parkway	1990 travel demand model network with Bend Parkway in place	2003	610,701	64,007	9.54
2003	*2003 travel demand model network	2003	587,557	64,007	9.18
2010	**2010 travel demand model network	2010	837,670	84,003	9.97
2030	*2030 travel demand model network including improvements from the financially constrained list	2030	1,248,220	126,988	9.83
2040	**2040 travel demand model network including improvements from the financially constrained MTP project list	2040	1,403,266	152,837	9.36

**An initial evaluation done using PM peak demand (not daily) and an incorrect set of TAZs (not reflecting the full UGB boundary) indicated a reduction in VMT/capita between 2008 and 2028 with the baseline 2008 and 2030 models. This analysis was replaced with the information listed in the table above.*

***The 2010 and 2040 results are based off the travel model developed for the 2014 Bend MTP. The 2010 VMT/capita was calculated based off the existing MPO boundary. The 2040 VMT/capita was calculated based on the predicted 2040 MPO boundary from the land use allocation prepared for the MTP Update.*

AREAS FOR FURTHER EXPLORATION

Because the travel demand model played such an important role in the analysis, a “Modeling 101” workshop for the project team was held in Bend. Based on this workshop and the initial evaluations, further steps were identified, including:



- The VMT analysis was not itself an integrated land use and transportation plan, but its results show that such a plan may be required per the TPR. Such an integrated plan could include an approach where the land use is “reverse engineered” so that modeling results yield the target VMT per capita results (preferably a 5% reduction over the 20 years).
- During the analysis the question was raised as to the effects of demographics on travel behavior, as certain demographic segments may make fewer and/or shorter vehicle trips than others. The project team concluded that assumptions about demographics may have a significant effect on VMT per capita. The City and MPO may consider working with experts in the field to assess and potentially update the demographic assumptions in the future year travel demand model. Note – demographics in the 2030 model are currently the same as the 2003 model.



Oregon

Theodore R. Kulongoski, Governor

Department of Land Conservation and Development

Community Services Division

635 Capitol Street NE, Suite 150

Salem, Oregon 97301-2540

Phone: (503) 373-0050

Fax: (503) 378-5518

www.oregon.gov/LCD



10-Nov-11

TO: Christopher S. Maciejewski, P.E., P.T.O.E.; DKS Associates

FROM: Matt Crall; DLCD TGM Program Coordinator;
Robert Cortright, DLCD Land Use-Transportation Planning Specialist;
Gary Fish, DLCD Land Use-Transportation Planner;
Karen Swirsky, DLCD Central Oregon Regional Representative

CC: Rick Root, City of Bend Transportation Planner;
Brian Shetterly, City of Bend Long Range Planning Manager

RE: Questions relating to the Bend Urban Growth Boundary (UGB) Vehicle Miles Traveled (VMT) analysis

DKS is beginning work analysis of the City of Bend's VMT as part of the Bend UGB effort. This is required by Sub-issue 8.6 of the November 2, 2010 Remand Order from the Land Conservation and Development Commission (LCDC). Sub-issue 8.6 found that the metropolitan planning organization (MPO) requirements of the Transportation Planning Rule (TPR) must be met by the City as part of its UGB expansion work.

DKS Project Manager Chris Maciejewski requested that the department clarify the following issues. We are happy to provide clarification. Our responses follow each numbered issue.

- 1. Confirm that our interpretation of the TPR definition of VMT for MPO analysis (only internal-internal trips within the UGB) apply for this effort. We are assuming there would be a different UGB boundary for the base year vs. future year comparisons.**

The department concurs with DKS's interpretation of the TPR definition. VMT for TPR purposes is include internal travel only. This is covered in the definition of VMT in OAR 660-012-0005:

(41) Vehicle Miles of Travel (VMT): means automobile vehicle miles of travel. Automobiles, for purposes of this definition, include automobiles, light trucks, and other similar vehicles used for movement of people. The definition does not include buses, heavy trucks and trips that involve commercial movement of goods. VMT includes trips with an origin and a destination within the MPO boundary and excludes pass through trips (i.e., trips with a beginning and end point outside of the MPO) and external trips (i.e., trips with a beginning or end point outside of the MPO boundary). VMT is estimated prospectively through the use of metropolitan area transportation models. (underline added)

On the second part of the question, the use of different boundaries for base and future year is not addressed by the rule. The department does not believe that there was significant VMT generated in the base year in the areas proposed for UGB expansion since the lands are mostly undeveloped in the base year. Thus the different boundaries would not make much difference in the overall results.

- 2. Forecast years: The City's UGB study years are 2008 and 2028. As we discussed, the travel demand model has a base year 2003 and a future year 2030 scenario (including corresponding land use data). Further complicating this, we have seen the 2030 scenario now be referred to as a year 2034 scenario (per the ODOT US 97 North Corridor Study). So question is...should we move ahead now with the 2003 and 2030 consistent with our prior UGB analysis? Maybe we change to 2008 and 2028 scenarios when we have developed the final UGB scenario? If we switch to 2008 and 2028, how would we go about creating new approved land use inputs to create those forecast year scenarios?**

The TPR does not specify particular years as the base year or planning year. However, the Remand concludes (p. 121) that: *“The City has agreed to prepare analyses of its baseline VMT per capita in 2003...”*

It would be ideal if the City could use a consistent set of assumptions as a basis for all of its land use planning decisions – i.e. for the TSP and the UGB – and that the 2003-2030 would be best. However, if the City chooses to use a different time frame for the UGB than it has for the TSP, it will be necessary to clearly explain how the different planning horizon years – 2028 and 2030 – are consistent with one another. For example, if the 2028 projections were lower than the 2030 projections, and the difference was roughly two years of growth, then they could be consistent without being identical. On the other hand, if the 2028 projections were higher than the 2030 projections, or if the difference were so large it could not be accounted for by two years of growth, then the TSP and UGB work would not be consistent. If they are consistent, relative to population and employment, then either could satisfy the requirement of the Remand and the TPR.

Additionally, the city's obligation to plan for VMT reduction is tied to its designation as an MPO (2002). That would suggest that 2003 will work better as a base year; however, using 2008 as a base year could work, unless there is some significant difference in VMT per capita between 2002 and 2008.

- 3. Taking credit for actions since 1990: Confirm that it would be correct to modify base year 2003 or 2008 model scenarios to remove major transportation projects that were implemented or constructed since 1990 (e.g., the southern river crossing and the Empire extension). This would include continuing to not include fixed route transit service in the base year scenario.**

The intent of the provision in the TPR that allows taking credit for actions implemented since 1990 is to recognize and allow a metropolitan area to “count” actions that have clearly reduced VMT per capita.

The first question for the City is to assess whether base year (2003/2008) VMT per capita is in fact **lower** than 1990 VMT per capita. If it is lower, then the second question would be to

identify actions that the City believes contributed to this reduction (i.e., explaining how actions like the Southern River Crossing and the Empire extension reduced VMT per capita). We want to caution that the effect of new roads on VMT is often mixed, and does not always lead to a reduction in per capita VMT. Although improved connectivity makes some trips shorter, the reduction can be offset by people taking additional trips or traveling to more distant destinations due to increased convenience.

4. What is the analysis period for the VMT/capita? Average daily vs. weekday PM peak hour? I was assuming weekday PM peak hour, as that is what the MPO model is primarily calibrated to and the focus of the traffic operations analysis for determining impact. I don't see this defined in the TPR.

The accepted interpretation and approach is to measure or estimate daily or annual VMT per capita – usually expressed as VMT per capita per day based on the average annual VMT. While the definition in 0005(41) does not specify a measurement period, it is not properly applied by measuring peak hour VMT for several reasons. First, peak hour VMT is only a fraction of total VMT.

Second, if the rule were intended to be limited to peak hour VMT, it would have specified that. We are not aware of any circumstances in which only peak hour VMT was used for MPO standards to meet TPR 0035(5).

Finally, the use of peak hour VMT is not appropriate because as congestion increases, travel tends to shift out of the peak hour. This means that over time – i.e. over the 20 year planning period – peak hour VMT per capita should decline simply because of increased traffic congestion. (In other words, it would not be surprising to see a 5% reduction in peak hour VMT per capita as a result of increased traffic congestion causing a shift to other times or modes of travel.)

We suggest that it is useful to think about measurement in the context of the VMT reduction requirement – remembering that the objective of the TPR is to reduce reliance on the automobile and increase the availability and convenience of other modes of transportation.

Again, thank you for the opportunity to discuss and clarify these issues. We look forward to continue working with you and the City of Bend as it moves forward with this important work.

Sincerely,

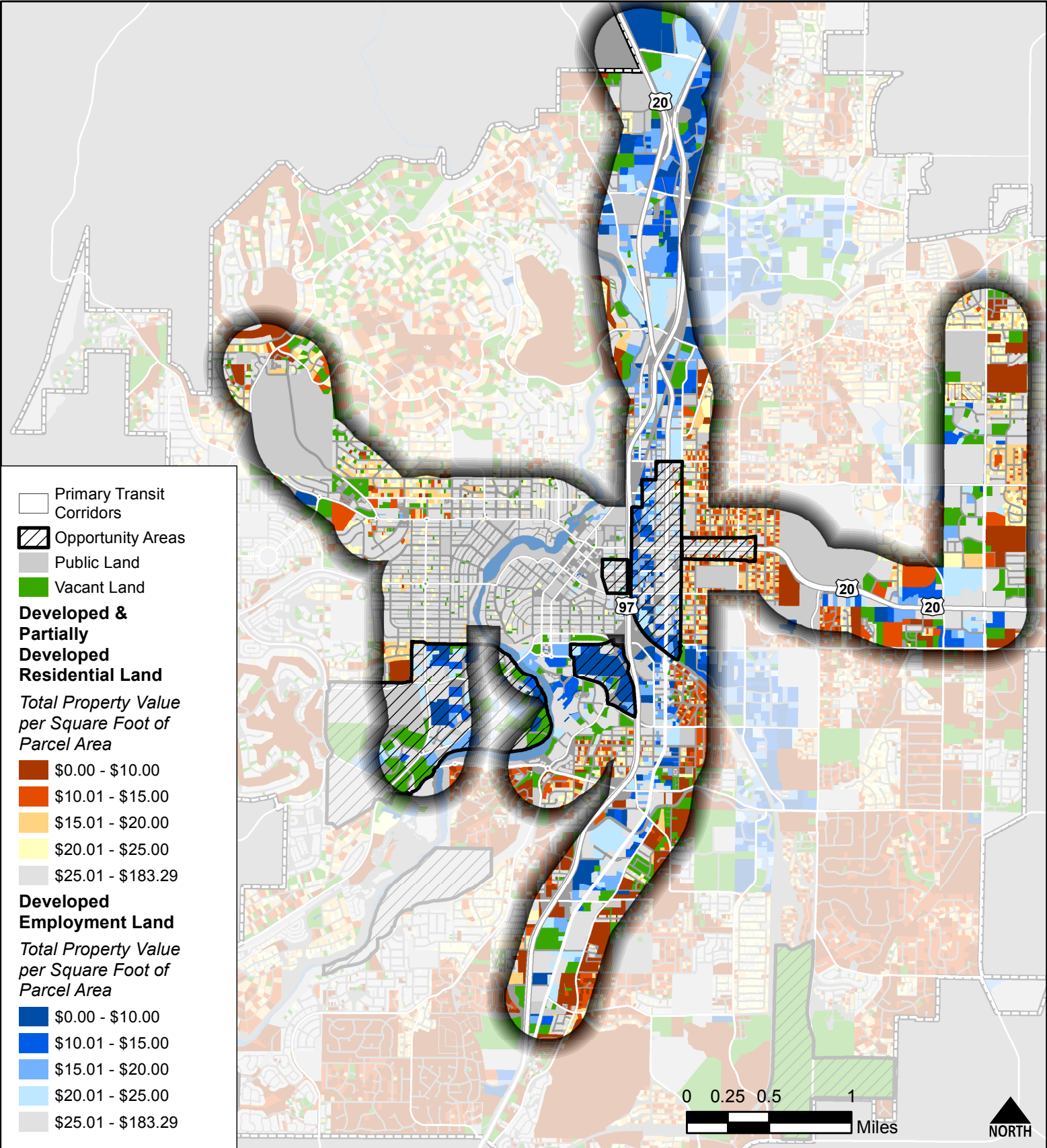
Karen Swirsky, AICP, Central Oregon Regional Representative
Matt Crall, Transportation and Growth Management Program Coordinator

ATTACHMENT 7 ANALYSIS OF LONG-TERM REDEVELOPMENT POTENTIAL IN TRANSIT CORRIDORS

Bend UGB Remand Project

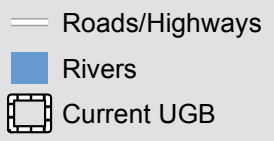
Redevelopment Potential in Key Transit Corridors

Prepared 6/14/2016



Disclaimer: This map represents land use assumptions for modeling purposes only. This is not a proposal for specific comprehensive plan designations.

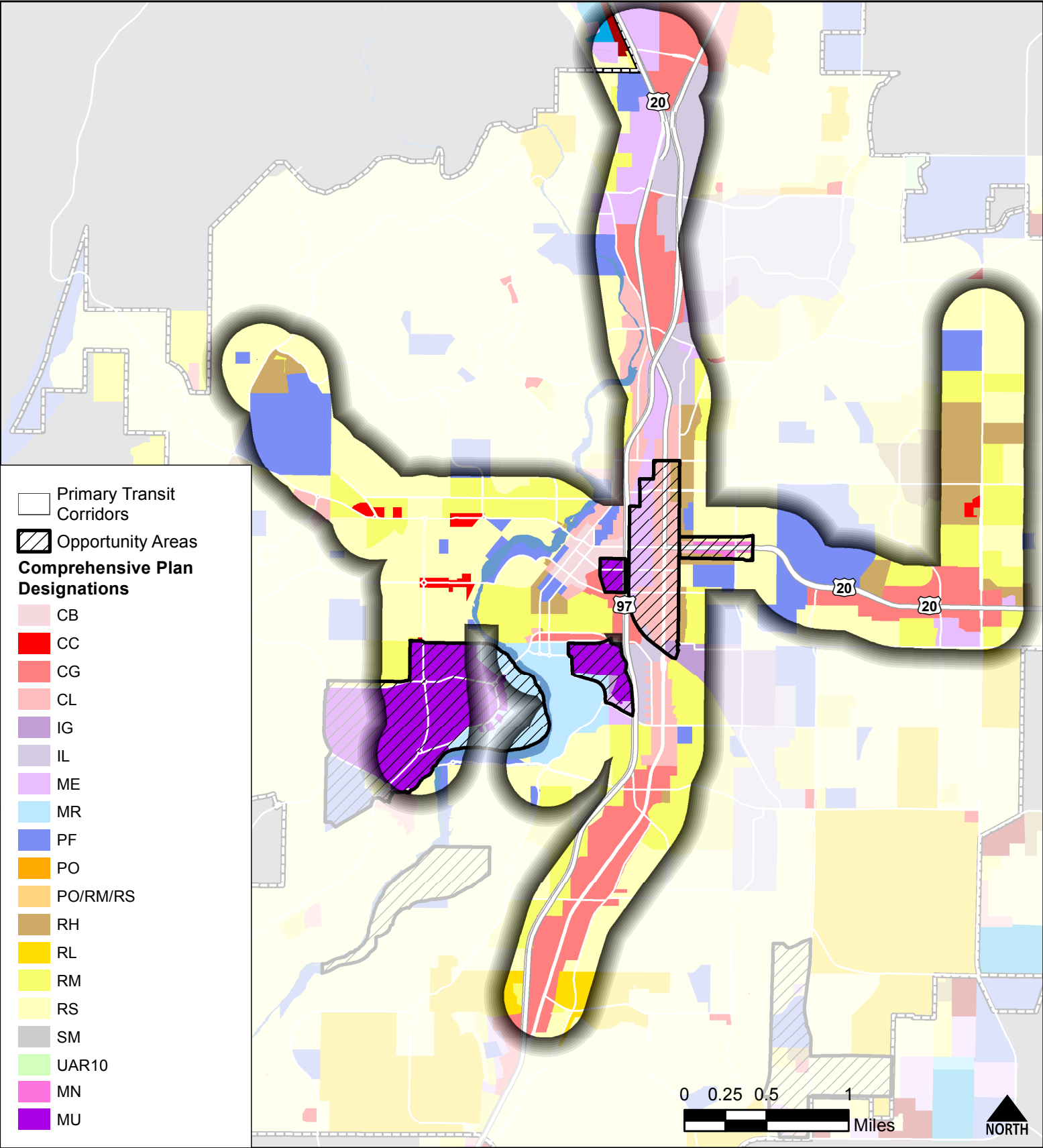
Service Layer Credits: Deschutes County GIS (2014)



Bend UGB Remand Project

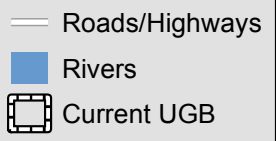
Existing Plan Designations in Key Transit Corridors

Prepared 6/14/2016



Disclaimer: This map represents land use assumptions for modeling purposes only. This is not a proposal for specific comprehensive plan designations.

Service Layer Credits: Deschutes County GIS (2014)



ATTACHMENT 8 SAMPLE PEDESTRIAN-/TRANSIT-ORIENTED DEVELOPMENT OVERLAY ZONE

Memorandum



July 12, 2016

To: Project Management Team

Cc:

From: Becky Hewitt

Re: Sample Pedestrian-/Transit-Oriented Development Overlay Zone Code Language

INTRODUCTION

This memo provides a starting point of draft language for the Bend Development Code (BDC) that could be used to establish pedestrian and transit oriented design standards for certain commercial corridors as an overlay zone or a set of special standards applied in a geographically specific area. This is provided for informational purposes only. Further refinement and additional public outreach may be needed prior to adoption of such language.

The standards below are largely drawn from existing code language applicable in other parts of the City, such as the Central Business District. They were developed as part of an exploration of “efficiency measures” and amendments to the BDC during the Urban Growth Boundary (UGB) Remand process, but were not recommended for adoption at that time. They have been included as an attachment to the Integrated Land Use and Transportation Plan (ILUTP) to provide an example of development standards that could be applied in these areas. Note that special parking standards, incentives, and/or reductions may also be appropriate in such areas, beyond those provided for in the proposed development code amendments that are part of the UGB adoption package.

SAMPLE CODE LANGUAGE

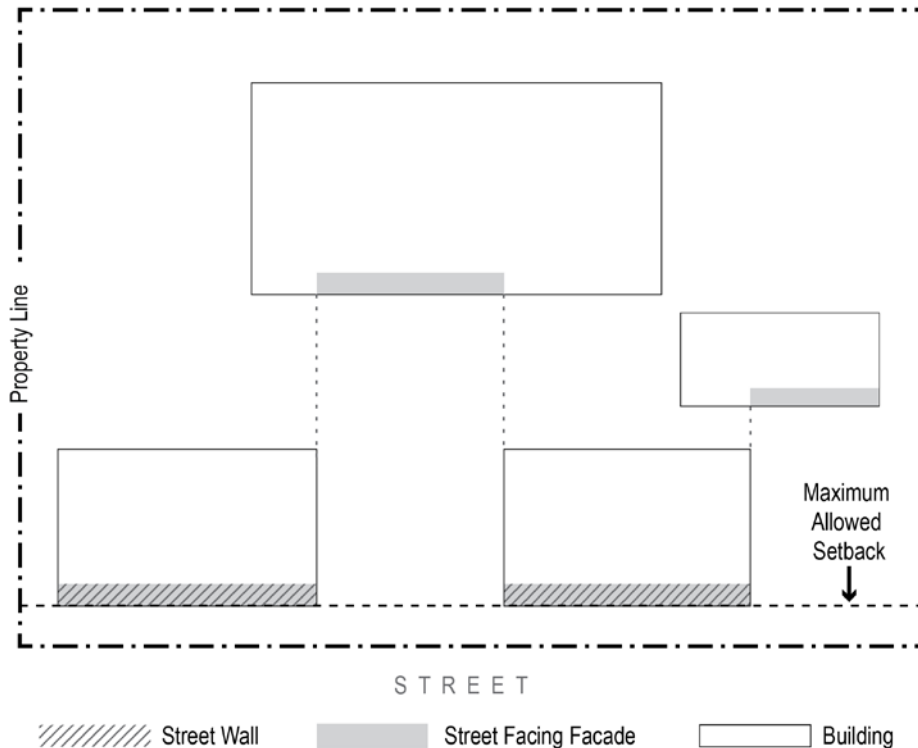
1. Standards for Commercial and Mixed Use Buildings in Pedestrian Districts. For the purpose of this section, “Pedestrian Districts” are defined as properties that have frontage on an Enhanced Pedestrian Design Street, as shown on **Figure X.X**.

[insert map of streets]

a. Ground-Floor Windows. In Pedestrian Districts, ground-floor windows must be installed for at least 50 percent of the building length and have an area equal to 60 percent of the street-facing ground-floor wall area. Ground-floor wall area includes all wall areas up to 10 feet above finished grade. If the site has two or more frontages, the ground-floor window standard is only required on the primary facade – the facade that fronts the street with the higher classification. The other facade has a minimum ground-floor window requirement of 50 percent of the length and 25 percent of the ground-floor wall area. Windows are required to be transparent to foster

both a physical and visual connection between activities in the building and pedestrian activities on the street.

[EXAMPLE GRAPHIC BELOW]



- b. Parking Location. Parking and vehicle circulation areas shall be prohibited between a Street Wall and a street.
- c. Main Entrance. The main entrance to a building shall face the street or be on the corner.
- d. Human Scale Design Elements. Street Walls in Pedestrian Districts shall provide visual interest for pedestrians by incorporating building details at the ground floor that meet two or more of the following options:
 - Incorporating building lighting between 10 and 15 feet from the sidewalk to the bottom of the light fixture.
 - Incorporating suspended signs (blade signs) between eight and 12 feet from the sidewalk to the bottom of the suspended sign.
 - Incorporating horizontal and vertical elements at the ground floor/the base of the building that are familiar to pedestrians and are at human scale: sign frieze, storefront cornice, window mullions, piers that frame storefronts, engaged columns, arcades, brick coursings, awnings, and well-lit transoms.
 - Incorporating a rhythm of awnings and/or canopies.

f. Weather Protection. Weather protection shall be provided along 50 percent of the Street Wall and at all street-facing entrances in Pedestrian Districts. Weather protection projections may include but are not limited to awnings, marquees, balconies, overhangs, umbrellas, fabric tensile structures, or building appendages; weather protection projections are required to extend five feet over the sidewalk in order to meet this standard.

ATTACHMENT 9 MEDIUM-TERM AND LONG-TERM TRANSIT SCENARIOS FOR ILUTP TESTING

EXPLANATION OF TRANSIT SCENARIOS FOR ILUTP

Below is a written summary of future transit service enhancements for the medium and high scenarios.

- 1) Additional service hours and shorter peak period headways (see attached spreadsheet)
- 2) Two new routes
 - a. Route 8 – start at Hawthorne Station, travel north on 3rd Street to Greenwood Avenue. Turn right (east) on Greenwood to NE 8th Street and travel to NE 8th Street. Turn left (north) on NE 8th Street and travel north to roundabout at Butler Market Road. Turn left (west) at roundabout and travel to NE Boyd Acres Road. Turn right (north) on Boyd Acres Road and travel north to Empire Avenue. Turn right (east) on Empire and travel to 18th Street. Turn left (north) on 18th Street and travel to Cooley Road. Turn left (west) on Cooley and travel to TAZ 534 or TAZ 1517 (see note below under 3a). Turn around and retrace same path back to Hawthorne Station.
 - b. Route 14 – start at Hawthorne Station, travel south on 3rd Street to Reed Market Road. Turn left (west) on Reed Market Road and travel to SE 15th Street. Turn right (south) on SE 15th Street and travel to TAZ 1549. Turn around and retrace same path back to Hawthorne Station.
 - c. Transit stops are generally spaced at 0.25 mile intervals. At that interval length, all of the TAZs along these new routes should have access to the bus.
- 3) Route modifications
 - a. Route 4 currently terminates in TAZ 535. The route should be extended to travel north along Hunnel Road and then east on Cooley Road to TAZ 534 or TAZ 1517. It would then turn around and retrace its route back to Hawthorne Station
 - b. Route 2 – after the bus makes the loop on the south end of the loop and begins to return north, the route should turn right (east) on Murphy Road and travel to 3rd Street. The bus will turn around at the Murphy/3rd roundabout, return to Brookwood and continue north
- 4) Community connectors and new hubs
 - a. Route 24 is the community connector from Redmond to Bend. Currently it's only stop in Bend is at Hawthorne Station. A new hub/stop should be created in TAZ 534 or 1517. Routes 24, 4, and 8 would be served at that hub. Passengers could transfer among those 3 routes at that location.
 - b. Route 30 is the community connector from La Pine to Bend. Currently it's only stop in Bend is at Hawthorne Station. A new hub/stop should be created in TAZ 500 or 501. Routes 30, 1, and 2 would be served at that hub. Passengers could transfer among those 3 routes at that location.
- 5) In the high scenario, routes 1, 4, and 7 convert from bus service to BRT service.

Cascades East Transit Future Service Levels

CET Existing Service - Low Scenario

Service hours: 6 am - 7:30 pm

Bus capacity: 36 seats

Route #	Route Location	Start Time	Finish Time	Peak Headways	Off-Peak Headways	Notes
1	S 3rd Street	6:00 AM	7:20 PM	30 mins	30 mins	
2	Brookwood	6:00 AM	7:32 PM	45 mins	45 mins	
3	Newport-COCC	6:00 AM	7:21 PM	30 mins	30 mins	
4	N 3rd Street	6:00 AM	7:22 PM	30 mins	30 mins	
5	Wells Acre/27th/Reed Mkt	6:00 AM	7:33 PM	45 mins	45 mins	
6	Reed Mkt/27th/Wells Acre	6:00 AM	7:33 PM	45 mins	45 mins	
7	Greenwood/St Charles	6:00 AM	7:22 PM	30 mins	30 mins	
10	Galveston/14th/Colorado	6:30 AM	6:51 PM	30 mins	30 mins	
11	Galveston/14th/Chandler	6:00 AM	7:24 PM	60 mins	60 mins	
12	COCC-OSU via 14th	6:00 AM	7:17 PM	30 mins	30 mins	

CET Planned Service - Medium Scenario

Service hours: 6 am - 10 pm

Bus capacity: 36 seats

Route #	Route Location	Start Time	Finish Time	Peak Headways	Off-Peak Headways	Notes
1	S 3rd Street	6:00 AM	9:20 PM	15 mins	30 mins	
2	Brookwood	6:00 AM	9:32 PM	45 mins	45 mins	
3	Newport-COCC	6:00 AM	9:21 PM	15 mins	30 mins	
4	N 3rd Street	6:00 AM	9:22 PM	15 mins	30 mins	
5	Wells Acre/27th/Reed Mkt	6:00 AM	9:33 PM	45 mins	45 mins	
6	Reed Mkt/27th/Wells Acre	6:00 AM	9:33 PM	45 mins	45 mins	
7	Greenwood/St Charles	6:00 AM	9:22 PM	15 mins	30 mins	
8	8th/Boyd Acres/18th	6:00 AM	9:30 PM	45 mins	45 mins	New route
10	Galveston/14th/Colorado	6:00 AM	9:51 PM	30 mins	30 mins	
11	Galveston/14th/Chandler	6:00 AM	9:24 PM	30 mins	30 mins	
12	COCC-OSU via 14th	6:00 AM	9:17 PM	30 mins	30 mins	
14	3rd/Reed Market/15th	6:00 AM	9:30 PM	30 mins	30 mins	New route

CET Planned Service - High Scenario

Service hours: 5 am - 10 pm

Bus capacity: 36 seats

Route #	Route Location	Start Time	Finish Time	Peak Headways	Off-Peak Headways	Notes
1	S 3rd Street	5:00 AM	9:20 PM	15 mins	30 mins	Convert from bus to BRT
2	Brookwood	5:00 AM	9:32 PM	45 mins	45 mins	
3	Newport-COCC	5:00 AM	9:21 PM	15 mins	30 mins	
4	N 3rd Street	5:00 AM	9:22 PM	15 mins	30 mins	Convert from bus to BRT
5	Wells Acre/27th/Reed Mkt	5:00 AM	9:33 PM	30 mins	45 mins	
6	Reed Mkt/27th/Wells Acre	5:00 AM	9:33 PM	30 mins	45 mins	
7	Greenwood/St Charles	5:00 AM	9:22 PM	15 mins	30 mins	Convert from bus to BRT
8	8th/Boyd Acres/18th	5:00 AM	9:30 PM	30 mins	45 mins	New route (also in medium scenario)
10	Galveston/14th/Colorado	5:00 AM	9:51 PM	30 mins	30 mins	
11	Galveston/14th/Chandler	5:00 AM	9:24 PM	30 mins	30 mins	
12	COCC-OSU via 14th	5:00 AM	9:17 PM	30 mins	30 mins	
14	3rd/Reed Market/15th	5:00 AM	9:30 PM	30 mins	30 mins	New route (also in medium scenario)

ATTACHMENT 10 COMPLETE STREETS PROJECTS TABLE

Project	COST	TYPE	MAP	Phase
Newport (College Way to 12th)	\$ 1,010,000	Sidewalk		2 Programmed
9th (Franklin-Greenwood)	\$ 1,010,000	Sidewalk		3 Programmed
14th (Colorado to Newport)	\$ 4,000,000	Streetscape		4 Programmed
Galveston Corridor (Harmon to 14th)	\$ 2,700,000	Streetscape		5 Programmed
Wilson (2nd to 9th)	\$ 1,480,000	Streetscape		6 Programmed
Murphy Extension to 15th	\$ 16,000,000	Extension		7 Planned
Bronzewood extension over Larkspur trail	\$ 500,000	Extension		8 Planned
Purcell Extension (Neff to Wells Acres)	\$ 3,000,000	Extension		9 Planned
Chase Extension to Brosterhous	\$ 3,000,000	Extension		10 Planned
3rd (Greenwood to COID canal)	\$ 5,000,000	Streetscape		11 Planned
Commerce (14th to Columbia)	\$ 2,000,000	Streetscape		12 Planned
Newport (NW 12th to Awbrey)	\$ 900,000	Streetscape		13 Planned
Franklin -Bear Creek Corridor (3rd to 27th)	\$ 800,000	Streetscape		14 Planned
Colorado/2nd Corridor (Bond to Wilson)	\$ 800,000	Streetscape		15 Planned
OSU-OMD-Coyner Trial via Aune	\$ 500,000	BikeBlvd		16 Planned
Juniper Rec-Bend High-Marshall High via 6th	\$ 500,000	BikeBlvd		17 Planned
North - South Bike Blvd (Harmon to Old Mill)	\$ 500,000	BikeBlvd		18 Planned
Empire extension (Purcell to 27th)	\$ 15,000,000	Extension		19 Future
Robal Rd connection (Hwy 20 to O.B. Riley)	\$ 2,000,000	Extension		20 Future
4th - Studio	\$ 1,500,000	Streetscape		21 Future
8th (Greenwood to Butler Market)	\$ 800,000	Streetscape		22 Future
9th (Wilson to Reed Market)	\$ 45,000	Streetscape		22 Future
8th (Greenwood to Butler Market)	\$ 800,000	Streetscape		22 Future
COCC to St Charles via 1st St Rapids	\$ 500,000	BikeBlvd		23 Planned
COCC to Larkspur Trail via Hawthorne	\$ 500,000	BikeBlvd		24 Planned
12th St from Bend High to Butler Mkt	\$ 500,000	BikeBlvd		25 Planned
12th St from Bend High to Butler Mkt	\$ 500,000	BikeBlvd		25 Planned
NW 15th St (Newport to Simpson)	\$ 500,000	BikeBlvd		26 Planned
Hawthorne/3rd	\$ 312,000	Safety Crossings and Bike		27 Programmed
Roosevelt/3rd	\$ 311,200	Safety Crossings and Bike		29 Programmed
Franklin/3rd	\$ 574,000	Safety Crossings and Bike		28 Programmed
Reed Market/3rd	\$ 336,000	Safety Crossings and Bike		30 Programmed
2nd Street (Franklin to Revere)	\$ 2,000,000	Streetscape		31 Planned
4th Street (Franklin to Butler Market)	\$ 2,000,000	Streetscape		32 Planned
Franklin Undercrossing Bridge	\$ 5,000,000	Bridge		33 Planned
Greenwood Undercrossing Bridge	\$ 5,000,000	Bridge		34 Planned
3rd Street Canal Bridge	\$ 2,500,000	Bridge		3 Planned
Drake Park Bridge	\$ 5,000,000	Bridge		35 Planned
Hawthorne Crossing	\$ 6,000,000	Bridge		36 Planned