Amended 12/21/16
by Ord. 2284

ORDINANCE NO. NS - 1747

AN ORDINANCE GRANTING ROATS WATER SYSTEM, INC. A FRANCHISE TO PROVIDE WATER SERVICE WITHIN THE CITY OF BEND.

THE CITY OF BEND DOES ORDAIN AS FOLLOWS:

Section 1: Short Title.

This ordinance shall be known as the "Roats Water System Franchise." The purpose of this ordinance is to promote and ensure the efficient allocation, regulation and use of domestic water and its provision to Bend residents and to avoid duplication of facilities, capital expenditure and other related resources.

Section 2: Definitions.

For the purpose of this ordinance, the following terms shall have the meaning provided below:

(1) "City" is the City of Bend, Oregon.

(2) "Company" is Roats Water System, Inc., the grantee of the rights under this franchise, and its successors or assigns.

(3) "Council" is the City Council of the City of Bend.

(4) "Person" means any person, firm, partnership, association, corporation, company or organization of any kind.

(5) "Facilities" shall mean all real property, fixtures and equipment used by Company in the provision of water services throughout its system, whether located inside or outside of City, and includes, but is not limited to, main transmission lines, distribution systems and all other things used in the provision of water services by Company.

(6) "Urban Growth Boundary" shall mean those properties within City's present city limits and the Urban Growth Boundary as they now exist and as they may change from time to time in the future.

Section 3: Grant of Authority.

City grants to Company the right and privilege to construct, erect, operate and maintain its facilities, in, upon, along, across, above, over and under the streets, alleys, and public ways now laid out or dedicated, and all extensions thereof, and additions thereto, for the provision of water services in City. This franchise is non-exclusive in that the City reserves the right to operate a water system within the public ways and to grant a similar use of streets, alleys and public ways to another person. The City will not serve new customers within the Company's Water Service Area, unless the Company will not serve the customer(s) or the utility is not providing service that meets the standards of a public water utility. The City will not provide service to new customers within the Company's water service area without first providing the Company ten days written notice. This notice shall not be required in the case of an emergency.

Section 4: Compliance with Laws, Rules and Regulations.

At all times during the term of this franchise, Company shall comply with all applicable laws, rules and regulations of the United States of America, the State of Oregon, and the City of Bend; including appropriate agencies and subdivisions thereof. Company shall be subject to the lawful exercise of the police power of City and to such reasonable regulations as City may from time to time hereafter adopt. Company shall have 30 days after written notice to remedy any non-compliance. If any non-compliance cannot reasonably be remedied within 30 days, City shall not declare a default for non-compliance provided Company is taking reasonable steps to remedy the

non-compliance as soon as is reasonably practicable. This 30 day notice requirement shall not apply in emergency-type situations where the preservation of public health, safety or welfare requires that immediate action be taken.

Section 5: Company Liability, Indemnification of City and Insurance.

(1) Company shall at all times conduct its operations under this franchise, including installation, construction or maintenance of its facilities, in a safe and workmanlike manner so as not to present a danger to the public or City.

(2) Company shall pay, save harmless and indemnify City from any loss or claim against City on account of or in connection with any activity of Company in the construction, operation or maintenance of its facilities and services.

(3) This franchise shall not be effective until Company secures, and shall at all times be conditioned upon Company maintaining, a comprehensive liability insurance policy which shall contain the following provisions:

(a) Bodily injury policy limits of $500,000 for each person and $500,000 for each occurrence.

(b) Property damage policy limits of $500,000.

(c) An endorsement for completed operations coverage.

(d) A designation of City, its officers, agents and employees, as an additional insured for liability arising from or in connection with this franchise.

(e) An endorsement requiring 10 days' written notice to City prior to the cancellation of the insurance coverage.

(f) A certificate evidencing insurance as described in this ordinance shall be deposited with City.

(g) In the event that City's tort liability limits are raised by the Oregon Legislature to exceed the limits described in this Section, Company shall obtain and maintain insurance in the amount of City's tort liability limits.

Section 6: Facilities and Service Standards.

For the term of this franchise, Company shall construct, operate and maintain its facilities and provide services as follows:

(1) Company shall provide its customers with good quality water services; and supply potable water to its customers in compliance with all applicable laws, rules and regulations.

(2) Company shall construct and maintain those portions of its facilities that are located within the City of Bend and within the Urban Growth Boundary surrounding the City, as it exists and changes, in compliance with City and State standards for the provision of the service. Compliance with City standards shall include, but not be limited to:

(a) Standards for construction and installation of the water system, including the use of C-900 or ductile iron pipe and restoration of City streets.

(b) Provision of standard City fire flows throughout the water system, subject to verification by the Fire Department with notice. At least annually or upon request by the City, the Company will provide the City with a written report of individual hydrant conditions.

(c) City inspection and approval of system design and installation pursuant to generally accepted practices and standards in the water utility area.

(d) Compliance with City construction standards shall be required only for facilities which are constructed or installed after the commencement of this franchise.

(3) Company shall maintain and improve its facilities according to generally accepted practices and standards in the regional water utility industry.

(4) Company's service to properties within the City shall be confined to the properties shown on the map entitled "Water Service Area Exhibit (__)" which is marked EXHIBIT A, attached hereto and incorporated by reference herein. Company shall not serve any other properties within the City.

(5) Unless prohibited by law or the Oregon Public Utilities Commission in cases where City provides sewer services to a Company customer, Company agrees to terminate the service of Company's customer, at the request of City, if the customer becomes delinquent in the payment of the customer's sewer service bill.

Section 7: Company Rules.

Company shall have authority to promulgate such reasonable rules and regulations governing the conduct of its business as shall be reasonably necessary to enable Company to exercise its rights and perform its obligations under this franchise, and to assure uninterrupted service to its customers pursuant to Company's rules and regulations. Company rules and regulations shall be subject to the provisions of this ordinance and any other governmental regulations. A copy of said rules and all amendments thereto shall be filed with the Office of City Manager.

Section 8: Conditions on Street Occupancy.

Company agrees to comply with the following conditions:

(1) Use. All facilities installed by Company within the Urban Growth Boundary after the date of this ordinance shall be so located as to cause minimum interference with the proper use of streets, alleys and other public ways and places, and to cause minimum interference with the rights or reasonable convenience of property owners who adjoin any of the streets, alleys or other public ways or places. Company shall obtain street cut permits for all street cuts and shall comply with the provisions of City's street cut ordinance.

(2) Restoration. In case of any disturbance of pavement, sidewalk, driveway or other surfacing by Company, Company shall, at its own cost and expense and in a manner approved by City, replace and restore all paving, sidewalk, driveway or surface of any street or alley disturbed, in a good condition as before the disturbance. If Company fails to make restoration as required, City shall cause the repairs to be made at the expense of Company.

(3) Relocation. City may require Company to change the location of any facility within the public right of way when the public convenience requires such change or removal and the expense thereof shall be paid by Company. City shall give Company reasonable notice of any changes required and Company shall have a reasonable time within which to make the requested change. If Company refuses to make the change requested by City or does not make the change within a reasonable time after the request of City, City may make the change and collect the cost of making said change from Company.

(4) Placement of Facilities. Company shall not place its facilities where they will interfere with any existing gas, electric or telephone fixtures or sewer or water facility. All facilities placed in the City street shall be placed as City directs.

Section 9: Notice of Intent to Sell.

Company shall not enter into any binding agreement to sell, assign, dispose of or transfer in any manner whatsoever any interest in this franchise, nor transfer, permit transfer of controlling interest in the Company, without first providing to the City sixty (60) days written notice of Company's intent to sell.

Section 10: Transfer of Franchise.

Company shall not sell, assign, dispose of or transfer in any manner whatsoever any interest in this franchise or in the technical facilities used with this franchise, nor transfer or permit transfer of controlling interest in Company without prior written approval of Council. Such approval shall be based upon the following criteria: Company shall be required to demonstrate to the satisfaction of the Council that Company's proposed purchaser, assignee or transferee has such financial and managerial resources are sufficient to maintain the then current quality of service and to comply fully with the terms of this franchise prior to the Council granting such approval. Such approval, based upon the above criteria, shall not be reasonably withheld by the Council. If the PUC approves the transfer, the transfer shall be presumed to be reasonable.

Section 11: City Right in Franchise.

City shall have the right to inspect all construction or installation of Company facilities, subject to the provisions of this ordinance and to make such inspections as it shall find necessary to ensure compliance with governing laws, rules and regulations.

Section 12: No Franchise Fee.

City shall not charge a franchise fee for Company's service unless City's water utility pays a comparable fee and the fee is approved by the P.U.C.

Section 13: Rate and Service Regulation.

City shall not regulate Company's rates so long as Company's rates are regulated by the Oregon Public Utility Commission or comparable governmental entity.

Section 14: Company Records and Reports.

Company shall keep accurate books of account at an office within the State of Oregon throughout the term of this franchise. Company shall produce its books of account for inspection by City at any time during normal business hours, after reasonable notice by City, and City may audit Company's books from time to time. City may require periodic reports from Company relating to its operations and revenue within City. Prior to requesting periodic reports, City shall first review the annual report submitted by Company to the P.U.C.

Section 15: System Data.

Company shall maintain, at a local office, current maps and other operational data relating to its facilities and system operations in the City of Bend. City may inspect these maps and data at any time during normal business hours.

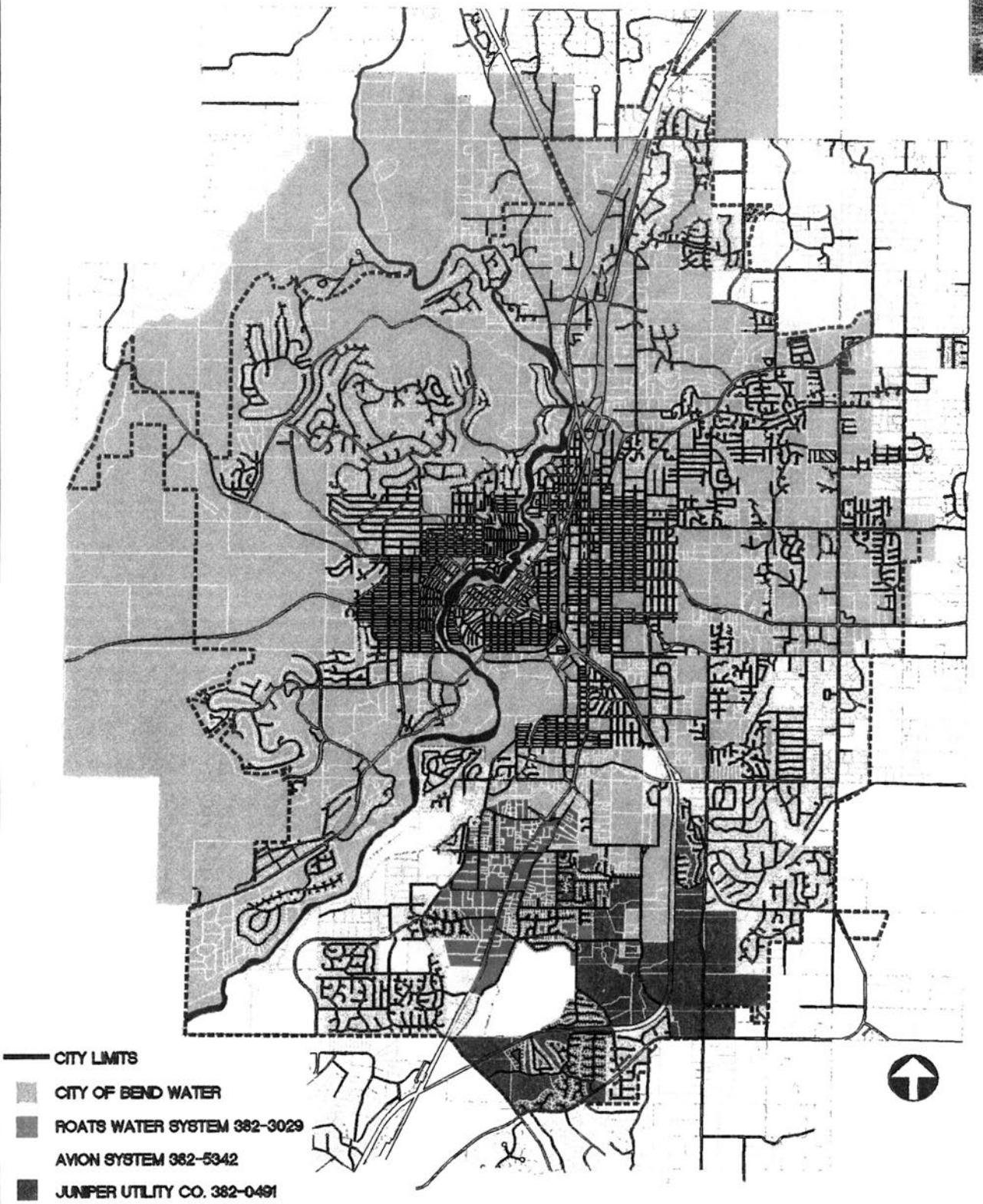
Section 16: Enforcement of Franchise.

City and Company shall have all remedies provided by law, including termination of this franchise, to enforce the terms and conditions of this franchise. Failure to enforce any provision of this ordinance shall not be construed as a waiver of a breach of any other term, condition or obligation of this ordinance.

Section 17: Franchise Term.

This franchise is granted for a term of 20 years beginning with the acceptance of this franchise by Company.

CITY OF BEND WATER SERVICE PROVIDERS



ADOPTED BY CITY COUNCIL ON 06/07/2000

Section 18: Acceptance of Franchise.

Within 30 days from the effective date of this ordinance, Company shall file with the City Recorder a written, unconditional acceptance of this franchise and all of its terms and conditions. If Company fails to do so, this ordinance shall be void and of no effect whatsoever.

Section 19: Franchise a Contract.

City and Company intend that this franchise shall constitute a contractual obligation between City and Company with respect to Company's service and facilities outside of City and within the Urban Growth Boundary. The parties contemplate that the City's corporate limits will expand through annexation within the Urban Growth Boundary throughout the term of this franchise through City's annexation of properties within the Urban Growth Boundary. The parties intend that the terms and conditions of this franchise shall apply to Company's activities outside the current City limits, but within the Urban Growth Boundary, as a contractual obligation so that as properties served by Company are annexed there will not be any significant difference in facilities or service standards.

Section 20: Constitutionality.

If any section, subsection, clause or portion of this ordinance is for any reason held invalid or is rendered unconstitutional by a court of competent jurisdiction, such portion shall be deemed a separate, distinct, and independent provision and such holding shall not affect the constitutionality of the remaining portion hereof. If for any reason the franchise fee is invalidated or amended by the act of any court or governmental agency, then the highest reasonable franchise fee allowed by law shall be the franchise fee allowed by this franchise.

Read for the first time this 17th day of May, 2000.

Read for the second time this 7th day of June, 2000.

Placed upon its passage this 7th day of June, 2000.

YES: 7 NO: 0

Authenticated by the Mayor this 7th day of June, 2000.

Jim Young

Mayor Jim Young

ATTEST:

Patricia S. Stell

Patricia Stell
City Recorder

(Text that is ~~struck through~~ is deleted;
text that is underlined is added.)

ORDINANCE NO. NS - 1748

AN ORDINANCE AMENDING ORDINANCE NO. NS 1514 GRANTING AVION WATER COMPANY A FRANCHISE TO PROVIDE WATER SERVICE WITHIN THE CITY OF BEND.

Whereas: Avion Water Company ("Company") has an existing franchise to provide water service in the City of Bend ("City") under Ordinance No. NS 1514; and

Whereas: The City annexed a significant area of land served by Company's water system, effective July 1, 1999; and

Whereas: The City and Company wish to update Company's franchise;

THE CITY OF BEND DOES ORDAIN AS FOLLOWS:

Ordinance No. 1514 is amended as follows:

SECTION 1: SHORT TITLE

This ordinance shall be known as the "Avion Water Service Franchise." The purpose of this ordinance is to promote and ensure the efficient allocation, regulation and use of domestic water and its provision to Bend residents and to avoid duplication of facilities, capital expenditure and other related resources.

SECTION 2: DEFINITIONS.

For the purpose of this ordinance, the following terms shall have the meaning provided below:

(1) "City" is the City of Bend, Oregon.

(2) "Company" is Avion Water Company, the grantee of the rights under this franchise, and its successors or assigns.

(3) ~~"Commission"~~ "Council" is the City ~~Commission~~ Council of the City of Bend.

(4) "Person" means any person, firm, partnership, association, corporation, company or organization of any kind.

(5) "Facilities" shall mean all real property, fixtures and equipment used by Company in the provision of water services throughout its system, whether located inside or outside of City, and includes, but is not limited to, main transmission lines, distribution systems and all other things used in the provision of water services by Company.

(6) "Urban Growth Boundary" shall mean those properties within City's present city limits and the Urban Growth Boundary as they now exist and as they may change from time to time in the future.

SECTION 3: GRANT OF AUTHORITY.

City grants to ~~Avion Water~~ Company the right and privilege to construct, erect, operate and maintain its facilities, in, upon, along, across, above, over and under the streets, alleys, and public ways now laid out or dedicated, and all extensions thereof, and additions thereto, for the provision of water services in City. This franchise is non-exclusive ~~and~~ in that the City reserves the right to operate a water system within the public ways and to grant a similar use of streets, alleys and public ways to another person. The City will not serve new customers within the Company's Water Service Area, unless the Company will not serve the customer(s) or the utility is not providing service that meets the standards of a public water utility. The City will not provide service to new customers within the Company's water service area without first providing the Company ten days written notice. This notice shall not be required in the case of an emergency.

SECTION 4: COMPLIANCE WITH LAWS, RULES AND REGULATIONS.

At all times during the term of this franchise, Company shall comply with all applicable laws, rules and regulations of the United States of America, the State of Oregon, and the City of Bend; including ~~all~~ appropriate agencies and subdivisions thereof. Company shall be subject to the lawful exercise of the police power of City and to such reasonable regulations as City may from time to time hereafter adopt. Company shall have 30 days after written notice to remedy any non-compliance. If any non-compliance cannot reasonably be remedied within 30 days, City shall not declare a default for non-compliance provided Company is taking reasonable steps to remedy the non-compliance as soon as is reasonably practicable. This 30 day notice requirement shall not apply in emergency-type situations where the preservation of public health, safety or welfare requires that immediate action be taken.

SECTION 5: COMPANY LIABILITY, INDEMNIFICATION OF CITY AND INSURANCE.

(1) Company shall at all times conduct its operations under this franchise, including installation, construction or maintenance of its facilities, in a safe and workmanlike manner so as not to present a danger to the public or City.

(2) Company shall pay, save harmless and indemnify City from any loss or claim against City on account of or in connection with any activity of Company in the construction, operation or maintenance of its facilities and services.

(3) This franchise shall not be effective until Company secures, and shall at all times be conditioned upon Company maintaining, a comprehensive liability insurance policy which shall contain the following provisions:

(a) Bodily injury policy limits of $500,000 for each person and $500,000 for each occurrence.

(b) Property damage policy limits of $500,000.

(c) An endorsement for completed operations coverage.

(d) A designation of City, its officers, agents and employees, as an additional insured for liability arising from or in connection with this franchise.

(e) An endorsement requiring 10 days' written notice to City prior to the cancellation of the insurance coverage.

(f) A certificate evidencing insurance as described in this ordinance shall be deposited with City.

(g) In the event that City's tort liability limits are raised by the Oregon Legislature to exceed the limits described in this Section, Company shall obtain and maintain insurance in the amount of City's tort liability limits.

SECTION 6: FACILITIES AND SERVICE STANDARDS.

For the term of this franchise, Company shall construct, operate and maintain its facilities

and provide services as follows:

(1) Company shall provide its customers with good quality water services; and supply potable water to its customers in compliance with all applicable laws, rules and regulations.

(2) Company shall construct and maintain those portions of its facilities that are located within the City of Bend and within the Urban Growth Boundary surrounding the City, as it exists and changes, in compliance with City and State standards for the provision of the service. Compliance with City standards shall include, but not be limited to:

(a) Standards for construction and installation of the water system, including the use of C-900 or ductile iron pipe and restoration of City streets.

(b) Provision of standard City fire flows throughout the water system, subject to verification by the Fire Department with notice. At least annually or upon request by the City, the Company will provide the City with a written report of individual hydrant conditions.

(c) City inspection and approval of system design and installation pursuant to generally accepted practices and standards in the water utility area.

(d) Compliance with City construction standards shall be required only for facilities which are constructed or installed after the commencement of this franchise.

(3) Company shall maintain and improve its facilities according to generally accepted practices and standards in the regional water utility industry.

(4) Company's service to properties within the City ~~and the urban growth boundary~~ shall be confined to the ~~following~~ properties shown on the map entitled "Water Service Area Exhibit ~~(4/91)~~ (_____)" which is marked EXHIBIT ~~M~~ A, attached hereto and incorporated by reference herein~~:~~. Company shall not serve any other properties within the City.

~~(a) all properties that lie outside of the City's service area shown on Exhibit M. The City's service area includes the areas surrounded by the turquoise blue line and properties which are colored turquoise blue; and~~

~~(b) that portion of the Wood River Village subdivision that is surrounded by a yellow line on Exhibit M, excluding those areas that are colored turquoise blue; and~~

~~(c) that area on Exhibit M surrounded by a pink line and marked with a pink question mark.~~

(5) Unless prohibited by law or the Oregon Public Utilities Commission in cases where City provides sewer services to a Company customer, Company agrees to terminate the service of Company's customer, at the request of City, if the customer becomes delinquent in the payment of the customer's sewer service bill.

SECTION 7: COMPANY RULES.

Company shall have authority to promulgate such reasonable rules and regulations governing the conduct of its business as shall be reasonably necessary to enable Company to exercise its rights and perform its obligations under this franchise, and to assure uninterrupted service to its customers pursuant to Company's rules and regulations. Company rules and regulations shall be subject to the provisions of this ordinance and any other governmental regulations. A copy of said rules and all amendments thereto shall be filed with the Office of City Manager.

SECTION 8: CONDITIONS ON STREET OCCUPANCY.

Company agrees to comply with the following conditions:

(1) USE. All facilities installed by Company within the Urban Growth Boundary after the date of this ordinance shall be so located as to cause minimum interference with the proper use of streets, alleys and other public ways and places, and to cause minimum interference with the rights or reasonable convenience of property owners who adjoin any of the streets, alleys or other public ways or places. Company shall obtain street cut permits for all street cuts and shall comply with the provisions of City's street cut ordinance.

(2) RESTORATION. In case of any disturbance of pavement, sidewalk, driveway or other surfacing by Company, Company shall, at its own cost and expense and in a manner approved by City, replace and restore all paving, sidewalk, driveway or surface of any street or alley disturbed, in a good condition as before the disturbance. If Company fails to make restoration as required, City shall cause the repairs to be made at the expense of Company.

(3) RELOCATION. City may require Company to change the location of any facility within the public right of way when the public convenience requires such change or removal and the expense thereof shall be paid by Company. City shall give Company reasonable notice of any changes required and Company shall have a reasonable time within which to make the requested change. If Company refuses to make the change requested by City or does not make the change within a reasonable time after the request of City, City may make the change and collect the cost of making said change from Company.

(4) PLACEMENT OF FACILITIES. Company shall not place its facilities where they will interfere with any existing gas, electric or telephone fixtures or sewer or water facility. All facilities placed in the City street shall be placed as City directs.

SECTION 9: NOTICE OF INTENT TO SELL.

Company shall not enter into any binding agreement to sell, assign, dispose of or transfer in any manner whatsoever any interest in this franchise, nor transfer, permit transfer of controlling interest in the Company, without first providing to the City sixty (60) days written notice of Company's intent to sell.

SECTION ~~9~~ 10: TRANSFER OF FRANCHISE.

Company shall not sell, assign, dispose of or transfer in any manner whatsoever any interest in this franchise or in the technical facilities used with this franchise, nor transfer or permit transfer of controlling interest in Company without prior written approval of ~~Commission~~ Council. Such approval shall be based upon the following criteria: Company shall be required to demonstrate to the satisfaction of the ~~Commission~~ Council that Company's proposed purchaser, assignee or transferee has such financial and managerial resources are sufficient to maintain the then current quality of service and to comply fully with the terms of this franchise prior to the ~~Commission~~ Council granting such approval. Such approval, based upon the above criteria, shall not be reasonably withheld by the ~~Commission~~ Council. If the PUC approves the transfer, the transfer shall be presumed to be reasonable.

SECTION ~~10~~ 11: CITY RIGHT IN FRANCHISE.

~~(1) City supervision and Inspection.~~ City shall have the right to ~~supervise~~ inspect all construction or installation of Company facilities, subject to the provisions of this ordinance and to make such inspections as it shall find necessary to ensure compliance with governing laws, rules and regulations.

SECTION ~~11~~ 12: NO FRANCHISE FEE.

City shall not charge a franchise fee for Company's service unless City's water utility pays a comparable fee and the fee is approved by the P.U.C.

SECTION ~~12~~ 13: RATE AND SERVICE REGULATION.

City shall not regulate Company's rates so long as Company's rates are regulated by the Oregon Public Utility Commission or comparable governmental entity.

SECTION ~~13~~ 14: COMPANY RECORDS AND REPORTS.

Company shall keep accurate books of account at an office within the State of Oregon throughout the term of this franchise. Company shall produce its books of account for inspection by City at any time during normal business hours, after reasonable notice by City, and City may audit Company's books from time to time. City may require periodic reports from Company relating to its operations and revenue within City. Prior to requesting periodic reports, City shall first review the annual report submitted by Company to the P.U.C.

SECTION ~~14~~ 15: SYSTEM DATA.

Company shall maintain, at a local office, current maps and other operational data relating to its facilities and system operations in the City of Bend. City may inspect these maps and data at any time during normal business hours.

SECTION ~~15~~ 16: ENFORCEMENT OF FRANCHISE.

City and Company shall have all remedies provided by law, including termination of this franchise, to enforce the terms and conditions of this franchise. Failure to enforce any provision of this ordinance shall not be construed as a waiver of a breach of any other term, condition or obligation of this ordinance.

SECTION ~~16~~ 17: FRANCHISE TERM.

This franchise is granted for a term of 20 years beginning ~~June 15, 1990~~ with the acceptance of this franchise by Company.

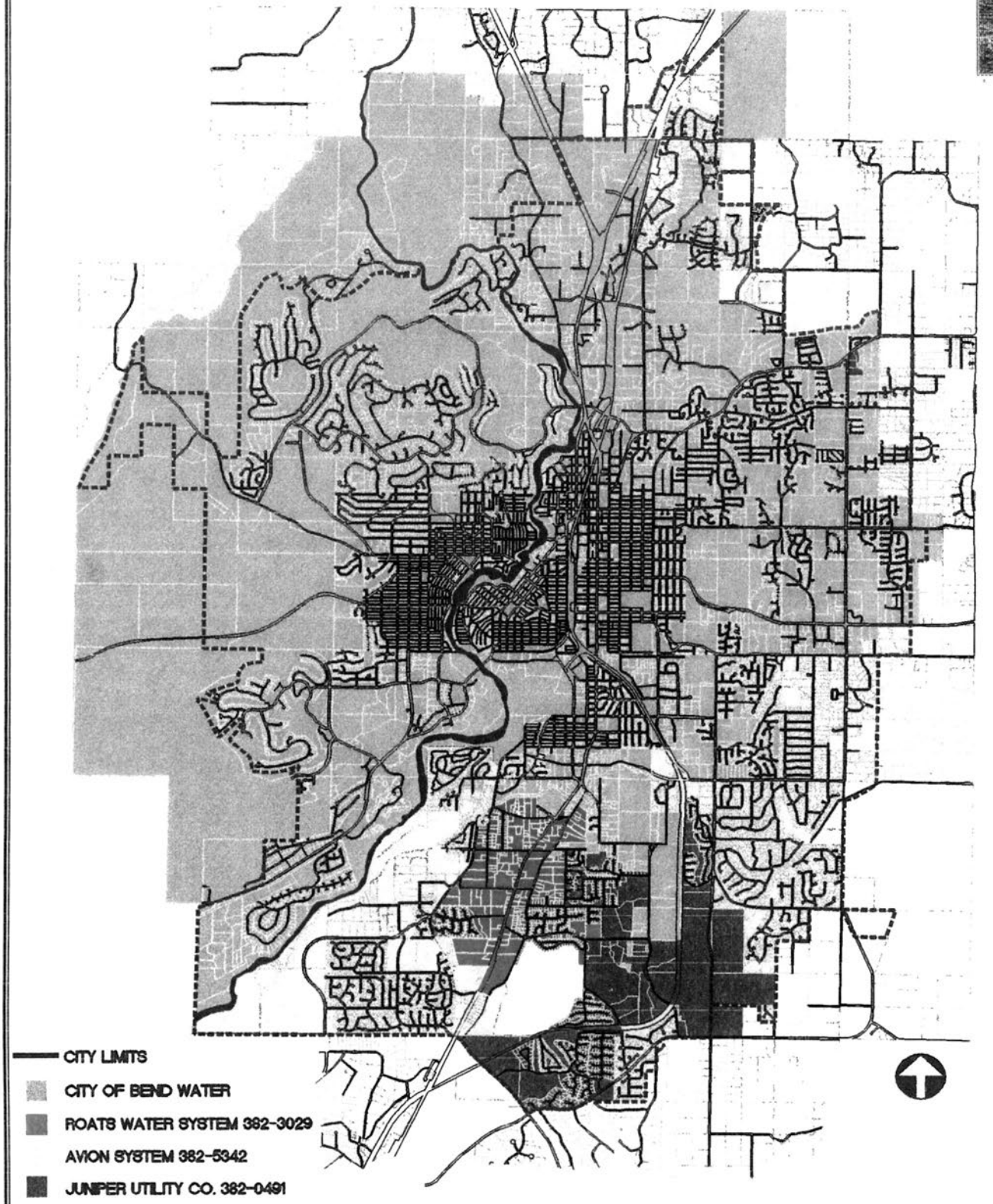
SECTION ~~17~~ 18: ACCEPTANCE OF FRANCHISE.

Within 30 days from the effective date of this ordinance, Company shall file with the City Recorder ~~Treasurer~~ a written, unconditional acceptance of this franchise and all of its terms and conditions. If Company fails to do so, this ordinance shall be void and of no effect whatsoever.

SECTION ~~18~~ 19: FRANCHISE A CONTRACT.

City and Company intend that this franchise shall constitute a contractual obligation between City and Company with respect to Company's service and facilities outside of City and within the Urban Growth Boundary. The parties contemplate that the City's corporate limits will expand through annexation within the Urban Growth Boundary throughout the term of this franchise through City's annexation of properties within the Urban Growth Boundary. The parties intend that the terms and conditions of this franchise shall apply to Company's activities outside the current City limits, but within the Urban Growth Boundary, as a contractual obligation so that as properties served by Company are annexed there will not be any significant difference in facilities or service standards.

CITY OF BEND WATER SERVICE PROVIDERS



ADOPTED BY CITY COUNCIL ON 06/07/2000

SECTION ~~19~~ 20: CONSTITUTIONALITY.

If any section, subsection, clause or portion of this ordinance is for any reason held invalid or is rendered unconstitutional by ~~any~~ court of competent jurisdiction, such portion shall be deemed a separate, distinct, and independent provision and such holding shall not affect the constitutionality of the remaining portion hereof. If for any reason the franchise fee is invalidated or amended by the act of any court or governmental agency, then the highest reasonable franchise fee allowed by law shall be the franchise fee allowed by this franchise.

Read for the first time this 17th day of May, 2000.

Read for the second time this 7th day of June, 2000.

Placed upon its passage this 7th day of June, 2000.

YES: 7 NO: 0

Authenticated by the Mayor this 7th day of June, 2000.

Mayor Jim Young

ATTEST:

Patricia S. Stell

Patricia Stell
City Recorder

(Text that is ~~struck through~~ is deleted;
text that is underlined is added.)

ORDINANCE NO. NS-1749

AN ORDINANCE AMENDING ORDINANCE NO. NS 1465, EXTENDING THE TERM OF THE NON-EXCLUSIVE FRANCHISE TO BEND CABLE COMMUNICATIONS, LLC, AND PROVIDING FOR CITY CONNECTION TO AND USE OF BEND CABLE'S FIBER OPTIC NETWORK

Whereas: Bend Cable LLC, (Company) operates a cable television system pursuant to the terms of Ordinance No. NS 1465; and

Whereas: Company wishes to rebuild portions of its fiber optic and coaxial cable system to increase channel capacity, improve overall reliability and to develop a fiber optic Institutional Network (the "I-Network"); and

Whereas: Company agrees to allow the City of Bend ("City) to have use of the fiber optic I-Network on the terms set forth in this ordinance; and

Whereas: Company's current franchise expires on July 17, 2009, but Company needs an additional 10 year period in order to amortize the investment involved in rebuilding its system and constructing the I-Network without putting undue pressure on cable television rates;

THE CITY OF BEND DOES ORDAIN AS FOLLOWS:

Section 1. Section 12 of Ordinance No. NS 1465 is amended by adding a new sub-section as follows:

Section 12. City Rights in Franchise.

. . .

(4) CITY CONNECTION TO INSTITUTIONAL NETWORK.
In addition to City's other rights in this franchise, City shall have the right to connect to Company's fiber optic Institutional Network (the "I-Network") on the following terms:

(a) Company shall allow the City the exclusive, unlimited use of two strands of fiber optic cable in the I-Network at no cost to City during the term of this franchise;

(b) Company shall connect the buildings listed on "Exhibit A" of this ordinance to the I-Network;

(c) City shall reimburse Company, on a one-time basis, Company's actual cost of extending the fiber optic cable to the buildings on Exhibit A utilizing the least expensive connection route between Company's system and the buildings; and

(d) City shall reimburse Company for any actual cost to Company in acquiring terminal connection equipment to connect City's buildings to Company's system. City may, at its sole option, acquire terminal connection equipment from a source other than company; and

(e) During the term of this franchise, City shall have the right, at its sole option, to connect additional City buildings to the I-Network on the terms set forth in this section; and

(f) City shall not be responsible for any cost of extension of Company's system to the extent that such costs are part of company's overall system rebuild, not specifically required for connecting City buildings to the I-Network; and

(g) Nothing in this subsection shall affect Company's obligation to pay franchise fees to the City under Section 13 of Ordinance No. NS 1465.

Section 2. Section 23 of Ordinance No. NS 1465 is amended as follows:

Section 23. Franchise Term. This franchise shall remain in effect until ~~is granted for a term of ten (10) years beginning at the expiration of Ordinance No. NS-806, as amended, on~~ July 16th ~~1989~~ 2019. ~~Company shall have an option to renew this franchise ordinance for another ten (10) years upon the following terms and conditions: Company shall not be in default in its performance of any of the terms or conditions of this franchise, and shall be providing acceptable system services as determined by the system review standards of Section 14 of this franchise.~~

Section 3. ACCEPTANCE OF THIS AMENDMENT TO ORDINANCE NO. NS 1465. Within 30 days of the effective date of this ordinance, Company shall file with the City Recorder a written, unconditional acceptance of this amendment to Ordinance No. NS 1465 and all of its terms and conditions. If Company fails to do so, then this ordinance shall be void and of no effect whatsoever.

Read for the first time the 17th day of May, 2000.

Read for the second time the 7th day of June, 2000.

Placed upon its passage the 7th day of June, 2000.

YES: 7 NO: 0 ABSTAIN:

Authenticated by the Mayor the 7th day of June, 2000.

Mayor Jim Young

Attest:

Patricia Stell
City Recorder

ORDINANCE NO. NS-1750

AN ORDINANCE AMENDING THE CITY OF BEND ZONING ORDINANCE NO. NS-1178, BY CHANGING THE ZONE OF A PARCEL OF LAND FROM RS, URBAN STANDARD DENSITY RESIDENTIALTO RH, URBAN HIGH DENSITY RESIDENTIAL.

THE CITY OF BEND ORDAINS AS FOLLOWS:

Section 1. The Bend City Council has held a public hearing, considered the Hearings Officer's findings and record, and has found that there is a public need and benefit for the proposed change. The Bend City Council adopts the Findings and Recommendation of the Hearings Officer dated June 12, 2000, file number PZ-00-114.

Section 2. Section 7(1) of Ordinance NS-1178 and the Zoning Map of the City of Bend are amended by changing the designation of the property described below from Urban Standard Density Residential (RS) to Urban High Density Residential (RH).

Lot 26 of Virginia Park
Deschutes County, Oregon

Read for the first time the 19th day of July, 2000.

Read for the second time the 2nd day of August, 2000.

Placed upon its passage the 2nd day of August, 2000.

YES: 5 NO: 0

Authenticated by the Mayor the 2nd day of August, 2000.

Jim Young

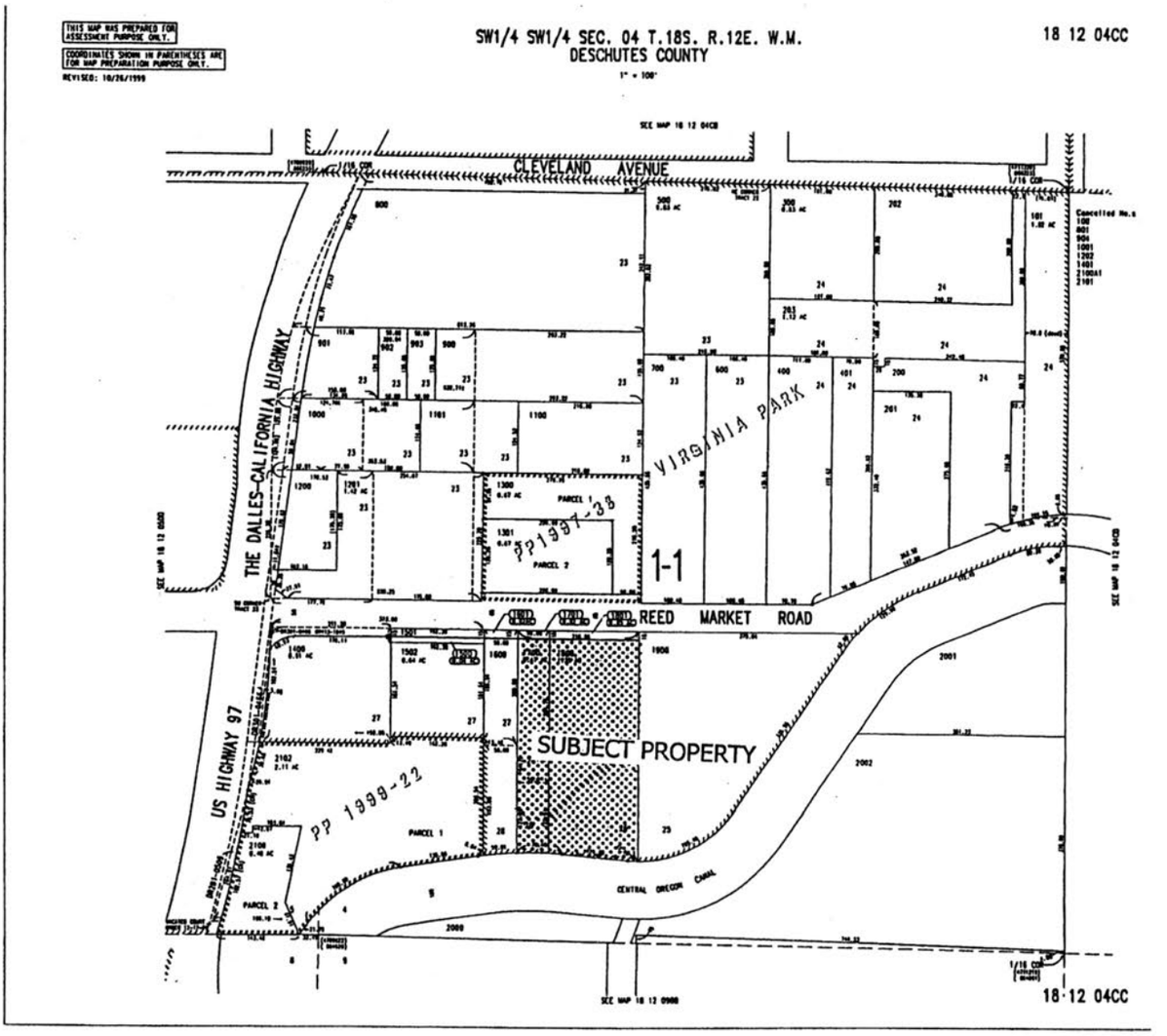
Jim Young, Mayor

ATTEST:

Patricia S. Stell

Patricia Stell, City of Bend Recorder

EXHIBIT A
Ordinance No. NS-1750



ORDINANCE NO. NS-1751

AN ORDINANCE AMENDING THE CITY OF BEND ZONING ORDINANCE NO. NS-1178, BY CHANGING THE ZONE OF A PARCEL OF LAND FROM RL, URBAN LOW DENSITY RESIDENTIALTO RS, URBAN STANDARD DENSITY RESIDENTIAL.

THE CITY OF BEND ORDAINS AS FOLLOWS:

Section 1. The Bend City Council has held a public hearing, considered the Hearings Officer's findings and record, and has found that there is a public need and benefit for the proposed change. The Bend City Council adopts the Findings and Recommendation of the Hearings Officer dated June 12, 2000, file number PZ-00-107.

Section 2. Section 7(1) of Ordinance NS-1178 and the Zoning Map of the City of Bend are amended by changing the designation of the property described in the attached "Exhibit A" from Urban Low Density Residential (RL) to Urban Standard Density Residential (RS).

Read for the first time the 19th day of July, 2000.

Read for the second time the 2nd day of August, 2000.

Placed upon its passage the 2nd day of August, 2000.

YES: 5 NO: 0

Authenticated by the Mayor the 2nd day of August, 2000.

Jim Young, Mayor

ATTEST:

Patricia Stell, City of Bend Recorder

PARCEL 1:

A parcel of land located in the Northeast One-quarter (NE1/4) of Section Sixteen (16), Township Seventeen (17) South, Range Twelve (12), East of the Willamette Meridian, Deschutes County, Oregon, described as follows:

Commencing at the Northeast corner of said Section 16; thence South 19°37'07" West, 2070.95 feet; thence North 02°07'35" West, 220.15 feet; thence West, 905.26 feet to the Northwest corner of that tract of land described in Volume 244, Page 991 and 992, recorded September 6, 1991, Deschutes County Records, and the True Point of Beginning; thence South 10°18'30" East, 97.03 feet; thence South 73°22'30" East, 210.96 feet; thence 50.00 feet along the arc of a 145.00 foot radius curve right, the chord of which bears North 40°38'55" East, 49.75 feet; thence North 39°28'23" West, 152.96 feet; thence West 154.68 feet to the True Point of Beginning.

PARCEL 2:

A tract of land located in Section Sixteen (16), Township Seventeen (17) South, Range Twelve (12), East of the Willamette Meridian, Deschutes County, Oregon, more particularly described as follows:

Beginning at a point from which the Northeast corner of said Section 16 bears North 19°37'07" East, 2070.95 feet; thence North 02°07'35" West, 220.15 feet; thence West, 905.26 feet; thence South 10°18'30" East, 223.61 feet; thence East, 873.41 feet to the Point of Beginning.

EXCEPTING THEREFROM the Easterly 30 feet thereof within Boyd Acres Road.

EXCEPTING THEREFROM a parcel of land located in the Northeast One-quarter (NE1/4) of Section 16, Township 17 South, Range 12, East of the Willamette Meridian, in the City of Bend, Deschutes County, Oregon, being more particularly described as follows:

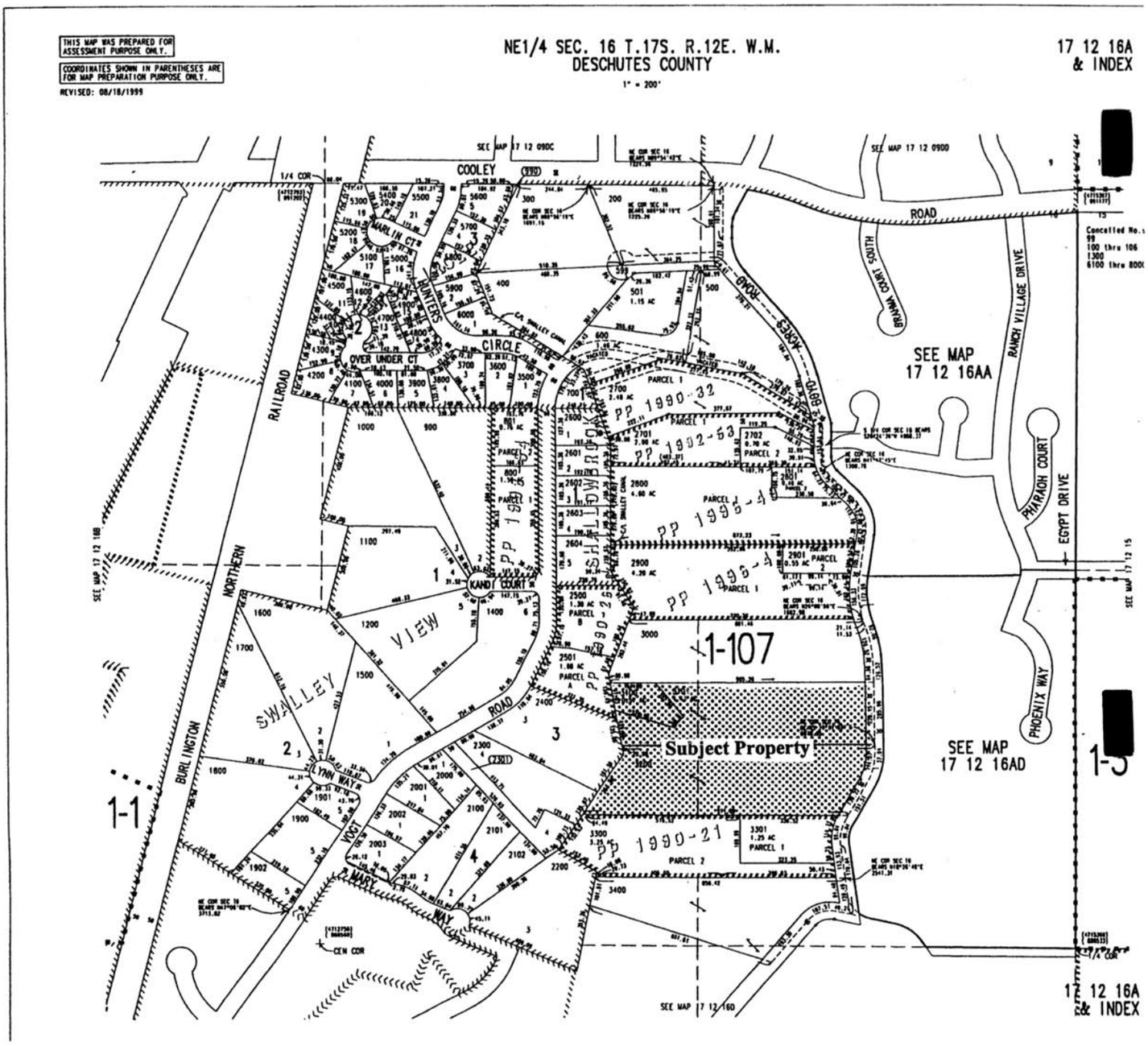
Commencing at the Northeast corner of said Section 16; thence South 19°37'07" West, 2070.95 feet; thence North 02°07'35" West, 220.15 feet; thence West, 905.26 feet to the Northwest corner of that tract of land described in Volume 244, Page 991 and 992, recorded September 6, 1991, Deschutes County Records, and the True Point of Beginning; thence South 10°18'30" East, 97.03 feet; thence South 73°22'30" East, 210.96 feet; thence 50.00 feet along the arc of a 145.00 foot radius curve right, the chord of which bears North 40°38'55" East, 49.75 feet; thence North 39°28'23" West, 152.96 feet; thence West, 154.68 feet to the True Point of Beginning and terminus of this description.

PARCEL 3:

A tract of land located in Section Sixteen (16), Township Seventeen (17) South, Range Twelve (12), East of the Willamette Meridian, Deschutes County, Oregon, more particularly described as follows:

Beginning at a point whence the Northeast corner of said Section 16 bears North 19°37'07" East, 2070.95 feet; thence West, 873.41 feet; thence South 10°18'30" East, 29.90 feet; thence South 33°57'30" West, 253.89 feet; thence East, 911.89 feet; thence North 30°33'10" East, 139.22 feet; thence around a 200 foot radius curve left, 114.07 feet; thence North 02°07'35" West, 11.04 feet to the point of beginning.

Ordinance No. NS-1751
EXHIBIT "A"
Page 2 of 2



ORDINANCE NO. NS-1752

AN ORDINANCE RATIFYING INTERGOVERNMENTAL AGREEMENT CREATING CENTRAL OREGON CITIES ORGANIZATION AS INTERGOVERNMENTAL ENTITY

WHEREAS, ORS 190.085 requires local governments to enact ordinances ratifying the creation of intergovernmental entities through intergovernmental agreements prior to the effective date of such agreements; and

WHEREAS, the Cities of Sisters, Redmond Prineville, Metolius, Madras, Culver, and Bend wish to establish an intergovernmental entity called the Central Oregon Cities Organization (COCO) to effectively and efficiently promote the common interests of the cities of Central Oregon; and

WHEREAS, the parties have agreed that COCO shall have the power to enter into contracts, provide agreed upon representation of the parties to this agreement before the state legislature and the US Congress, and to provide administrative and support services necessary in furtherance of these objectives

THE CITY OF BEND DOES ORDAIN AS FOLLOWS:

Section 1.

Declaration of Intent, Public Purpose and Powers of Intergovernmental Agency. It is the intent of the City of Bend to create, by this ordinance, an intergovernmental entity having the public purpose of effectively and efficiently promoting the common interests of the cities of Central Oregon; and having the power to enter into contracts; provide agreed upon representation of the parties to this agreement before the state legislature and the US Congress; and provide administrative and support services necessary in furtherance of these objectives, as set forth in the Intergovernmental Cooperative Agreement Establishing the Central Oregon Cities Organization ("Agreement"), a copy of which is Attached as Exhibit A.

Section 2.

Ratification of Intergovernmental Agreement Creating Central Oregon Cities Organization as Intergovernmental Entity. Pursuant to ORS 190.085, the City of Bend hereby ratifies the Agreement.

Read for the first time the 2nd day of August, 2000.

Read for the second time the 16th day of August, 2000.

Placed upon its passage the 16th day of August, 2000.

YES: 7 NO: 0 ABSTAIN: 0

Authenticated by the Mayor the 16th day of August, 2000.

Jim Young, Mayor

Attest:

Patricia Stell, City Recorder

Ordinance NS-1752
Exhibit A

INTERGOVERNMENTAL COOPERATIVE AGREEMENT ESTABLISHING THE CENTRAL OREGON CITIES ORGANIZATION

This agreement is between the City of Sisters, the City of Redmond, the City of Prineville, the City of Metolius, the City of Madras, the City of Culver, and the City of Bend ("member cities"). The member cities agree as follows:

1. Introduction

ORS 190.010 allows the formation of intergovernmental entities. Pursuant to this statute, an intergovernmental entity is hereby created by this agreement, to be called the Central Oregon Cities Organization (COCO). This agreement shall be governed and construed in accordance with the laws of the State of Oregon.

2. Purpose

The purpose of this agreement is to create an organization to effectively and efficiently promote the common interests of the cites of Central Oregon.

3. Board of Directors

3.1 The Board of Directors of COCO (Board) shall consist of 7 members, one of which shall be appointed by each member city. At its first meeting of each calendar year, the Board shall appoint one of its members to serve as chair for that year. The Board shall be responsible for the management, supervision, policy and direction of all programs, functions and activities established and operated under COCO.

3.2 The term of each member of the Board shall be 1 year. Each member of the Board shall hold office until the city he or she represents appoints a successor.

3.3 Any director who has 3 consecutively unexcused absences from Board meetings may be removed by the City appointing such member.

3.4 A vacancy on the Board shall be filled by the City that appointed the member who created the vacancy.

3.5 The first meeting of the Board shall be on the third Monday following the effective date of approval of this agreement by the seventh city to so approve. Thereafter, regular meetings of the Board shall be held at such time and place as shall be determined by the Board. Special meetings of the Board may be called by the Chair. Notice of special meetings may be given telephonically or by other means of electronic communication.

3.6 The concurrence of 5 Board members is necessary to decide a matter before the Board. The Board may meet telephonically or by other means of electronic communication.

4. Bylaws

The Board shall adopt bylaws for appointment of officers and to establish procedures for management of COCO.

5. Funds

The Board shall, from time to time, recommend an amount of money that should be contributed by each member city to fund the functions and activities of COCO. The governing body of each member city shall, in its sole discretion, decide whether to appropriate such amount to fund such functions and activities.

6. No Joint and Several Liability

6.1 Member cities are *not* jointly and severally liable with other member cities for any tort (as defined by ORS 30.260(8)) committed by an elected or appointed official, employee or agent of such city acting in connection with this agreement.

6.2 Nothing in this agreement shall be construed to increase tort liability that any member city would otherwise have under Oregon Law.

6.3 Obligations of COCO arising from contract or quasi contract shall be the obligations of COCO alone, and member cities are *not* jointly and severally liable for such obligations, unless one or more of the member cities agree, in writing, to individually guarantee performance of a specific obligation.

7. Employment Liabilities

Each member city shall be responsible for any and all claims arising from its respective employer/employee relationships. For the purpose of this agreement, elected and appointed public officials are included in the employer/employee relationship. Examples of the employer/employee relationship include selection, termination, discipline, benefits and equal employment opportunity issues. Each member city shall provide its own Workers' Compensation coverage as provided by law, and each member city shall indemnify and defend other member cities for any claim(s) arising from the employer/employee relationship. (Member cities do not, however, agree to indemnify or defend other member cities for claims arising from alleged torts, contracts or quasi contracts, as set forth in Section 6 of this agreement.)

8. Duration, Termination and Withdrawal

8.1 This agreement shall be perpetual unless terminated by agreement of the member cities.

8.2 Any member city may withdraw at any time by act of its governing body by giving written notice to the other member cities.

9. Distribution of Assets on Termination or Withdrawal

9.1 Upon termination of this agreement, each remaining member city shall be entitled to reclaim any then existing non-monetary assets contributed by that city to COCO. In addition, upon termination of this agreement each remaining member city shall be entitled to reclaim monetary contributions from funds then in COCO's possession according to the percentage of all monetary contributions made by such member city, compared to other member cities, throughout the existence of COCO. (e.g., if a city contributes 10% of all funds ever contributed to COCO during COCO's existence, and COCO has $5,000 on hand at the time of termination, then such city shall be entitled to reclaim $500.)

9.2 A city that withdraws from this agreement shall be entitled to reclaim any then-existing non-monetary asset it contributed to COCO. In addition, a city that withdraws from this agreement shall be entitled to reclaim monetary contributions it made to COCO in the fiscal year in which the city withdraws according to the percentage of days then remaining in that fiscal year. (e.g., if a city contributes $3,650 to COCO in a fiscal year and then withdraws on the 100th day of the fiscal year, then such city shall be entitled to reclaim $2,650 at the time of withdrawal.)

10. This agreement embodies the entire agreement of the member cities. There are no promises, terms, conditions or obligations other than those contained herein. This agreement shall supercede all prior communications, representations or agreements, either written or oral, on the same subject between the parties.

Dated this __ day of _____, 2000
CITY OF BEND

Dated this __ day of _____, 2000
CITY OF CULVER

By:_____
Title:_____

Dated this __ day of _____, 2000
CITY OF MADRAS

By:_____
Title:_____

Dated this __ day of _____, 2000
CITY OF PRINEVILLE

By:_____
Title:_____

Dated this __ day of _____, 2000
CITY OF SISTERS

By:_____
Title:_____

By:_____
Title:_____

Dated this __ day of _____, 2000
CITY OF METOLIUS

By:_____
Title:_____

Dated this __ day of _____, 2000
CITY OF REDMOND

By:_____
Title:_____

ORDINANCE NS-1753

AN ORDINANCE ADOPTING THE LAVA RIDGE REFINEMENT PLAN AND AMENDING THE BEND AREA GENERAL PLAN

THE CITY OF BEND ORDAINS AS FOLLOWS:

Section 1. The Bend City Council has held a public hearing, considered the Planning Commission's recommendation and record, and has found that there is a public need and benefit for the proposed change. The Bend City Council hereby adopts the Lava Ridge Refinement Plan as an amendment to the Bend Area General Plan, attached as Exhibit "A" to this ordinance.

Section 2. To update the General Plan policies to be consistent with the adopted Lava Ridge Refinement Plan Policy #55 in Chapter 5 of the General Plan is deleted and replaced as follows:

~~55. Within the two study areas shown on Figures 22A and 22B of the Plan no quasi-judicial plan amendment or zone changes shall be allowed while the county is conducting the refinement plan study~~.

55. The Lava Ridge Refinement Plan is adopted as part of the Bend Area General Plan.

Section 3. To update the General Plan figures to be consistent with the adopted Lava Ridge Refinement Plan, Figure 22A in Chapter 5 of the General Plan is replaced by a new map, attached as Exhibit "B" to this ordinance, that shows the boundary and zoning for the Lava Ridge Refinement Plan area.

Section 4. The Bend Urban Area General Plan Map is hereby amended to show the boundary of the refinement plan area and to include a text reference to the Lava Ridge Refinement Plan.

Section 5. The Bend Urban Area General Plan Map is hereby amended by changing and adjusting land use designations as displayed in Figure 3 of the Lava Ridge Refinement Plan and attached as Exhibit "B" to this Ordinance.

Section 6. The Bend Urban Area Bicycle and Trail System Plan map is amended by removing the "Swalley Canal Trail" segment, running north and south through the area, and by removing the "Yeoman Sewer Line Trail" running between NE 18th Street and Boyd Acres Road.

Read for the first time the 16th day of August 2000.

Read for the second time the 6th day of September, 2000.

Placed upon its passage the 6th day of September, 2000.

YES: 6 NO: 0

Authenticated by the Mayor the 6th day of September, 2000.

Jim Young, Mayor

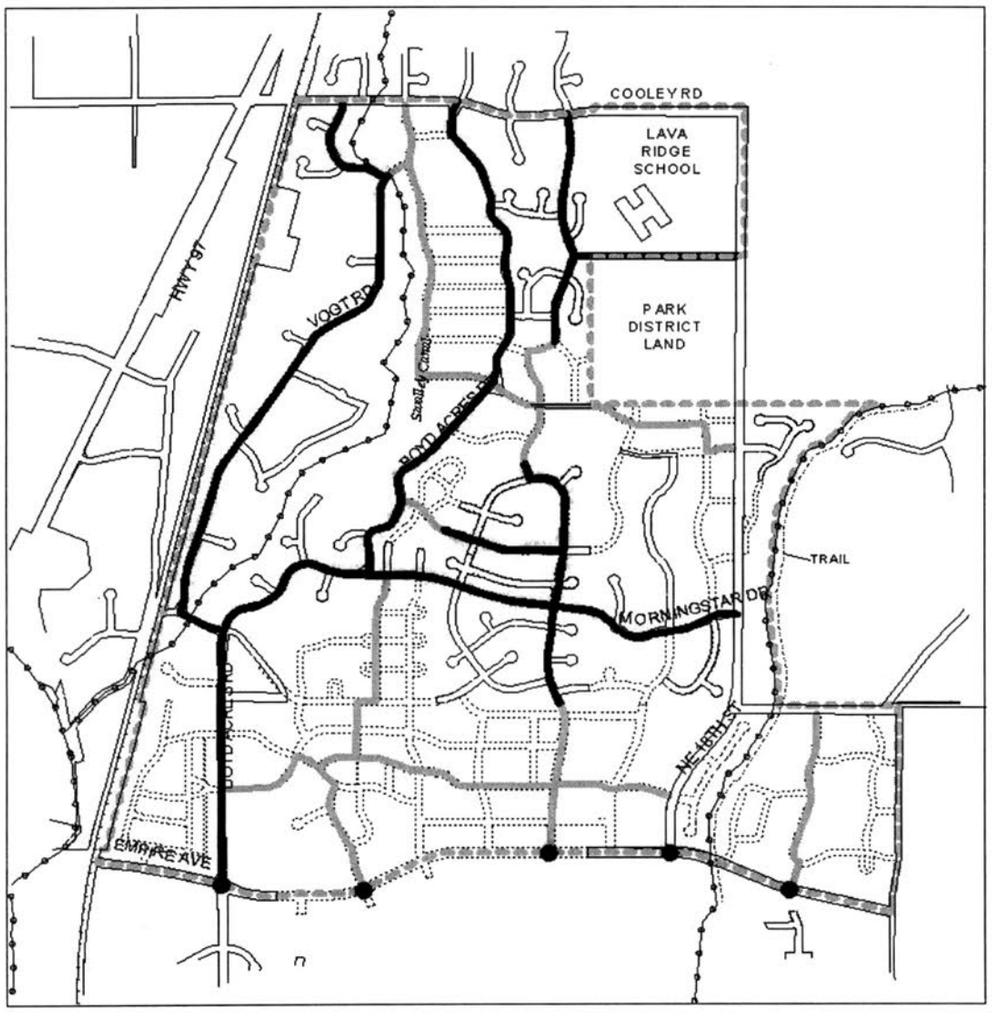
ATTEST:

Patricia Stell, City of Bend Recorder

Ordinance No. 1753
Exhibit A

LAVA RIDGE REFINEMENT PLAN

NOVEMBER 1999



DESCHUTES COUNTY
CITY OF BEND

Site and Context

Boundaries:
The area covered by the Lava Ridge Refinement Plan is approximately 700 acres of partially developed land on the Northeast edge of Bend. It is bounded on the north by Cooley Road, to the East by the Urban Growth Boundary, to the South by Empire Boulevard and to the west by the railroad.

Natural Resources:
Swalley Canal runs through the western quarter of the plan area while Pilot Butte Canal runs along the easternmost edge. Low shrubs and juniper trees with occasional prominent rock outcroppings characterize the area. There are views to the west of the Cascade Mountains.

Transportation:
The area is accessed primarily from the Empire Avenue exit from Highway 97 and is approximately 5 miles from the Downtown. Primary north/south traffic is carried through the middle of the plan area on Boyd Acres Road - a twisty two lane road with no on street parking or sidewalks - or on the newer NE 18th Street - an arterial street that runs up the eastern edge of the plan area. Primary east/west traffic is carried on Morning Star Drive that bisects the plan area or Cooley Road to the north. There is a general lack of street connectivity to distribute local or through traffic.

Land Use:
Existing uses are single family residential, some light industrial, and a few civic/religious uses. An elementary school is built in the Northeast corner of the Plan area on approximately 40 acres of land. Adjacent and to the south of the school is 40 acres of land owned by Bend Metro Park and Recreation District that will be developed in the future into a regional park.

Historically the building pattern has been single family houses on large parcels serviced by individual septic systems. More recently, subdivisions have been developing throughout the area, bringing with them sewer lines. Smaller lots (6000 S.F.) on cul-de-sacs have been the typical form of these newer developments. This has forced heavier traffic on the few through streets in the area - namely Morning Star Drive and Boyd Acres Road. In addition, due to access management, the newer developments are backing lots onto some of these streets which in turn promotes fenced off, unfriendly and dangerous streetscapes.

Potential new development is possible on large parcels of undeveloped land (40 acres plus) or in redeveloping and/or subdividing the older single-family parcels.

SITE AND CONTEXT

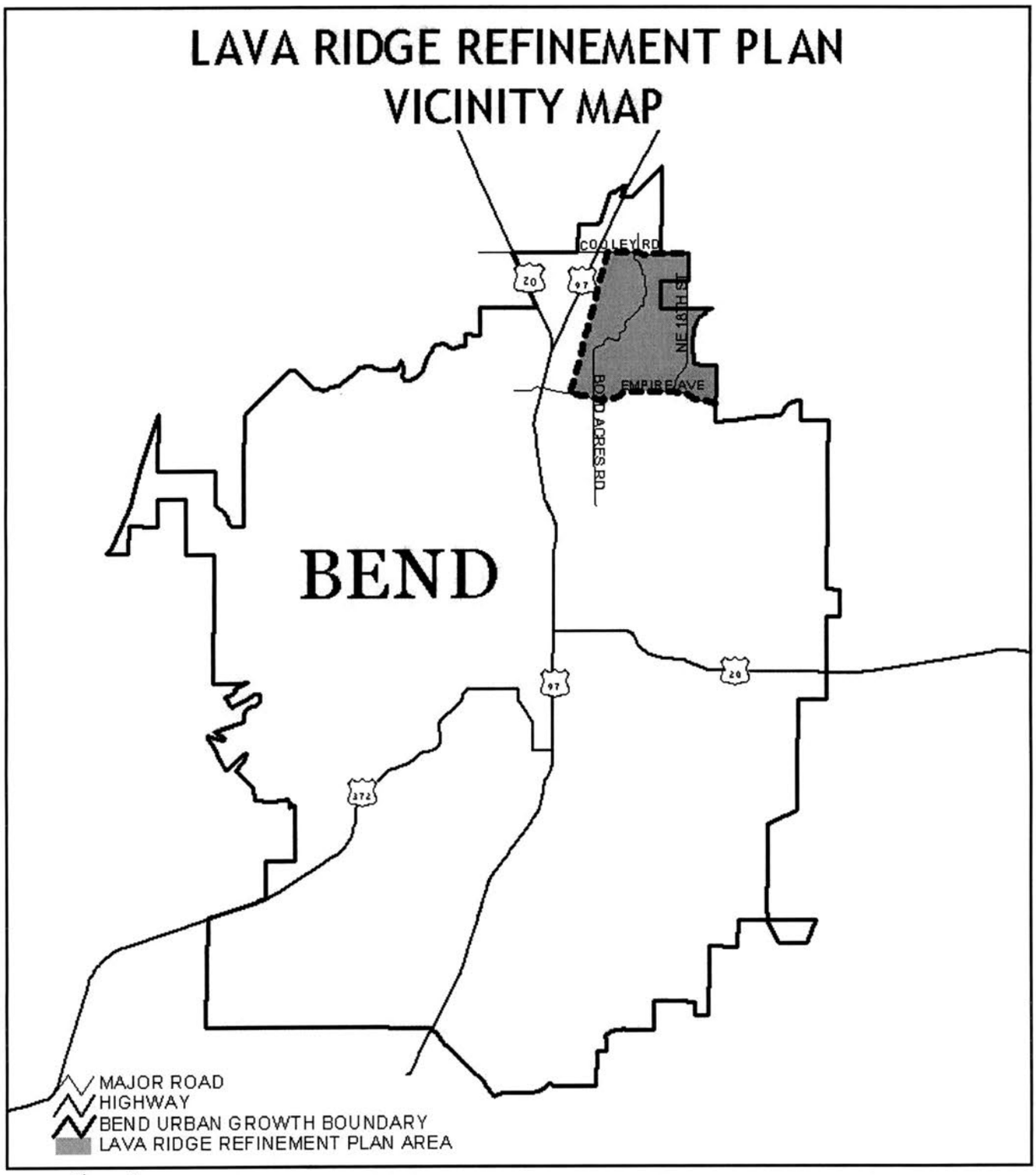


Figure 1

SITE AND CONTEXT

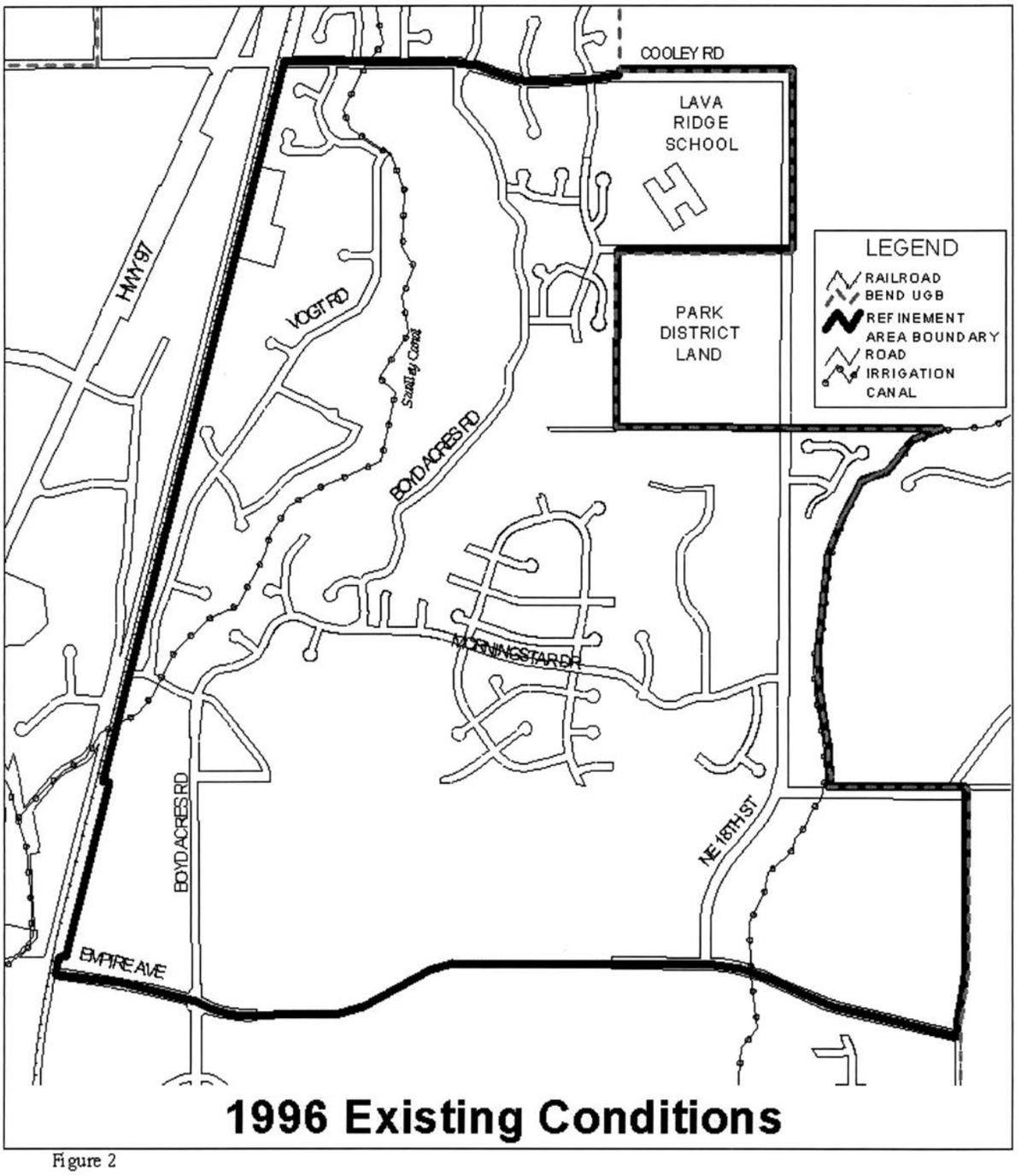


Figure 2

PLAN OBJECTIVES

The objectives of the refinement plan process are:

- *Identify and coordinate street and utility locations.*

- *Involve all of the property owners in the plan area and identified stakeholders in a collaborative process to draft the refinement plan.*

- *Develop a street plan that will allow individual property owners to develop independently and still create an interconnected street system and compatible uses.*

- *Designate neighborhood open space and provide a mechanism for construction and maintenance of designated parks.*

- *Determine density locations and ranges that will allow flexibility for individual property owners to respond to the market and still meet the housing needs identified in the Bend Area General Plan.*

- *Establish design standards for street, sidewalks and building location to create streetscapes that are safe and accessible for pedestrians.*

PLAN OVERVIEW

Goals:
The goal of the refinement plan is to ease the transition to urban density residential zoning in the Northeast area of Bend. The Lava Ridge area was selected because of recent and planned conversion of large suburban parcels to higher urban density development. In addition, there has been extensive controversy over the nature of recent development with the existing residents of the area. The community has expressed frustration with the type of development that is occurring: walled and fenced subdivisions, small lots with no open space, oversized streets, and high traffic speeds on some streets. Similarly, developers in the area have expressed frustration regarding citizen complaints and holdups to their developments. Both groups felt that lack of certainty has been the number one problem. It was agreed that if consensus could be reached on what type of development would be allowed the process would be much smoother.

The large number of undeveloped or underdeveloped properties between 5 and 40 acres are likely to be built up within the next 15 to 20 years if Bend continues to grow at the current rate.

PLAN OVERVIEW

A specific plan is necessary to allow property owners to develop at separate times while still creating a cohesive neighborhood.

Process:
The Refinement Plan process has included two intense public design workshops in the Lava Ridge area. The first workshop educated the participants in the concepts of traditional neighborhood design and developed a conceptual plan for the area. This workshop also achieved some consensus that urban density could be designed to create neighborhoods with a mix of housing types and lot sizes, open space, possible neighborhood commercial or mixed use centers, narrower streets and safeguards to make new development compatible with existing development. A report titled "Town Making Principles" was produced which demonstrates strategies for implementing the conceptual plan developed in the workshop.

A follow-up workshop was conducted to involve the public and stakeholders in resolving some of the issues in the conceptual plan including open space acquisition and management, street standards and density. The result has been this written and graphic Lava Ridge Refinement Plan.

Results:
The plan promotes the development of neighborhoods based on traditional planning principles. A network of connected streets, some narrower than the current standard, will help to reduce cut-through traffic while distributing local traffic more evenly. Neighborhood parks are provided, particularly in higher density areas. Neighborhood commercial at the edge of the neighborhood can reduce daily car trips while keeping the associated commercial traffic away from the residential areas.

LAND USE

The Lava Ridge Refinement Plan alters existing Land Use in the following manner:

- *Provides new General Plan land use designations and zoning.*
- *Limits further subdivision in the designated RL zone west of Swalley Canal and north of Morningstar Drive*
- *Rezones 122 acres of RL land to RS*
- *•Creates a Professional Office (PO) zone along the North side of Empire Avenue to buffer the residential areas from the industrial uses to the south of Empire. The PO zone shall be intended primarily for office use. Housing in the PO zone shall be limited to the upper floors of structures, above offices or uses otherwise permitted in the zone.*
- *Provides a band of RM zoning between the new PO zone and the existing RS zones to the north. The purpose is to provide a gradient of density and uses between Empire Boulevard and it's corresponding uses and traffic and the inner residential neighborhoods.*
- *Creates a flex zone on the southern portion of the property north of the Industrial zone north of Empire. While the exact form of the zone will be determined during the platting process, it will be no more than 7 acres in total area. The property may be platted as PO, RM or RS or a combination of these zones. The intent is to provide a buffer between the adjacent industrial zone and the single-family zone to the north.*
- *Provides up to 4 acres of Neighborhood Commercial at the corner of Empire Avenue and 18th Avenue.*
- Provides neighborhood parks in the Lava Ridge Refinement plan area. The parks are surrounded by streets on at least three sides to provide the greatest amount of public access and safety. The three parks within the Bend Metro Parks and Recreation District (BMPRD) Boundary are required. The required parks shall be developed in accordance with BMPRD standards under the provisions of District SDC ordinance. The other two parks are optional. Because of the varied terrain on the parcel east of the North Unit canal, the exact size and location of park number 1, shown on the Park & Pedestrian Access Ways Diagram (Figure 4), shall be determined with the platting process. The size of park number 1 shall be between two and five acres.
- Amends the zoning on the Lava Ridge School site from SR2.5 to Public Facility (PF).

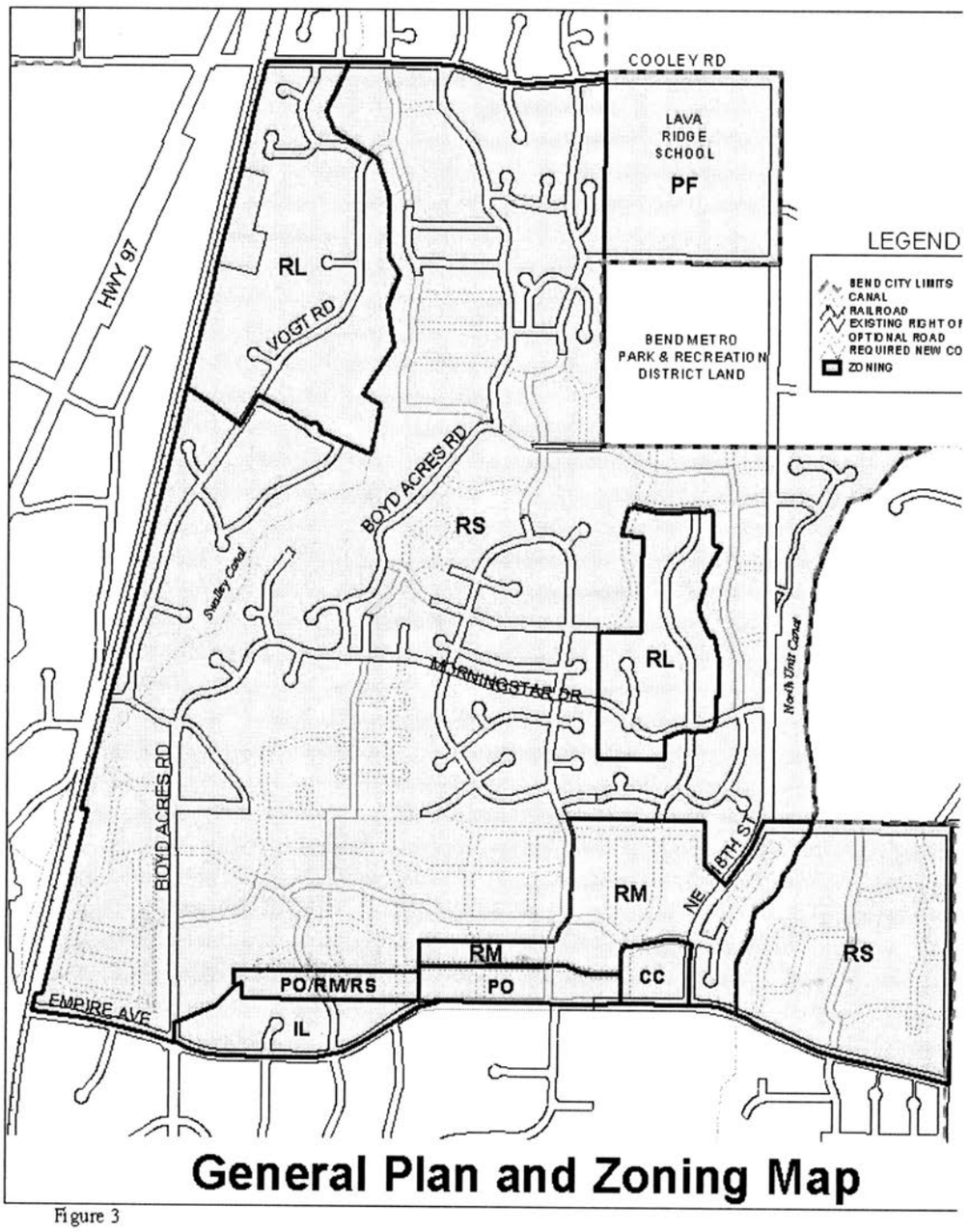


Figure 3

ORDINANCE NS-1753
EXHIBIT A

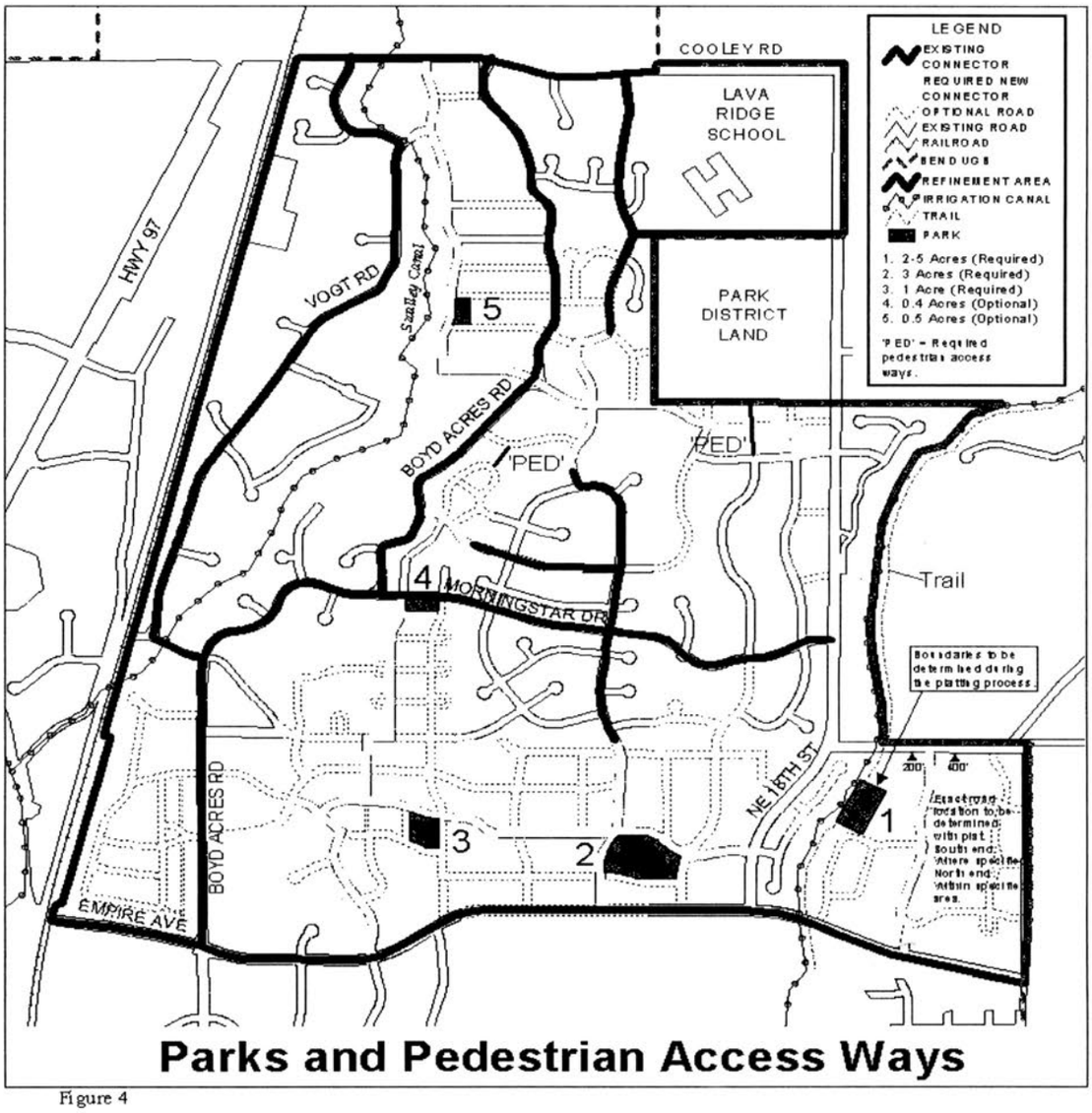


Figure 4

Ordinance No. 1753
Exhibit A *(Continued)*

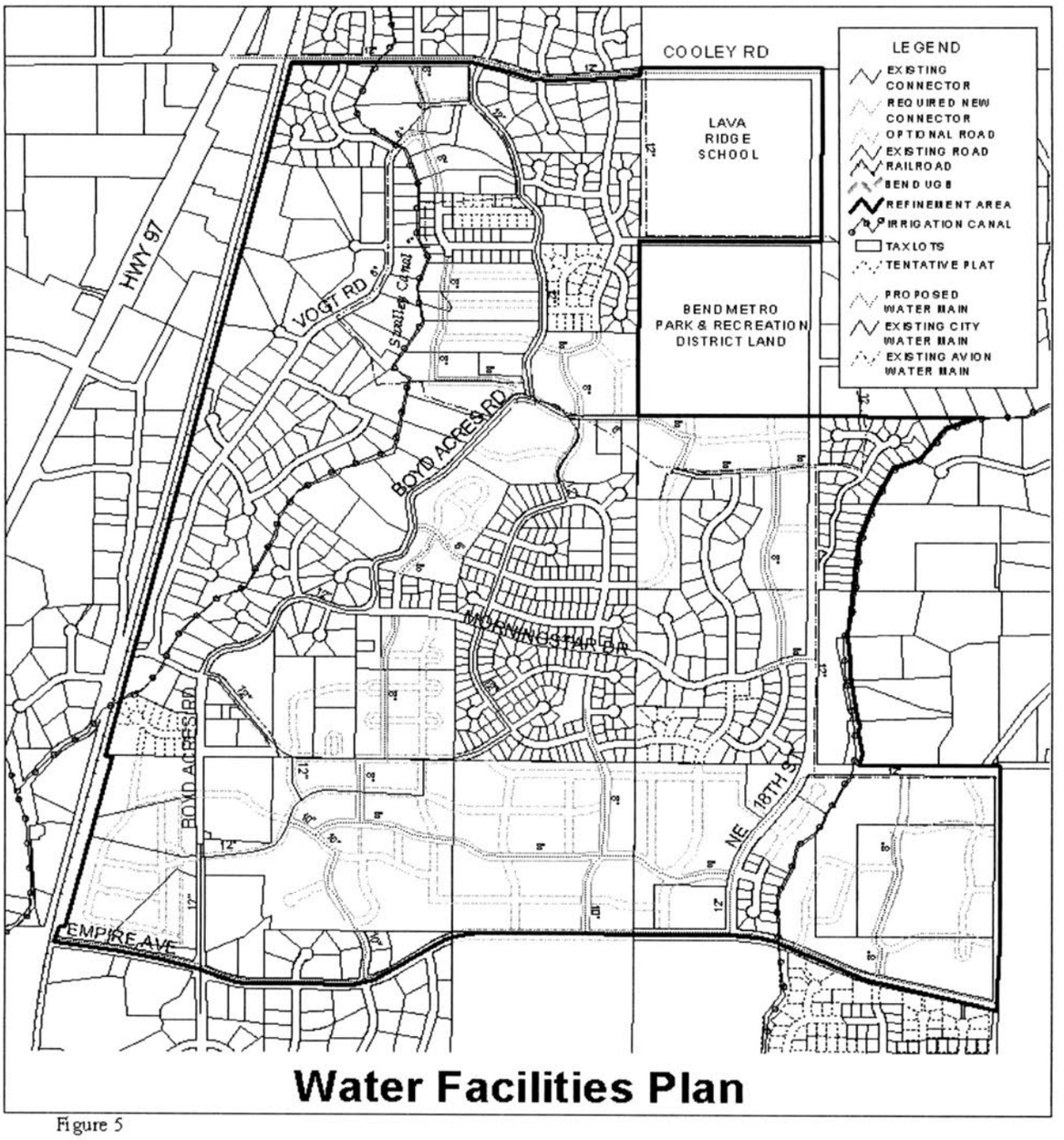


Figure 5

Ordinance No. 1753
Exhibit A *(Continued)*

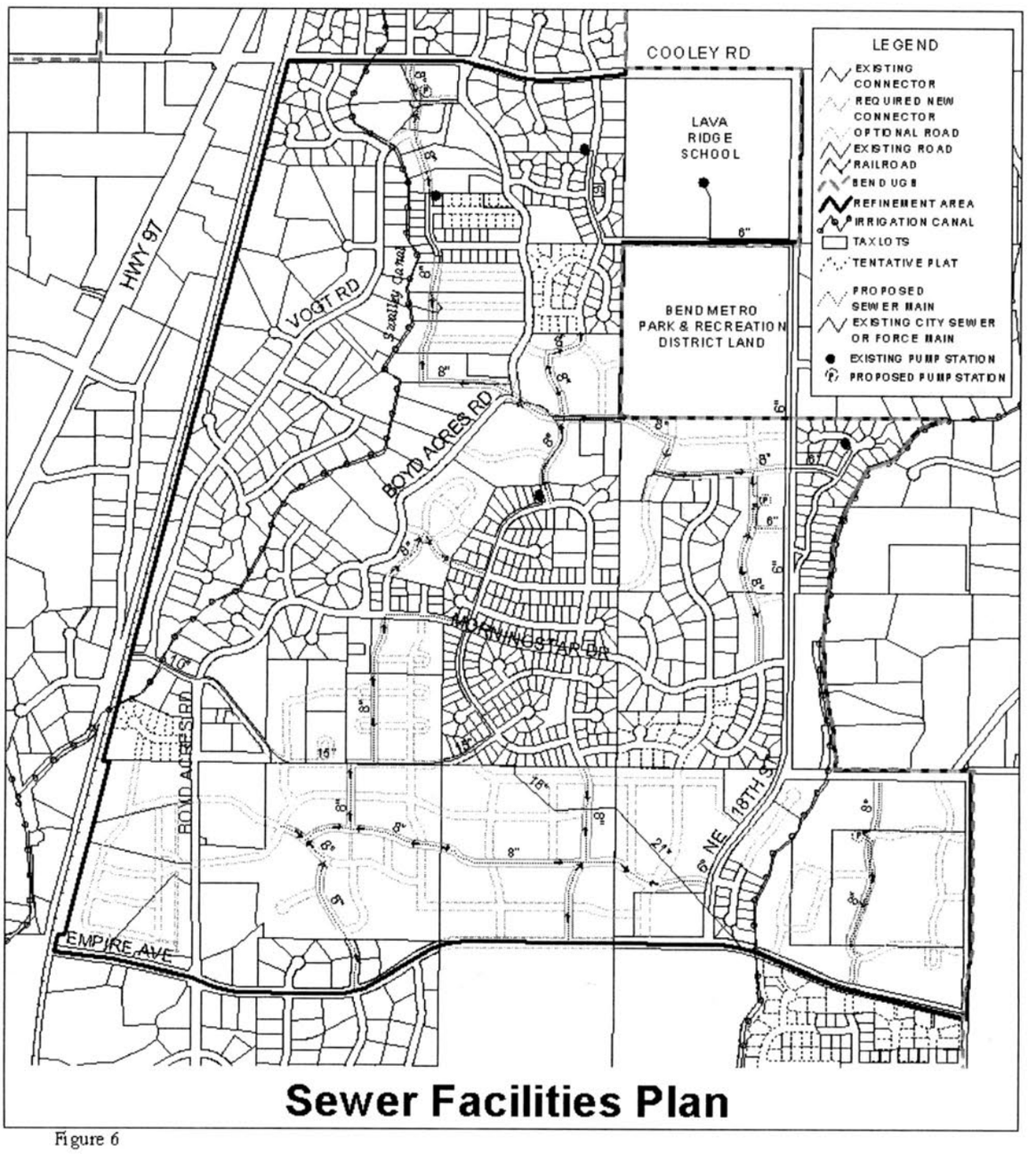


Figure 6

Ordinance No. 1753
Exhibit A *(Continued)*

DENSITY

The following policies shall apply to zones within the Lava Ridge Refinement Plan:

- *In the RL zone partition shall be limited to one new lot for each existing lot provided it can be served by an on-site septic system.*
- *In the RS zone permitted densities are the same as in the underlying RS zone.*
- *In the RM zone permitted densities are the same as in the underlying RM zone.*
- *The PO zone shall be intended primarily for office use.*
- *Housing in the PO zone shall be limited to the upper floors of structures, above offices or uses otherwise permitted in the zone.*

CIRCULATION/TRANSPORTATION

Overview:

Primary north/south traffic is currently carried through the middle of the plan area on Boyd Acres Road. Primary east/west traffic is currently carried on Morning Star Drive. Neither of these streets was designed for the heavier traffic they are experiencing as more development occurs in the area so a main goal of the refinement plan has been to provide other local routes.

The planned Empire Avenue and NE 18th Street, both arterials, will carry through traffic around the residential areas. Local traffic will be distributed on many smaller interconnected local streets. Those shown in black or gray on the Circulation/Transportation Plan in Figure 7, are local connectors. They provide general overall connectivity through the plan area but are indirect enough to discourage cut-through traffic.

These local connectors, except the one east of 18th Street, are required to be built within 50' of where they are shown on the plan. The southern end of the required local connector east of 18th street shall be within 50 feet of its location shown on Figure 4. The northern end shall be located on the section line between points 200 feet and 700 feet of the centerline of the North Unit canal. The street alignment shall be determined at the platting and shall connect the two ends points as directly as possible considering the terrain. The streets shown in dashed lines in Figure 7 are suggested new streets. While the exact location of these streets is up to the developer, adequate street connectivity is guaranteed through maximum block perimeter standards.

CIRCULATION/TRANSPORTATION

Standards:
Street and pedestrian standards shall be consistent with the requirements of the Bend General Plan and the Zoning Ordinance, except as set forth below:

1. Special street design standards have been developed for select locations in the refinement plan area. The Circulation/Transportation diagram (see Figure 7) depicts where these standards are applied.

2. Figure 8 depicts the Arterial Standard for Empire Avenue. Left turn access is restricted on Empire Boulevard to the following intersections (indicated with circles on the Circulation/Transportation Plan): Boyd Acres Road, NE 18th Avenue, and the three new required connector streets.

3. Figure 9 depicts the special standards for Boyd Acres Road.

4. Figure 10 depicts the local street standard. Local streets shall include a minimum 60-foot right-of-way (ROW) and a 32-foot-wide paved travel surface (curb to curb). Parking shall be permitted on both sides of local streets. Local streets shall include property-tight 5-foot-wide sidewalks on both sides of the street. The sidewalks shall be separated from the curb by a minimum 8-foot-wide planter strip.

5. Figure 11 depicts another alternative local street standard that provides a center median.

6. Alleys shall include a minimum of 20 feet of right-of-way and 16 feet of paved travel surface (see Figure 12).

7. Required pedestrian access ways and trail (identified in Figure 4) shall be located within a right of way no less than 14 feet wide. Pedestrian access ways shall be a minimum of 10 feet wide and paved with asphalt or concrete (see Figure 13). The trail shall be developed with a surface approved by the City and the Bend Metro Park and Recreation District.

8. Street trees shall be provided along all new local connector streets and arterials. Only street trees from a list maintained by the City Planning Department shall be planted. Along these streets, trees shall be planted 25 to 30 feet on center. Trees shall be a minimum of 2-inch caliper measured 4 feet from ground level.

SEWER AND WATER PUBLIC FACILITIES

Public water and sewer facilities shown on Figures 5 and 6 shall be constructed to City standards and should be located in identified connector street rights of way.

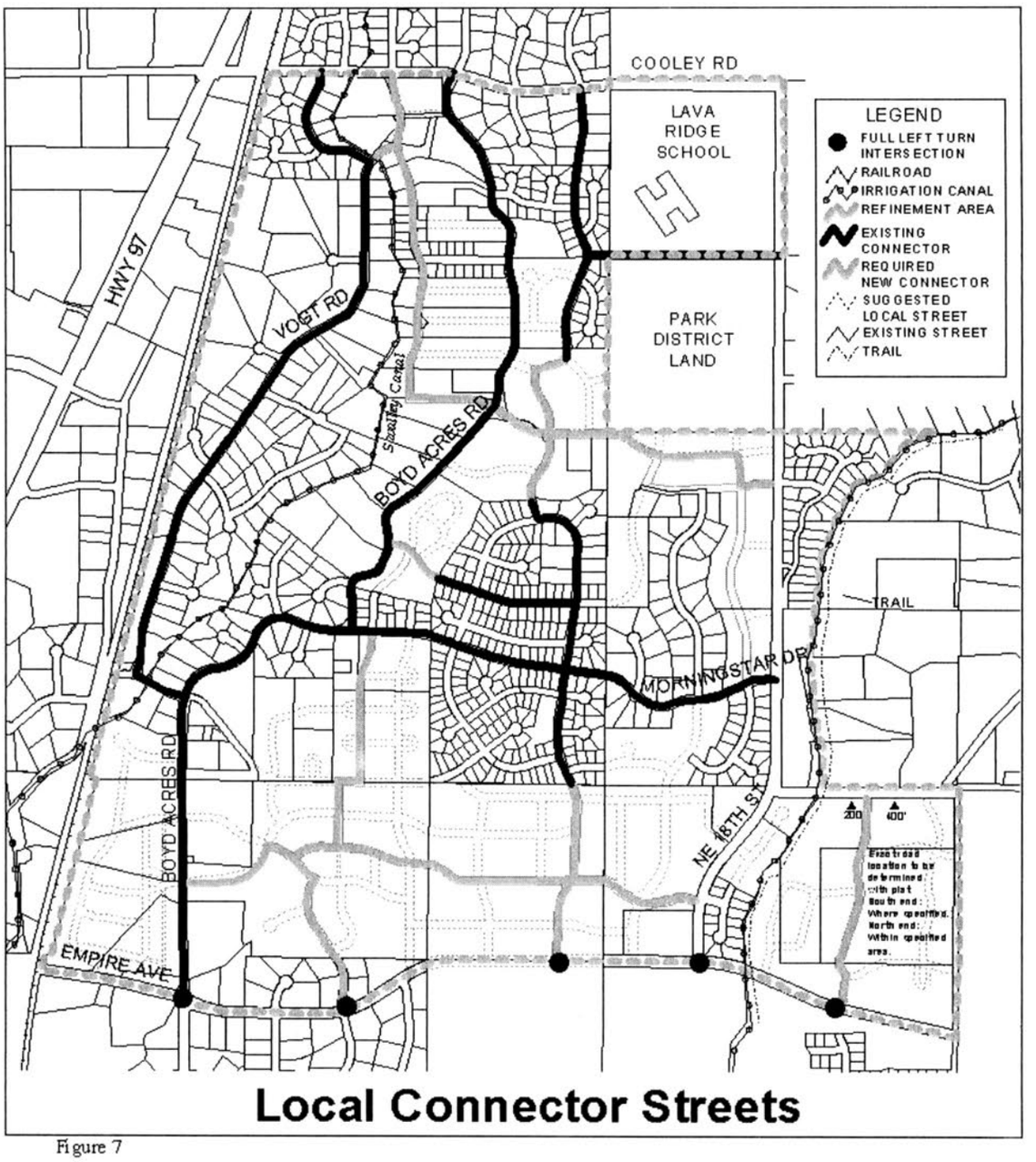


Figure 7

Ordinance No. 1753
Exhibit A *(Continued)*

STREET SECTIONS

Empire Avenue *80' ROW*

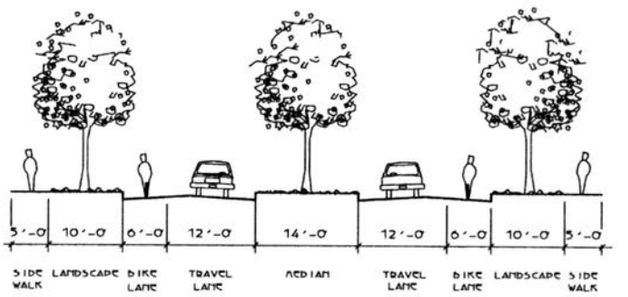


Figure 8

Boyd Acres Road *60' ROW*

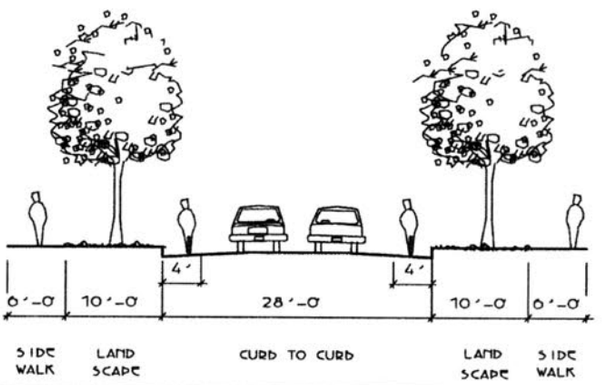


Figure 9

Local Street *60' ROW*

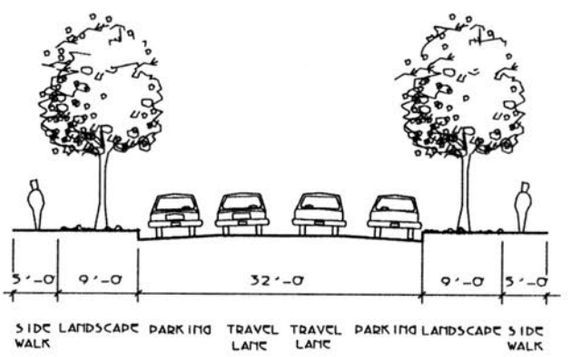


Figure 10

STREET SECTIONS

Local Street with Median *60' ROW*

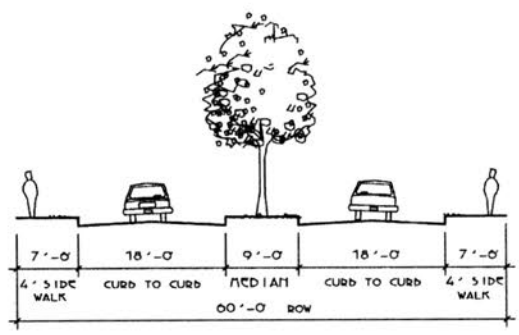
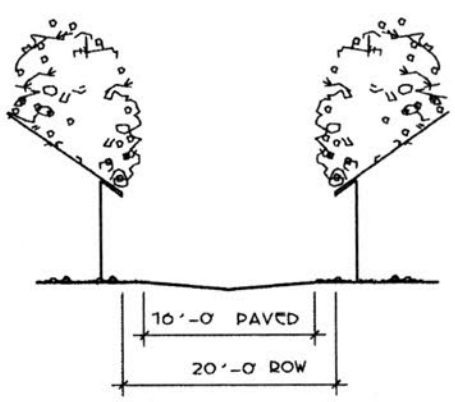


Figure 11



Alley *20' ROW*

Figure 12

Pedestrian Access Ways *14' ROW*

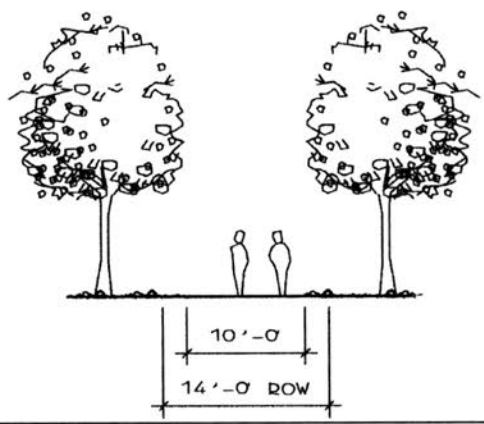


Figure 13

DESIGN AND DEVELOPMENT STANDARDS

Neighborhood Public Parks *– Three required public parks shall be provided at the locations depicted on the Parks and Pedestrian Access Ways diagram of the this plan. (Figure 4) The exact location and size of the park east of 18th street (#1 on Park and Pedestrian Access Ways Diagram) shall be determined at the time of plat. The park shall be between 2 and 5 acres in size.*

Block Perimeter *– In addition to block length standards of the Zoning Ordinance, the perimeter of blocks shall not exceed 1,600 feet. Blocks over 500 feet in length shall provide a pedestrian access way at approximately mid-block.*

Office and commercial development shall be subject to the Bend City Code design review standards.

Residential Design Standards - Residential development shall be oriented to a street, with a primary entrance that fronts on the street. Garages shall be set back a minimum of 5 feet behind the front of any residential dwelling. Garage doors shall represent no more than 50% of the building frontage of any single family or duplex structure. The planning director may waive the garage setback standard for single family, duplex or triplex structures when slope at the front of the lot exceeds 12%. Parking shall be behind the building for multifamily developments.

Fences *– Fences in front yards and yards that abut local, collector or hammerhead streets shall not exceed 3 feet 6 inches in height. Six-foot-high fences may be provided outside the front yard setback area between the property line and the building and the side lot lines. Fences up to 6 feet tall may be provided along alleys although 5 feet is encouraged for safety. See diagram below.*

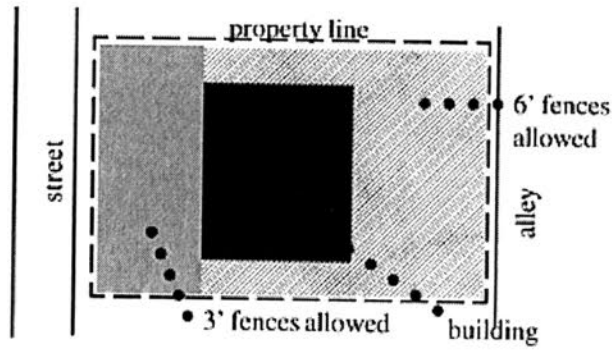


Figure 14

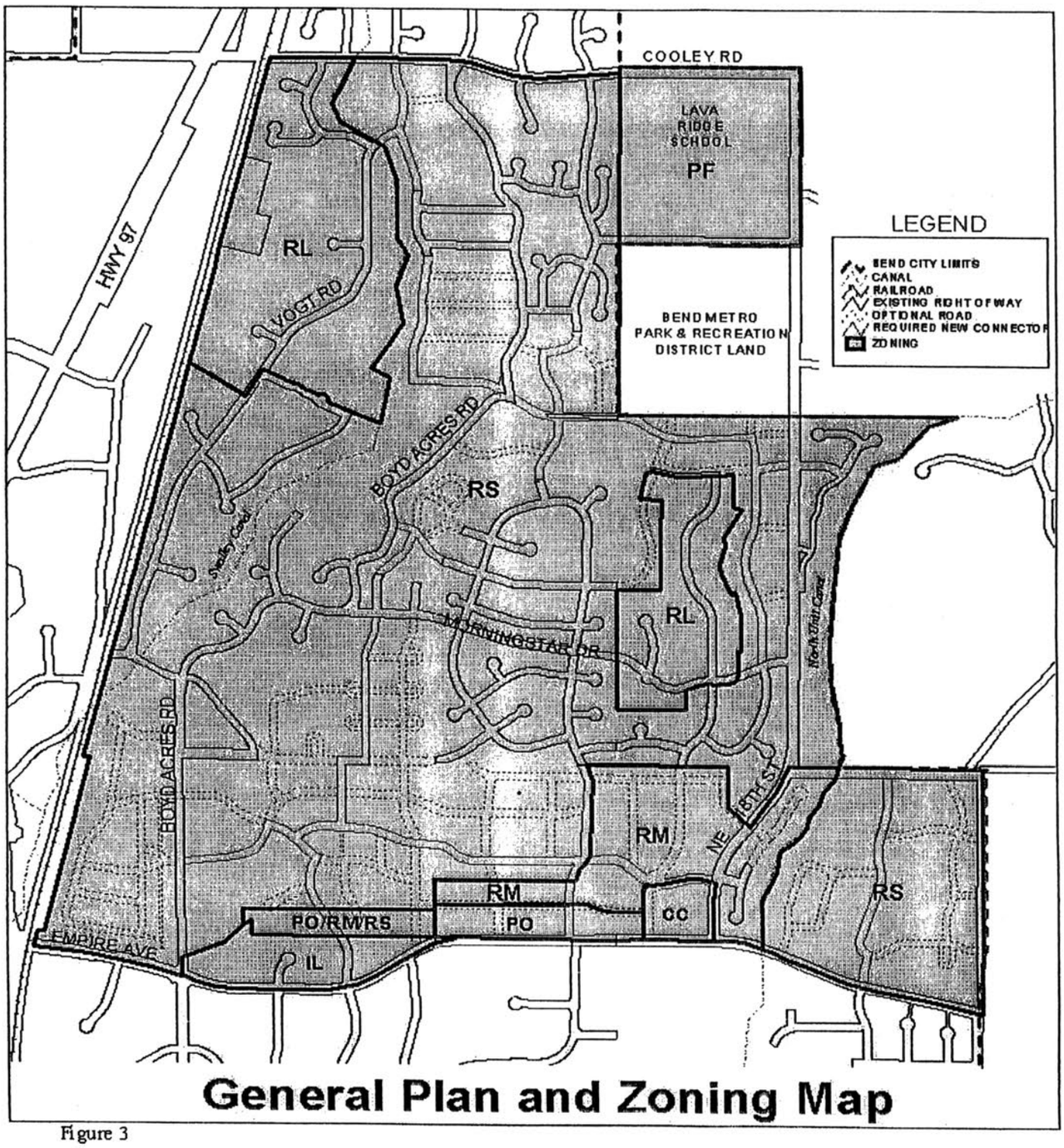

COOLEY RD
LAVA RIDGE SCHOOL
PF
HWY 97
RL
VOGT RD
BEND METRO PARK & RECREATION DISTRICT LAND
LEGEND
BEND CITY LIMITS
CANAL
RAILROAD
EXISTING RIGHT OF WAY
OPTIONAL ROAD
REQUIRED NEW CONNECTOR
ZONING
BOYD ACRES RD
RS
RL
MERRINGSTAR DR
BOYD ACRES RD
NE 15TH ST
RM
RM
PO
CC
RS
PO/RM/RS
IL
E EMPIRE AVE
General Plan and Zoning Map

Figure 3

ORDINANCE NS-1754

AN ORDINANCE IMPLEMENTING THE LAVA RIDGE REFINEMENT PLAN BY AMENDING THE CITY LAND USE PERMIT AND REVIEW PROCEDURES ORDINANCE, AMENDING THE CITY ZONING CODE, AND AMENDING THE ZONING MAP

THE CITY OF BEND ORDAINS AS FOLLOWS:

Section 1. The Bend City Council has held a public hearing, considered the Planning Commission's recommendation and record, and has found that there is a public need and benefit for the proposed changes. The Bend City Council hereby adopts changes to the City Land Use Permit and Review Procedures Ordinance NS-1556, the City Zoning Ordinance NS-1178, and the City Zoning Map as described in Sections 2 through Section 5 of this ordinance.

Section 2. The City Land Use Procedures Ordinance No. NS-1556 is amended by adding Section 3B Refinement Plan Review Procedures as described in "Exhibit A" attached to this Ordinance.

Section 3. The City Zoning Ordinance No. NS-1178 is amended by adding Section 22B, Refinement Plan Overlay Zone, and Section 22C, Lava Ridge Refinement Plan Development Standards, as described in "Exhibit B" attached to this Ordinance.

Section 4. The City Zoning Ordinance No. NS-1178 is amended by adding Section 21D, Professional Office Zone or PO zone, as described in "Exhibit C" attached to this Ordinance.

Section 5. The Zoning Map of the City of Bend is amended by changing the zoning designation for property as described generally in the text of "Exhibit D" and displayed as the map attached as "Exhibit E" to this Ordinance.

Read for the first time the 16th day of August, 2000.

Read for the second time the 6th day of September, 2000.

Placed upon its passage the 6th day of September, 2000.

YES: 6 NO: 0

Authenticated by the Mayor the 6th day of September, 2000.

Jim Young, Mayor

ATTEST:

Patricia Stell, City of Bend Recorder

Amendment to Ordinance NS-1556
Refinement Plan Procedures

Section 3B. Refinement Plan Review Procedures

(1) Refinement Plan Development and Approval Process.

(a) Initiation. The process to establish a refinement plan shall be initiated by the City Council. The Planning Commission or interested property owners may submit requests to the City Council to initiate the refinement plan process. If owners request initiation of a refinement plan process, the City Council may require an application fee to cover the cost of creating the plan.

(b) Steering Committee. The City Council may appoint a steering committee to guide development of the plan. The steering committee may include persons representing affected property owners, neighbors, city staff, agencies, special districts and the community at large. The role of the steering Committee is advisory to the Planning Commission and the City Council.

(2) Refinement Plan Content. At a minimum, a refinement plan shall include the following text and diagrams:

(a) Plan Objectives. A narrative shall set forth the goals and objectives of the plan.

(b) Site and Context. A map of the site and context shall identify the project area.

(c) Land Use Diagram. The land use diagram shall indicate the distribution and location of planned land uses, including open space and parks, within the area covered by the refinement plan.

(d) Density. If residential uses are proposed, a narrative shall describe planned residential densities.

(e) Facilities Diagram. The facilities diagram shall depict the general location and extent of major components of sanitary sewer, water, and other essential facilities proposed to be located within the area covered by the refinement plan and needed to support the land uses described in the plan.

(f) Circulation/Transportation Diagram. The circulation diagram shall indicate the proposed street pattern for the refinement plan area, including pedestrian pathways and bikeways. Design standards and street cross sections shall be included, if different than normal City standards.

(g) Design and Development Standards. If standards differ from normal City standards, design and development standards shall be included in the plan.

(3) Land Use Review. Except as set forth below, the review procedures for Land Use Activity Categories outlined in Section 3 of this code shall apply for all property subject to a RP overlay zone.

(a) Administrative Review. The following activities shall be reviewed administratively. The Director, at his or her discretion, may refer a Type I application to the Planning Commission.

(A) Type I land use permits.

(B) Type II land use permits conforming to the standards of the refinement plan.

(C) Administrative amendments to the refinement plan.

(D) Minor amendments to the refinement plan

(E) Lot line adjustments consistent with the refinement plan.

(b) Planning Commission Review. The Planning Commission shall review the following activities:

(A) Type II variance

(B) Lot line adjustments that are not consistent with the refinement plan.

(c) City Council Review. The following activities shall be reviewed by the City Council according to City Procedure Ordinance.

(A) Major amendments to the refinement plan.

(B) Appeals of land use decisions.

(4) Amendments and Adjustments to the Refinement Plan. Amendments to an approved refinement plan are classified as administrative, minor, or major amendments.

(a) Administrative Amendments. Administrative amendments may be approved by the City Planning Director based on Type I procedures. Public notice of administrative amendments is not required. Administrative amendments include:

(A) Street, easement, sidewalk, and trail relocations that result in a location change of less than 50 feet from what is depicted on refinement plan diagrams.

(B) Public park relocations that result in a location change of less than 100 feet from what is depicted on refinement plan diagrams.

(C) Increases in the size of public neighborhood parks, provided that transportation connections remain consistent with the refinement plan.

(D) Reductions in the size of public neighborhood parks, provided the reductions are less than 10 percent of park area depicted on refinement plan diagrams and that the reductions do not result in a park that is less than 20,000 square feet in size.

(E) Changes related to street trees, street furniture, fencing, or signage that were approved as part of the refinement plan.

(F) A change in the utility plan other than what would be necessary for other authorized adjustments.

(b) Minor Amendments. A minor amendment to a refinement plan shall be processed as a Type II administrative land use decision according to the Procedure Ordinance. Notice of the pending decision shall be provided to all owners of land within or abutting the Refinement Plan district(s) in question. The Hearings Body decision shall include findings

demonstrating that the change will not affect adversely:

- *the purpose and objectives of the refinement plan,*
- *the functioning of the refinement plan, or*
- *the coordination of transportation and infrastructure provision to properties within the refinement plan area.*

Minor amendments are those that result in any of the following:

(A) A change in the circulation/transportation plan that requires an identified transportation element to be moved 50 to 100 feet from the location depicted on the refinement plan circulation/transportation diagram.

(B) A change in the circulation/transportation plan that requires a required transportation element including local street, easement, sidewalk or trail to be shifted 50 to 100 feet in any direction from what is depicted on the refinement plan circulation/transportation diagram.

(C) A change in the land use diagram that reduces the size of a public park or facility more than 10 percent, or moves the location more than 100 feet from the location depicted on the land use diagram

(c) Major Amendment. A major amendment to a refinement plan shall be processed as a comprehensive plan amendment affecting the existing refinement plan. The amendment shall follow Type III procedures and meet plan amendment and zone change criteria. Findings must additionally demonstrate that the change will not affect adversely:

- *the purpose and objectives of the refinement plan,*
- *the functioning of the refinement plan, or*
- *the coordination of transportation and infrastructure provision to properties within the refinement plan area.*

Major amendments are those that result in any of the following:

(A) A change in land use plan boundary or density, unless as part of the original approvals an alternative design was approved outlining acceptable plan designation options (for example, a residential designation may be approved as an alternative use for a park site).

(B) A change in the circulation/transportation plan that causes a required transportation element, including a trail, to be added, eliminated or moved more than 100 feet from the location depicted on the refinement plan circulation/transportation diagram.

(C) A change in the land use diagram that adds or eliminates a designated public park or facility.

(D) A change in development standards, except those set forth as minor or administrative amendments.

◆◆◆◆

Amendment to Ordinance NS-1178

Refinement Plan Overlay Zone and Lava Ridge Standards

Section 22B. Refinement Plan (RP) Overlay Zone.

(1) Purpose. The purpose of the RP overlay zone is to allow development of land consistent with the standards in an adopted refinement plan.

(2) Definition. As used in this code a refinement plan does not meet the statutory definition and requirements of ORS 197.200.

(3) Map Identification. The RP overlay zone is identified on the Zoning Map with the suffix "RP" added to the symbol of the base zone. A report that includes the refinement plan and relevant development standards shall be adopted as an exhibit to the ordinance approving the overlay zone district. A refinement plan is similar to a master plan and therefore does not require a comprehensive plan amendment.

(4) Compliance with Refinement Plan Standards and Procedures. New construction and land divisions shall meet any development, land division and design standards of the appropriate refinement plan. Base zone and land division standards shall apply where no different standard is referenced for the refinement plan area.

(5) Refinement Plan Standards. Specific standards for each of the refinement plan areas are defined below.

Section 22C. Lava Ridge Refinement Plan Development Standards

(1) Residential Density and Development Provisions. The permitted residential densities shall be the same as in the underlying zones except as specified below:

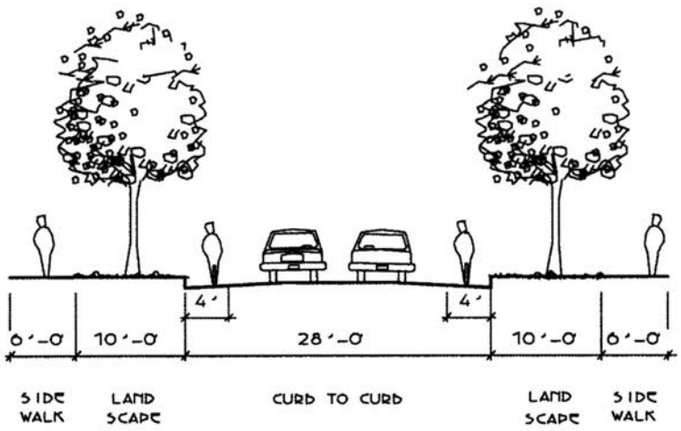
(a) RL – In the RL zone, a parcel existing on the date of adoption of the plan may be partitioned into no more than two lots. This standard shall apply even if sewer service is provided to the RL zone.

(b) RS – In the area north of Morningstar Drive in sections 15CB and 15CC, all new lots next to the Morningstar subdivision lots shall have a minimum width of 100 feet along any rear or side property line that abuts the existing Morningstar subdivision lots.

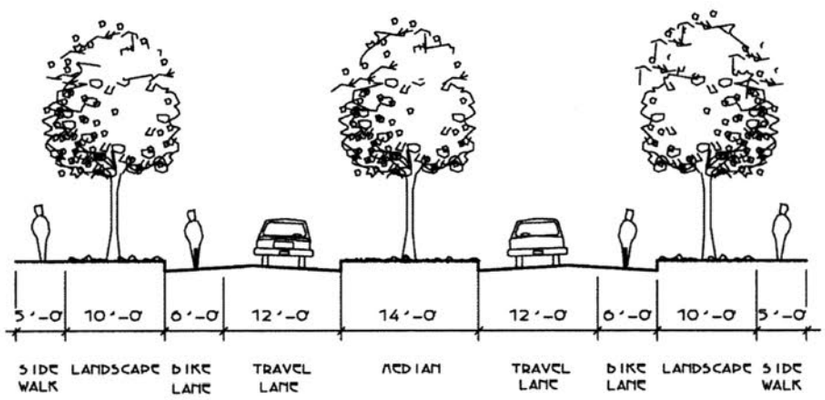
(2) Neighborhood Public Parks. Public parks shall be provided at the locations depicted on the land use diagram of the refinement plan. The developer shall work with the Bend Metro Park and Recreation District on park design to comply with District standards. The developer may be reimbursed by the Park District for parkland and/or construction costs up to the amount of park system development charges for the development. Procedures for developing such proposals are outlined in the Bend Metro Park and Recreation District SDC Ordinance Number 1, Section 7. The proposal to develop a park and receive park SDC credits must first be approved by the Bend Metro Park and Recreation District Board of Directors. Upon construction of the park to District standards and reimbursement to the developer, the designated parkland shall be transferred to Park District ownership. The Park District shall be responsible for park maintenance.

(3) Street and Pedestrian Standards. Street and pedestrian standards shall be consistent with the requirements of the Bend General Plan and the Zoning Ordinance, except as set forth below:

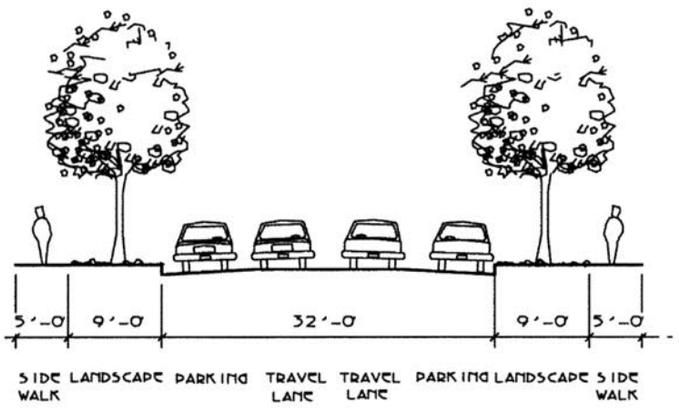
(a) Boyd Acres Road.



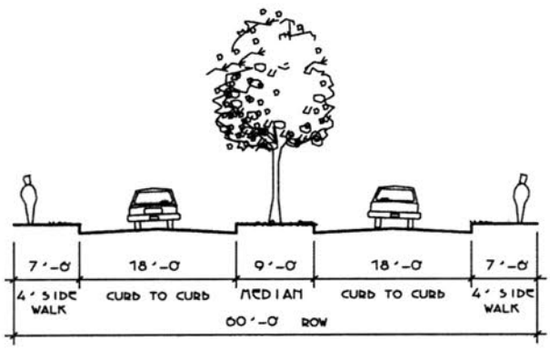
(b) Empire Boulevard.



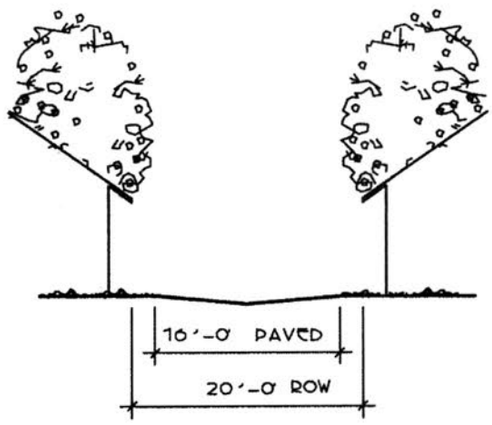
(c) Local Street.



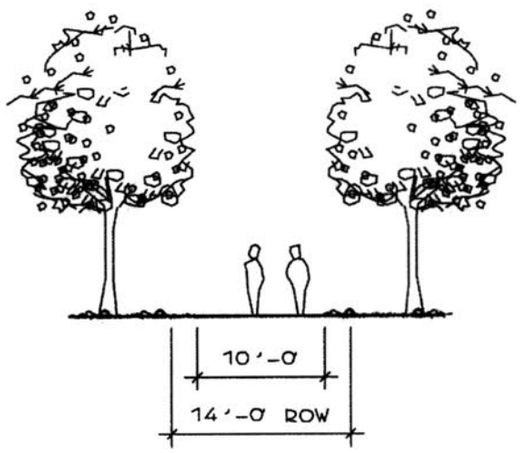
(d) Local street with median.



(e) Alley. Alleys shall include a minimum of 20 feet of right-of-way and 16 feet of paved travel surface.



(f) Pedestrian access way. Pedestrian access ways shall be located within a right-of-way no less than 14 feet wide. The trail or path shall be a minimum of 10 feet wide and paved with asphalt or concrete.



(g) Hammerhead streets. Hammerhead streets meeting the following design standards may be permitted in the Lava Ridge Refinement Plan RM and RS zones.

- *(A) Hammerhead streets shall be private streets.*
- *(B) The hammerhead street length shall be no more than150 feet.*
- *(C) The minimum right of way width shall be 40 feet plus a 5-foot utility easement on each side.*
- *(D) Utility easements shall be required for public and/or private development.*
- *(E) The minimum street pavement width shall be 20 feet.*
- *(F) The maximum public street block length shall be 600 feet.*
- *(G) The maximum width of a housing cluster on a hammerhead street shall be 300 feet.*
- *(H) Sidewalks are not required within the cluster.*

(I) Sidewalks shall be required on the external public streets.
(J) Parking is not permitted on the hammerhead street.
(K) Off street parking requirements shall be met for underlying zone.
(L) Landscaping on interior of hammerhead cluster shall be required in area from house to edge of pavement.
(M) Street frontage - houses on lots fronting a public street, except an arterial, shall face the public street.
(N) Building setback shall be the same as the underlying zone unless modified in the plat.
(O) Fences or walls adjacent to an arterial shall be approved at the time of plat. Walls shall be built with varied texture and materials and shall comply with any adopted design standards. The maximum height shall be 6 feet except where the elevation between the arterial street and the lot line exceeds 8 feet in which case, reductions to the wall or fence height may be required. The area between the fence or wall and the arterial curb shall be landscaped and maintained by abutting property owner(s) or homeowners association.
(P) Fencing: On hammerhead and public streets, except arterials, fences within the yard setback area may not exceed three and a half feet in height. A fence up to six foot in height may be constructed outside of the setback area provided that it is no closer to the street than the building face. A fence up to six feet in height may be constructed on rear lot line.

(4) *Street Trees. Street trees shall be provided along all arterial streets and streets designated as connector streets on the Lava Ridge Plan transportation/ circulation diagram. Only street trees from a list maintained by the City Planning Department shall be planted. Street trees shall be planted 25 to 30 feet on center. Trees shall be a minimum of 2-inch caliper measured 4 feet from ground level.*

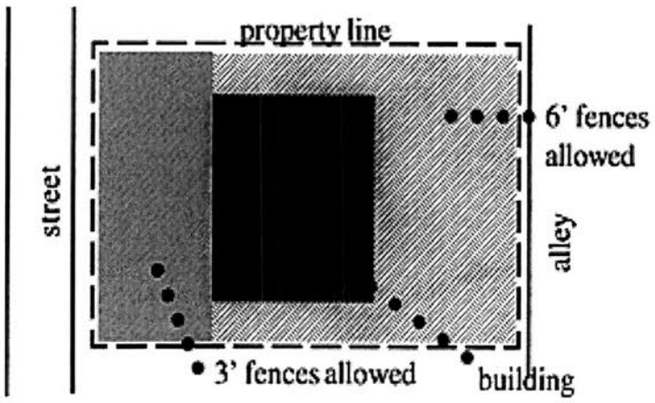
(5) Block Perimeter. In addition to block length standards of the Subdivision Ordinance, the perimeter of blocks shall not exceed 1,600 feet.

(6) *Design Review and Building Orientation.*
(a) Design review standards shall apply to development in the Commercial and Professional Office zones and any other Design Review Overlay District specified in Section 23A of this code.

(b) Residential development shall be oriented to a street, with a primary entrance that fronts on the street. Garages shall be set back a minimum of 5 feet behind the front of any residential dwelling. Front sides of garages shall represent no more than 50 percent of the building frontage of any residential structure. The planning director may waive the garage setback standard when slope at the front of the lot exceeds 12 percent.

(7) Area of Special Interest. Areas of Special Interest shown on the Bend Area General Plan Map shall be subject to policies of the Bend Area General Plan.

(8) Fences. Walls and fences in the setback area between the front of the house and the adjacent local or collector street shall not exceed three and a half feet in height. Six-foot high fences are permitted outside the front yard setback area between the property line and the building and on side lot lines. Fences up to 6 feet may be provided along alleys.


property line
6' fences allowed
street
alley
3' fences allowed
building

Ordinance NS-1754
Exhibit C – Professional Office Zone

Amendment to NS-1178
Professional Office Zone

Section 21D Professional Office Zone, or PO Zone

(1) **Purpose.** The Professional Office zone is intended to provide for professional offices in locations near arterial or collector streets and to provide a transitional use area between residential areas and other more intensive zones. Through design standards, the Professional Office zone is intended to create mixed use and office developments that are pedestrian oriented and provide a positive contribution to the streetscape.

(2) **Permitted Uses.** The following uses are permitted subject to the Site Plan provisions of Section 23 and the Design Review provisions of Section 23A.

(a) Offices and studios of accountants, architects, artists, attorneys, authors, consultants, counseling services, designers, dentists, engineers, insurance agents, physicians or other practitioners of the healing arts, photographers, and surveyors.

(b) Offices for organizations or companies providing educational, electronic commerce, financial, governmental, publishing, real estate, religious, research, scientific, or marketing services.

(c) Medical and dental clinics. Laboratories and pharmacies located within clinics.

(d) Nursery schools or day-care facilities serving the employees of a permitted or conditional use and located on the site of the permitted or conditional use.

(e) Residential use when located in the upper story or stories of a building housing a permitted or conditional use.

(3) **Conditional Uses**. The following conditional uses may be permitted subject to a Conditional Use Permit and the provisions of Section 29.

(a) Business, technical or similar schools.

(b) Dance or music school.

(c) Nursery schools and day-care facilities not part of a permitted or conditional use, and subject to Section 25(17).

(d) Public or private park.

(e) Recreation facility owned and operated by Bend Metro Park and Recreation District or other public non-profit organization.

(f) Library or museum.

(g) Existing hospitals.

(h) Off-site parking when appurtenant to a permitted or conditional use.

(i) Beauty or barber shop and related personal services.

(4) **Hours of Operation**. Business hours for use by the general public shall be between 6 a.m. and 10 p.m., seven days a week, for all uses except hospitals.

Nothing in this provision is intended to limit access by business operators or owners.

(5) Height Regulations. No building or structure shall hereafter be erected, enlarged or structurally altered to exceed a height of 45 feet without approval of a Conditional Use Permit.

(6) Lot Requirements. The following lot requirements shall be observed:

(a) Lot Area: Every lot shall have a minimum area of 3000 square feet.

(b) Lot Width: Every lot shall have a minimum width of 30 feet.

(c) Front Yard Setback: Except where special yard setback requirements apply, the front yard setback shall be a minimum of 15 feet along local streets and 20 feet along arterial and collector streets. On corner lots the vision clearance requirements of Section 27(5) shall apply.

(d) Side Yard Setback: The side yard setback distance shall be a minimum of 5 feet. Adjacent to a residential zone, the required side yard setback distance to a building shall be increased by 1 foot for each 1 foot by which the building height exceeds 25 feet. The side yard setback distance for one or both sides may be waived for an approved zero lot line subdivision or partition.

(e) Rear Yard Setback: The rear yard setback distance shall be a minimum of 5 feet when adjacent to an alley or non-residential zoning district. The rear year setback distance shall be a minimum of 15 feet when adjacent to a residential zoning district, and shall be increased by 1 foot for each 1 foot by which the building height exceeds 25 feet.

(f) Solar Setback: The solar setback as prescribed in Section 26A.

***(7) Distances Between Buildings**. The distance between principal buildings on the same site shall be at least 10 feet.*

(8) Off-Street Parking. Off-street parking shall be provided as required in Section 24.

(9) Special Site Design Standards. In addition to the Design Review Standards of this code, the following special building design and landscaping requirements shall apply:

(a) Building Orientation – New buildings shall be sited at the front yard setback line for lots with one frontage and at both front yard setback lines for corner lots. For lots with more than two front yards the building(s) shall be oriented to the two busiest streets.

(b) Building Location – Buildings and structures shall be placed so they cover at least 50 percent of the lot width along a public street. Where a development has frontage on two streets, this building location standard shall apply to at least one of the streets. Where a development has frontages on three or more streets, this building location standard shall apply to at least two of the streets.

(c) Landscaping – in addition to the landscaping requirements in Section 23, Site Plan Review, the required front yard setback area along all street frontages shall be landscaped. Parking areas adjacent to alleys that are across from residential areas shall have trees planted every 25 feet in the setback area to screen the parking area.

◆ ◆ ◆ ◆

Amendment to NS-1178
Description of Zoning Changes in Lava Ridge Refinement Plan Area

The City Zoning Map is changed as described below and as displayed on the map as Exhibit E to Ordinance M56-3.

1. Change from Suburban Low Density Residential Zone or SR 2 ½ to Public Facility Zone or PF. All of tax lot 1712150000200, site of the Lava Ridge Elementary school and new middle school.

2. Change from Urban Low Density Residential Zone or RL to Urban Standard Residential or RS. The area south of Cooley Road and east of the Swalley Canal in the north half of Section 16.

3. Change from Urban Low Density Residential Zone or RL to Urban Standard Residential or RS. The area of west, north, and east of Morningstar subdivision and Morningstar First Addition subdivision in Section 171215CB and Section 171215CC (31.25 acres more or less).

4. Change from Urban Standard Residential or RS to Urban Medium Density Residential Zone or RM. The north 100 feet of tax lot 171222BB00200.

5. Change from Urban Standard Residential or RS to Urban Medium Density Residential Zone or RM. An area, all within tax lot 1712210000100, 200 feet deep north to south and running east and west the entire width and being 230 feet north of the south boundary of said tax lot; and an area 200 feet deep east to west from the east boundary of said tax lot and running south 860 feet more or less south from the north lot line to intersect with the area running east and west in the same tax lot (9.8 acres more or less).

6. Change from Urban Standard Residential Zone or RS to the Professional Office Zone or PO. An area within tax lot 17122100100, 230 feet deep north to south from the south lot line and running from the east lot line to the west lot line (9.2 acres more or less); and an area within tax lot 171222BB00200, 230 feet deep north to south from the south lot line running east for 150 feet from the southwest corner of said tax lot (1.1 acres more or less); and an area within tax lot 171222BB00300, 230 feet deep from the south lot line and running 80 feet east from the southwest corner of lot (0.4 acres more or less).

7. Change from Urban Standard Residential or RS to a flexible zoning category allowing any combination of Professional Office Zone, Urban Medium Density Residential zone, or Urban Standard Residential zone. Within tax lot 1712210000200, an area 200 feet deep from north to south along the entire south boundary of said tax lot (6.5 acres more or less).

◆◆◆◆

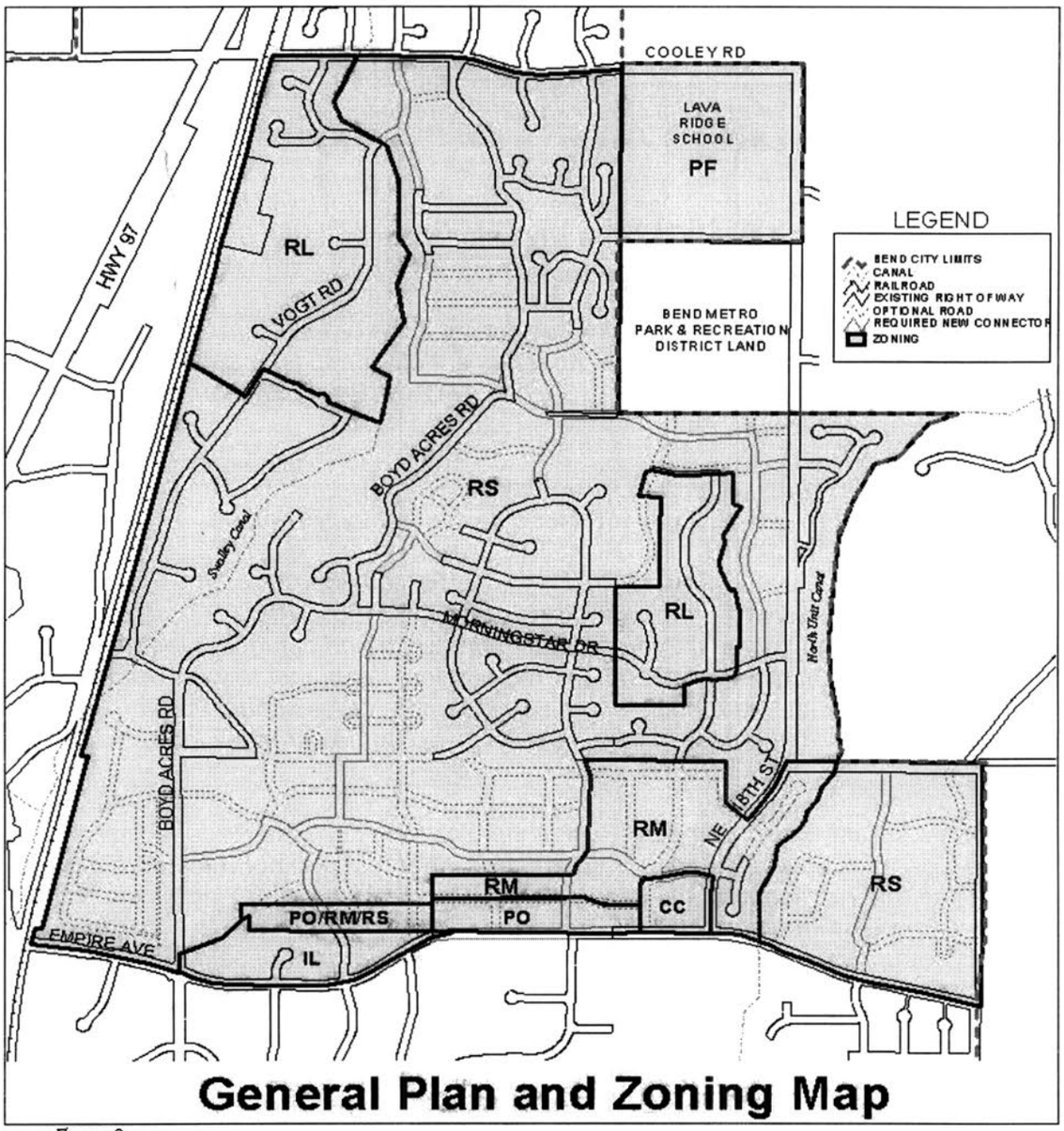

COOLEY RD
LAVA RIDGE SCHOOL
PF
LEGEND
BEND CITY LIMITS
CANAL
RAILROAD
EXISTING RIGHT OF WAY
OPTIONAL ROAD
REQUIRED NEW CONNECTOR
ZONING
HWY 97
RL
VOGT RD
BEND METRO PARK & RECREATION DISTRICT LAND
BOYD ACRES RD
RS
Shelley Canal
RL
MORNINGSTAR DR
North Unit Canal
BOYD ACRES RD
NE 18TH ST
RM
RS
RM
PO/RM/RS
PO
CC
EMPIRE AVE
IL
General Plan and Zoning Map

Figure 3

ORDINANCE NO. NS-1755

AN ORDINANCE EXTENDING LIMITATIONS ON SIGNS ORIENTED TOWARDS THE BEND PARKWAY; AND DECLARING AN EMERGENCY.

THE CITY OF BEND DOES ORDAIN AS FOLLOWS:

Section 1. Section 8.005 of the City of Bend Sign Code shall be extended for an additional six months from the effective date of this ordinance. Section 8.005 provides:

> **8.005 Limitation. No sign permits for billboards or outdoor advertising signs or ground mounted signs which exceed 10-feet in vertical height and 8-feet in horizontal width shall be issued pursuant to the City of Bend Sign Code, nor shall any such signs be installed, which are oriented toward the Bend Parkway, within a distance of two-hundred feet from each side of the Bend Parkway right-of-way. This limitation shall be for a period of six months from the effective date of this ordinance, or until a new sign code regulating these signs is adopted, whichever happens first. A sign shall be considered as oriented toward the Bend Parkway if it would have not have been installed but for the potential of display to, and viewing from, traffic on the Bend Parkway.**

Section 2. The existing regulations of the City of Bend Sign Code were developed prior to the construction of the Bend Parkway; and these regulations do not adequately deal with the new sign regulation situation presented by the Bend Parkway. Because signs oriented toward the Bend Parkway have been installed along portions of the Parkway that have been opened to public travel, it is necessary and desirable for the protection of the public health, safety and welfare to not permit any signs described in this amendment until there is an opportunity to review the kind of sign regulation that will be required by this new situation, and develop whatever regulations are necessary to provide whatever sign regulation is needed. Therefore an emergency is declared to exist, and this ordinance shall take effect immediately upon its passage.

Read for the first time the 6th day of September, 2000.

Read for the second time the 20th day of September, 2000.

Placed upon its passage the 20th day of September, 2000.

YES: 7 NO: 0

Authenticated by the Mayor the 20th day of September.

Jim Young, Mayor

ATTEST:

Patricia Stell, City Recorder

ORDINANCE NO. NS-1756

AN ORDINANCE AMENDING THE BEND AREA GENERAL PLAN BY ADDING THE BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

WHEREAS, The Transportation Planning Rule, OAR 660 Division 12, requires that the City of Bend adopt a Transportation System Plan that identifies a system of transportation facilities and services adequate to meet urban area needs for the next 20 years, and

WHEREAS, The Bend Urban Area Planning Commission and the Bend Transportation Advisory Committee have held numerous public hearings and have extensively considered the Bend Urban Area transportation needs for the next 20 years and have recommended that the Bend City Council adopt the Bend Urban Area Transportation System Plan dated June, 2000, a copy of which is attached hereto, and

WHEREAS, The City of Bend has previously adopted the Bend Area General Plan, and

WHEREAS, The Bend City Council, following public hearings and Council discussion finds that the Bend Urban Area Transportation System Plan dated June, 2000 is consistent with the Bend Area General Plan, and is adequate to meet the transportation needs of the Bend Urban Area for the next 20 years, and

WHEREAS, In accordance with findings adopted contemporaneously with this ordinance, the Bend City Council finds that the Bend Urban Area Transportation System Plan, dated June, 2000, complies with all applicable state land use goals, laws, rules and regulations,

THE CITY OF BEND DOES ORDAIN AS FOLLOWS:

SECTION 1. The Transportation System Plan, dated June, 2000, a copy of which is attached hereto, is adopted as the Transportation System Plan of the City of Bend.

SECTION 2. Codification. Upon adoption of this ordinance, the Transportation System Plan shall be added to and supplement the City's General Plan as an amendment thereto. The Transportation System Plan shall be codified by incorporating its provisions into the General Plan's transportation chapter in a manner that will integrate the Transportation System Plan consistent with the format of that chapter.

Read for the first time the 2nd day of August, 2000.

Read for the second time the 11th day of October, 2000.

Placed upon its passage the 11th day of October, 2000.

YES: 5 NO: 1 ABSTAIN: 0

Authenticated by the Mayor the 11th day of October, 2000.

Jim Young, Mayor

ATTEST:

Patricia Stell, City Recorder

City of Bend Supporting Findings For the Adoption of the Bend Transportation System Plan

The City of Bend has grown from a small timber and agricultural community to an important and diverse regional center in Central Oregon. A multi-modal transportation system is a key infrastructure component for our community. The City of Bend has prepared detailed plans to augment and improve the transportation system. Some of these plans preceded the adoption of Goal 12 and show that the City of Bend had undertaken significant planning efforts well before the adoption of State mandated transportation planning. This is important to note because local government *and* Bend's citizens recognize that providing the needed transportation improvements is part of creating and maintaining a vibrant, healthy, and livable City.

The City of Bend has continued to refine and expand its' transportation planning by focusing on the same elements contained in the Transportation Planning Rule (TPR). The TPR requires cities to develop and adopt transportation plans that are coordinated at all levels of development. These plans are to address the various transportation modes through the adoption of standards, land use regulations and the identification of funding sources. Many of the requirements of the TPR are consistent with the efforts Bend has developed which are reflected in existing policy and regulatory documents. For example, the City has had strong access control policies and development requirements that complement non-auto- dependent transportation modes. The requirement for developers to extend the City system of trails, streets, bike lanes and sidewalk facilities is another example of pro-active transportation planning in advance of the TPR mandates. The City will continue to modify and improve the regulations needed to meet or exceed the TPR mandates as they relate to the Bend Transportation System Plan (TSP).

The City of Bend has identified the needed transportation improvements to support the community as we approach the build-out population at the 20-year horizon. The City of Bend has developed and implemented strategies to reduce reliance upon the automobile and discourage single occupant vehicle travel.

The City of Bend has coordinated its' plans with other affected agencies and worked extensively with citizens and advocacy groups. Particularly, the citizen involvement program developed by City Council for the TSP process has been instrumental for interacting with a broad spectrum of citizens within the community.

The citizen involvement program is called the Bend Transportation Advisory Committee or BTAC. BTAC made significant progress to involve and educate the public about the City's transportation issues and the results have led to further refinement of the TSP. The City of Bend "OUR CITY" newsletter also reported the progress and activities of the citizens advisory group as they worked on the TSP. The results of the BTAC citizen involvement process have been recorded in a series of video programs for distribution on cable. This effort was instrumental in encouraging other city residents who could not attend meetings to become aware of the issues and participate in the TSP process. The BTAC citizen involvement process recently achieved additional honors by being awarded the *"Community Visioning"* award from the 3CMA organization.

The Bend Transportation Advisory Committee consisted of the following citizens and affiliations:

BTAC

Shane Avery – Taxi Service Owner
Louis Conter – Retired/Navy/Contractor
Hal Efron – Structural Engineer
Kevin Keillor – Attorney
Bob Lovlien – Attorney
Tracy Osborn – COCAAN
Kirk Schueler – Brooks Resources
Don Sjolander – Goodwill Industries
Tom Szymoniak – ODOT

Allan Bruckner – Private Investor
Chris Eck – Attorney
John Hummel – Attorney
Michael Lovely – Retired/Forest Service
Jeff Monson – Commute Options
Liz Rewick – Friends of Bend
Michael Schwartz- Sears, Inc.
Sharon Smith – Attorney
Ann Wheeler – Friends of Bend

The TSP contains a thorough review of transportation system. In addition, the TSP provides a framework and strategy for implementation for all modes of transportation, which will function as a general guide for the City of Bend to follow as the population increases within the urban growth boundary. The TSP builds upon the community efforts to date and seeks to address federal, state and local transportation issues in a manner that appropriately considers local values. This requires careful consideration of the issues as they relate to the needs of Bend's citizens.

The TSP is a comprehensive document and mirrors the requirements outlined in the TPR. The following findings have been developed to provide an overview and concise explanation of how the TSP meets or exceeds the requirements of the TPR. In addition,
the findings support the adoption of the Bend Urban Area Transportation System Plan.

1. COMPLIANCE WITH GOAL 12

- The Bend Urban Area Transportation System Plan is for land within the Bend Urban Growth Boundary (city limits) and the jointly city-county administered Urban Reserve Area adjacent to the Bend Urban Growth Boundary.

- Compliance with Goal 12, *Transportation*, is interpreted and implemented through Oregon Administrative Rule 660-012, the *Transportation Planning Rule*. The nine components of a transportation plan described in Goal 12 are met by complying with transportation planning standards in OAR 660-012. The City of Bend has an acknowledged comprehensive plan, which includes the transportation element that will be supplemented with the adoption of the TSP.

- The city has complied with Goal 12 by meeting the requirements in OAR 660-012 through adoption of the Bend Urban Area Transportation Plan and adoption of zoning and subdivision code changes to implement the Plan.

- The Bend Urban Area General Plan, updated in 1998, includes Chapter 7 *Transportation Systems* that addressed many of the elements of a transportation system plan. All of the elements of the larger, more detailed Bend Urban Area Transportation System Plan will supplement Chapter 7.

- The Bend Urban Area Transportation System Plan is adopted as part of the Bend Urban Area General Plan and supplements Chapter 7 in the General Plan.

2. CITIZEN INVOLVEMENT

- The City provided varied opportunities for citizen to participate in the development and review of the Bend Urban Area General Plan and the Bend Urban Area Transportation System Plan. These opportunities, including citizen committees, facilitated citizen study groups, public presentations, public hearings, web sites and other venues, are listed in Table 1 of the Bend Urban Area Transportation System Plan.

- The Bend Transportation Advisory Committee (BTAC) provided more than 2500 person hours of review and discussion of the draft Transportation System Plan between February and May of this year. BTAC meetings were open to the public and included time for public comment and discussion.

- Public comment was provided through presentations to BTAC and through public hearings by the Planning Commission and City Council.

- BTAC recommended changes to the text, policies and funding amounts and funding mechanisms in the Transportation System Plan have been included in the Bend Urban Area Transportation System Plan.

- The level and opportunity for citizen involvement in the preparation and adoption of the Bend Urban Area Transportation System Plan meets or exceeds the standards for citizen involvement in the Periodic Review rule.

- The city has responded to public comment and testimony presented at the public hearings on the Bend Urban Area Transportation System Plan.

3. PREPARATION AND COORDINATION [-0015]

- The Bend Urban Area Transportation System Plan is consistent with Deschutes County's Transportation Plan, an approved transportation system plan. Exhibit "A" in the County Transportation Plan shows consistency between city and county arterial and collector road systems. The City of Bend has coordinated its' transportation analysis with the County and ODOT staff thorough regular meetings which will be ongoing for the life of the plan. The City of Bend has an inter-governmental agreement with Deschutes County by which the parties coordinate planning efforts.

- The EMME/2 Transportation Model and draft Transportation System Plan were reviewed by the Transportation Technical Advisory Committee (T-TAC). The T-TAC included representatives from the Oregon Department of Transportation Region 4, Deschutes County public works and transportation planners, Commute Options coordinator, Bend La Pine School District, Central Oregon Inter-governmental Council, the local Safe Communities Program, and the Bend Metro Park and Recreation District.

- The assumptions and methodology used in the update of the transportation model for the urban area were reviewed and approved by the ODOT Transportation Planning and Analysis Unit (TPAU) in Salem.

- The urban trails shown on Bend Urban Area Transportation System Plan's *Bicycle and Primary Trail System* map are consistent with the trails included in the Bend Metro Park and Recreation District (BMPD) comprehensive plan. The City of Bend has used data from the map when updating the Comprehensive Plan in 1998. The City of Bend has worked extensively with the BMPD staff to develop criteria for trail acquisition and development. The City of Bend has an inter-governmental agreement with the BMPD by which the parties coordinate planning efforts.

- The Bend Urban Area Transportation System Plan includes text and/or map designations for the Parkway, state highways, designated freight routes, and design elements of the Parkway that are consistent with the Oregon Transportation Plan and ODOT Region 4.

- The regional Deschutes County Bicycle/Pedestrian Advisory Committee has reviewed and commented on bicycle and pedestrian needs, priorities, and funding in the Bend Urban Area Transportation System Plan. City staff attends and coordinates activities of the Committee.

- As established by policy in the Bend Urban Area Transportation System Plan, the *Oregon Pedestrian and Bicycle Plan* shall serve as an interim guide for the maintenance and construction of pedestrian and bicycle facilities until local standards are developed. A local advocacy group will help staff prepare the permanent guidelines. Staff has resources allocated and budgeted for assisting in this project.

- The Bend City Council has accepted the ODOT corridor plans for US Highway 97 and US Highway 20 in the urban area and has maintained access controls and regulations consistent with ODOT direction.

- The specific location of planned public school facilities, and the general location of future school facilities, were incorporated into the EMME/2 transportation model. City staff has regular meetings with the School District regarding new school siting and other land use and planning requirements.

4. ELEMENTS OF TRANSPORTATION SYSTEM PLANS [-0020]

- The Bend Urban Area Transportation System Plan includes a road plan for a system of arterial, collector, and important non-collector street connections described in the text of the Bend Urban Area Transportation System Plan and as shown in the Roadway System Plan map. {0020(2)(b)}

- The Bend Urban Area Transportation System Plan includes a functional classification system and design standards for local roads to provide safe and convenient movement of people and goods. {0020(2)(b)}

- The Bend Urban Area Transportation System Plan designates state highways consistent with the ODOT access management categories for the state highways. {0020(2)(b)}

- The Bend Urban Area Transportation System Plan describes public transportation services (Dial-A-Ride) for the transportation disadvantaged, and identifies service inadequacies for the disadvantage and general public. {0020(2)(c)}

- The Bend Urban Area Transportation System Plan describes inter-city bus and passenger rail service and the location of terminals for these services. {0020(c)}

- The Bend Urban Area Transportation System Plan includes a description and map for a network of bicycle and pedestrian routes throughout the urban area. {0020(d)}

- The Bend Urban Area Transportation System Plan identifies rail facilities within the urban area, and describes regional air and passenger rail services outside the urban area. There are no regional port or pipeline terminal facilities within the urban area. {0020(e)}

- The Bend Urban Area Transportation System Plan includes plans and policies for transportation system management and demand management. {0020(f)}

- The Bend Urban Area Transportation System Plan includes policies and implementation objectives for the various transportation elements of the Plan. {0020(h)}

- The Bend Urban Area Transportation System Plan includes a description of existing and proposed local code provisions to implement the Plan and reduce the principal reliance on the automobile. {0020(i)}

5. INVENTORY OF TRANSPORTATION FACILITIES [-0020(3)]

- Bend Urban Area Transportation Plan includes an inventory and map of the existing and planned arterial and collector road system. Missing portions of the future grid are identified on the map. The map shows how the grid system connects to the State and County transportation system.

- An appendix to the Bend Urban Area Transportation Plan provides an inventory of sidewalks and bike lanes along arterial and collector roads in the urban area. (TSP appendix A). Missing portions of future sidewalks and bike lanes are identified on the map.

- Map Exhibit D to the Bend Urban Area Transportation Plan provides an inventory of sidewalks on arterial, collector, and local streets in the urban area.

- City has prepared an inventory of improved trails that provide both recreational and transportation routes within the community as listed on Table 4 in the Transportation System Plan and as shown on the *Bicycle and Primary Trails System Plan Map*.

- There is no fixed-route public transportation system within Bend. The Dial-A-Ride system provides daily "door-to-door" service for seniors and disable citizens within Bend. The City of Bend plans to expand this program to allow general public ridership as the initial phase. The City of Bend will encourage ridership through a variety of methods and develop service routes that are intended to expand into future fixed-route transit.

6. DETERMINATION OF NEEDS [-0030]

- Consistent with the TPR definition that states " Needs...are typically based on projections of future travel demand resulting from a continuation of current trends as modified by policy objectives...especially those for avoiding principal reliance on any one mode of transportation"--- the roadway needs in Bend Urban Area Transportation System Plan are based on the Bend Area General Plan 20-year population, housing, and employment forecasts, and the land use patterns in General Plan. (TPR rule has two factors to determine need (1) population and employment forecasts and (2) implementation measures to reduce reliance on automobile." See –012-0030(3)(a) & (b).)

- EMME/2 computer model was used to estimate Year 2000 and Year 2020 traffic loading on the city arterial and collector roads, and on the state highway system. The model included current and future housing and employment estimates for 155 different geographic areas within and outside Bend.

- The model was prepared and evaluated by Kittelson and Associates, Inc., a professional Transportation Planning/Traffic Engineering firm that has developed two previous models for Bend in 1990 and 1995.

- The EMME/2 model is the current standard in Oregon for modeling vehicle traffic patterns. The assumptions and methodology in the model were reviewed and approved by the ODOT Transportation Planning and Analysis Unit (TPAU) in Salem.

- The EMME/2 model update recommended *combined alternative* showed that some two and three lane road links along 27th Street and Reed Market Road would operate above their capacity levels in the year 2020 forecast. Designating these segments as Major Arterials in the Transportation System Plan will allow eventual construction of a four lane facility with a median/turn lane along these segments that will lower the projected capacity ratios to acceptable levels. These arterials serve the highest concentration of commercial uses and heavy vehicle traffic and are connected to the State Highway system.

- Increasing the right-of-way to 100 feet from 80 feet, where needed, along the designated four lane Major Arterials in these segments would reduced vacant residential land by 5.31 acres and reduce vacant commercial/industrial land by .41 acres. The Council finds that these additional acres needed for future right-of-way are minor and do not significantly reduce the supply of residential or commercial land in the urban area.

- The EMME/2 model is one of several tools used by the city to evaluate traffic needs during the planning period. Other tools used in the needs analysis are the Oregon Transportation Plan, vehicle traffic counts by the city and state, vehicle accident history patterns, and traffic impact studies by engineering firms.

- The bicycle and pedestrian needs are based on future travel demand resulting from land use patterns and alternative transportation modes in the Bend Area General Plan, and previously adopted implementation measures consistent with OAR 660-012-0030.

- By adopting the EMME/2 *Combined Alternative* traffic forecast model the Bend Urban Area Transportation System Plan assumes an increase in bicycle and pedestrian commuting, shopping and recreation trips .

- The sidewalk inventory map shows areas where sidewalks are needed. The BTAC advisory committee recommendation, included in the Bend Urban Area Transportation System Plan, is to construct sidewalks along school walking routes. Other needs in the sidewalk system are to complete routes to major activity centers including downtown, shopping areas, and parks.

- Bicycle needs are primarily based on a state policy decision that bicycles should be accommodated on virtually all collector and arterial roadways. The need is inherent in the presence within the community of large groups of individuals who do not drive or exercise their choice not to drive. This determination of need is consistent with the ODOT *Transportation System Planning Guidelines* prepared for local governments.

- Pedestrian needs, like bicycle needs, are also not usually based on a capacity analysis but that there is a need to establish a network of facilities to link all parts of the community to provide opportunities and choices to all citizens. This determination of need is consistent with the ODOT *Transportation System Planning Guidelines* prepared for local governments.

- The Deschutes County Bicycle and Pedestrian advisory committee, that represents the cities and county, will help the city prepare a specific and detailed list for sidewalk and bicycle infill projects within Bend.

- In compliance with the requirements in the Transportation Planning Rule the city has adopted code measures and land use policies that reduce the reliance on the automobile. Existing and proposed measures are described in Chapter 8 of the Bend Urban Area Transportation System

Plan and in the Bend Area General Plan.

- Public transportation needs have been evaluated through previous Council directives, consultant studies, and special citizen advisory groups. The City Council has determined that a fixed route transit system is needed at buildout.

- The city's 10-bus Dial-A-Ride system does not meet the daily needs of its target customers. Efforts are underway to expand and improve the efficiency of the City's Dial-A-Ride system and to make it available to general public use.

- The City, through studies and citizen comments and recommendations, finds there is a need for a public transit system that is available to all segments of the population.

- An interim public transportation system using an expanded Dial-A-Ride program will meet the needs of the transportation disadvantaged and provide alternative transportation options for others until a fixed-route system can be developed.

- Bend Urban Area Trails Plan prepared in 1995 and updated through the TSP review process provides a needs analysis for trails. Needed and planned trails are shown on the adopted inventory list and on the Bike and Trail map.

- Additional river crossing shown on the City's land use plan transportation map and plan since 1954. EMME/2 analysis shows need for additional bridge still remains even with demand management and other changes incorporated into General Plan in 1998 to reduce vehicle trips.

7. EVALUATION AND SELECTION OF SYSTEM ALTERNATIVES [-0040]

- EMME/2 model analyzed four different year 2000 road system alternatives – No Build, Comprehensive Plan, Transportation Demand Management, and Combined Alternative. These alternatives are described in Bend Urban Area Transportation System Plan.

- The Combined Alternative that is incorporated into the TSP provides for all transportation modes at levels that can reasonably meet identified transportation needs.

- The Bend Urban Area Transportation System Plan supports urban development by providing types and levels of transportation facilities appropriate to serve the land uses in the Bend Area General Plan.

- Bend is not in an air quality "non-attainment" area, nor is it in an area covered by a state Water Quality Management Plan, therefore the Bend Urban Area Transportation System Plan is consistent with this standard in the rule.

- The Bend Urban Area Transportation System Plan reduces principal reliance on the automobile by providing objectives, directives, policies, benchmarks and funding to construct and support alternative modes consistent with the needs for those modes.

8. FINANCING PROGRAM [-0045]

- The Transportation Planning Rule requires that a financing program include (a) list of planned facilities (b) general estimate of timing (c) determination of rough cost estimates (d) discussion of existing funding mechanisms and possible new mechanisms.

- A listing of planned street, bicycle, and sidewalk facilities are included as Appendices A.3 through A.7 to the Transportation System Plan.

- The lists of planned street, bicycle and sidewalk facilities include a determination of rough cost estimates for needed improvements.

- A general estimate of timing for projects is included in the City's adopted five-year Capital Improvement Plan. The Capital Improvement Plan is updated every fiscal year.

- The Transportation System Plan describes the primary funding sources to pay for planned

transportation facilities. The City relies on state shared revenues and system development charges to fund roadway and bike lane improvements. Additional sources used by the City include county participation, urban renewal funds, developer improvements, local improvement districts, grants, and transient room tax.

- The variety of funding sources currently available to the city are not sufficient to pay for all planned facilities. The City Council has authorized the placement of a five-year serial levy before the voters in November 2000 to supplement existing resources. This levy would fund sidewalk construction, trail development, expansion of Dial-A-Ride and additional roadway maintenance.

9. IMPLEMENTATION OF THE PLAN [-0045]

- The policies in the Transportation System Plan and Bend Area General Plan provide the framework for implementing the TSP.

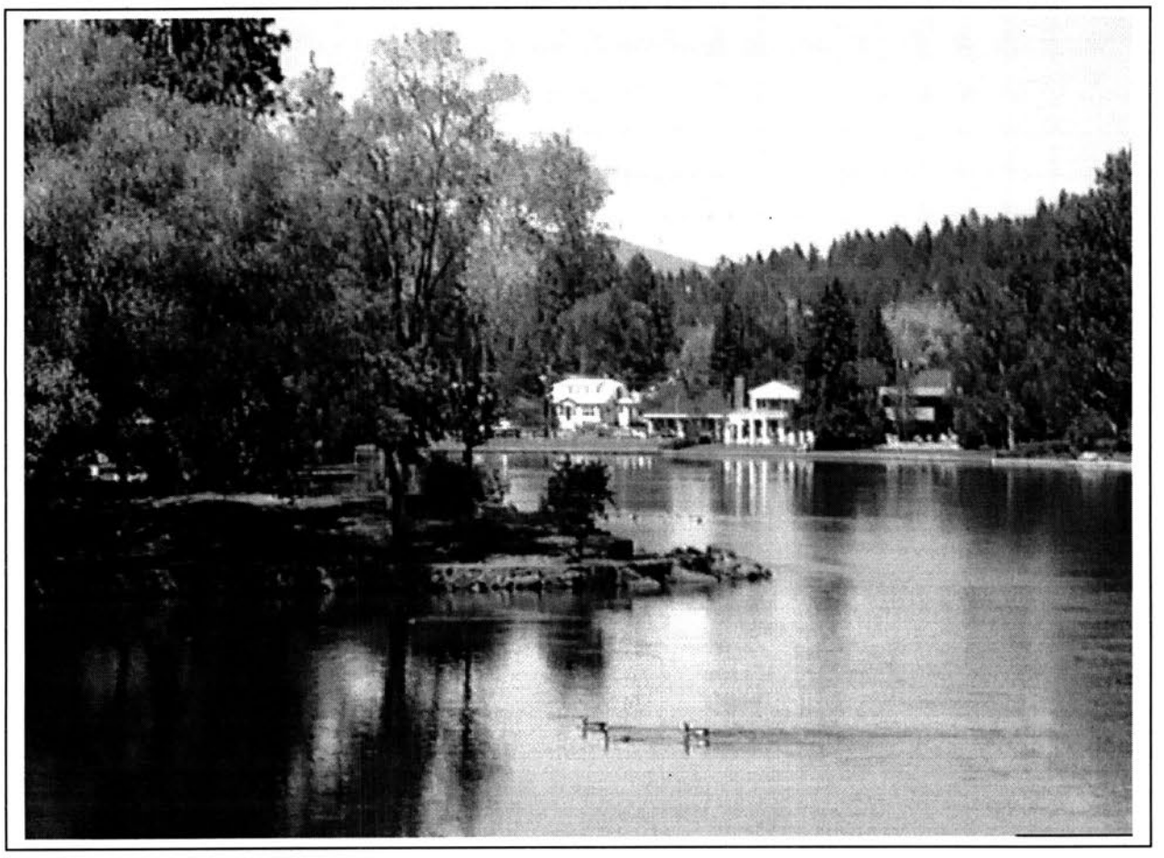
- Transportation System Plan includes benchmarks by which to measure progress in realizing the goals and policies within the Plan. The benchmarks were prepared by the City Council appointed BTAC citizens advisory committee. The benchmarks include direction to update and modify the zoning and subdivision codes to be consistent with the Transportation System Plan policies.

- In 1993, the city adopted zoning and subdivision code standards to provide for safe and convenient pedestrian and bicycle circulation. These code standards have been acknowledged by the Department of Land Conservation and Development, and satisfy the requirements in Section 0045 of the Transportation Planning Rule.

- The city has adopted a variety of development code standards that reduce the reliance on the automobile and/or support alternative transportation modes. These adopted standards are listed in Chapter 8 of the Transportation System Plan.

- Additional code changes needed to implement the Transportation System Plan and General Plan are listed in Chapter 8. These standards exceed the requirements in the Transportation Planning Rule.

Bend Urban Area
Transportation System Plan



ACKNOWLEDGEMENTS

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Tim Berg, Deschutes County computer mapping

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Christopher Eck
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Bob Lovlien
Jeff Monson
Tracy Osborn
Liz Rewick
Kirk Schueler
Michael Schwartz
Don Sjolander
Sharon Smith
Tom Szymoniak
Ann Wheeler

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Mike O=Herron, Vice Chair
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John Gilbert III, Vice Chair
Jeff Ellington
Michael Holtzclaw
Angela Lee
Don Leonard
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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
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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

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APPENDIX B. TSP TECHNICAL STUDIES [*A separate bound document*]

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

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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

RESOURCE DOCUMENT B. City Transportation Studies and State Plans

B.1 Bend Municipal Airport Master Plan, 1994
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RESOURCE DOCUMENT C. Public Involvement Summaries

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C.2 Bend Urban Area Transportation Issues Phone Survey, 1994
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C.4 What's Around the Next Bend - Open House, March 1995
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RESOURCE DOCUMENT E. Transportation Funding Documents

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E.3 City of Bend – Transportation System Development Charges Report, May 2000

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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,

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 year 2000, the City engaged the services of yet another citizens 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.

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 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.

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 Appendix A.

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.

IMPLEMENTION 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.

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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.

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 Brookswood 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.



Figure 1 b. Bend, Oregon 1912

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: B].

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

- 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.

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.

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 TPR. 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 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,*

- *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 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

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.

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 *update*	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
	Refinement Plan **Public Hearing** Hearing follow-up & plan **Adoption** (to be forwarded to City Council)	**June 14, 1999** **June 28, 1999**

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 *update* — 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

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

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

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

	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)	January1994 thru October 1997; Spring 2000
Deschutes County Transportation Technical Advisory Comm. (C-TAC)	Ongoing Coordination (monthly meetings)	December1994 thru October 1997
Comprehensive (General) Plan CAC	*Discussions specific to TSP & Trans. Plan:* 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) *Summary of key issues/discussions*: 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

	5. Transit Feasibility	5. March 17, 1994 June 16, 1994 March 21, 1996 June 6, 1996
	6. Sidewalk Priorities	6. January 18, 1996 March 21, 1996
	7. Street Width Reductions (residential) & **Approval**	7. March 21, 1996 **July 17, 1996**
	8. Trail & Collector Street Plan amendments	8. April 18, 1996
	9. Transportation Model Alternatives discussions/ work session	9. October 10, 1994 November 17, 1994 December 15, 1994 April 20, 1995 May 18, 1995 July 17, 1996
	10. Street Functional Classification	10. January 19, 1995 March 16, 1995 June 15, 1995 October 19, 1995
(T-CAC continued)	11. Highway 97 Corridor Study presentation Recommendation of **support**	11. April 20, 1995 July 20, 1995 **August 17, 1995**
	12. General Plan *update*: • Goals & Objectives • G & O, Text, Policies & Maps • **Approve** Transportation Chap. Forward to PC • Alternative Evaluation Criteria	12. 1996-1997: July 18, 1996 August '96-April '97 **May 15, 1997** July 17, 1997
	13. *Roundabouts* – special mtg. presentation	13. January 30, 1997
	14. South River Crossing – EIS Scoping Study Recommendation to City Council	14. April 11,1997
	15. Joint meeting w/Comp. Plan CAC	15. April 22, 1997
Bend TSP Advisory Committee (BTAC)	1. Full Committee Meetings (10 meetings)	1. Feb-May 2000
	2. Subcommittee Meetings (55 meetings)	2. Feb-May 2000
	3. Open Houses	3. Feb. 15, 2000 Apr. 25,27, 2000 May 5,6, 2000
	4. Jt. City Council/Plan. Comm. recomm. present.	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

		December 19, 1995 January 26, 1996 March 8, 1996
Safe Communities Coalition	Deschutes County Safe Communities Program General *Meetings*	December 10, 1996 June 24, 1997
Bend Chamber of Commerce: *Leadership Bend Class*	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 Guest Speaker: Andres Duany – *Rethinking Urban Sprawl* Newport Avenue *Design Charrettes* sponsored by Friends of Bend & Brooks Resources NorthWest Crossing Develop. *Open Houses* (West Bend Properties) West Bend Transportation Consortium *Workshops* Friends of Bend sponsored Guest Speaker: Ebon Fodor – *Who Pays for Growth?*	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 *charrettes*: 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. *Transportation Updates* Newsletter 2. *Our City* Newsletter 3. *Our City* Newsletter 4. *Safety by Design* Newsletter 5. *Safety by Design* Newsletter 6. *What's around the Next Bend* – Transportation Newsletter 7. *What's around the Next Bend* – General Plan Update Info. Flyers 8. *Our City* Newsletter 9. *Safety by Design* Newsletter 10. *Safety by Design* 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

	11. *Our City* Newsletter 12. *Our City* Newsletter 13. Bend Community Survey 1999 14. *Our City* Newsletter 15. *Our City* 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: *Roundabouts* 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 3, 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

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 as 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, 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.

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[:B13].

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.

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.

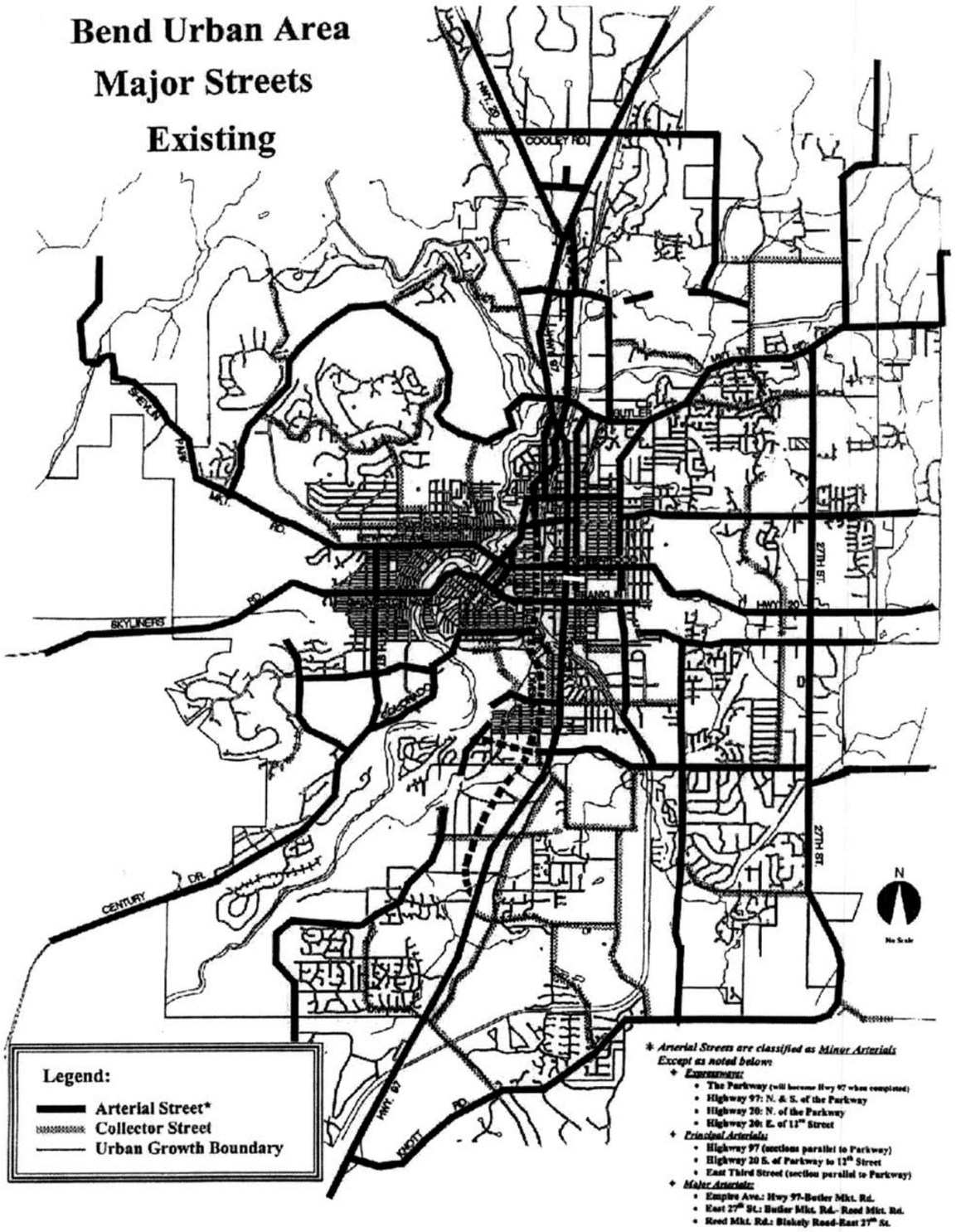
Several state highways serve the Bend area. These highways include the Dalles-California Highway and Third Street (U.S. Highway Route 97), the McKenzie-Bend Highway (U.S. Highway Route 20 - "to the west") and the Central Oregon Highway (U.S. Highway Route 20 - "to the east"). Also, Century Drive (State 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.1 and A.2. 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).

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



Adopted: October 11, 2000

The inventory detail, in Appendix A, 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 B, Figures 9a-d, provide a graphic illustration of the existing summer peak hour traffic volumes for the urban area.

- **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 B.

- **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.

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 (Wagners 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	27th Street	City of Bend
31	Butler Market Road	Boyd Acres Road	City of Bend
32	Century Drive Roundabout	Century Dr./14th St./Colorado Ave.	City of Bend

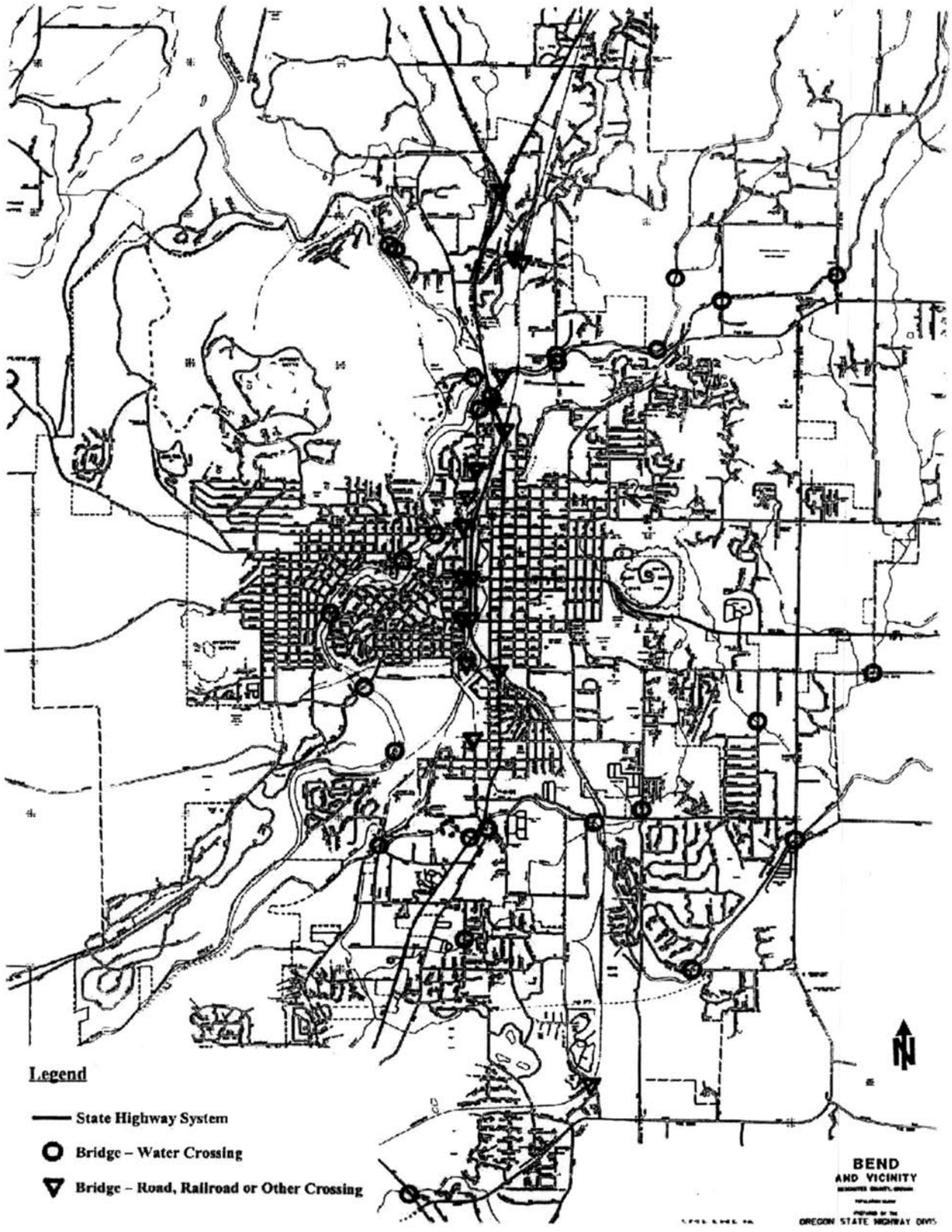
Table 3
Existing Bend Urban Area Bridges

	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 27th 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 18th 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 15th Street	North of Reed Market Rd.	Canal crossing
SE 27th 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

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)

Figure 3
Map of Bend Urban Area Bridges – Existing



Adopted: October 11, 2000

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 A.).

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".

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 *will be built* 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 BMPRD 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***

3.4 PUBLIC TRANSPORTATION SYSTEM

3.4.1 BEND DIAL-A-RIDE PROGRAM

Bend's Dial-A-Ride system is available for use by seniors (60 and older) and eligible disabled persons. The Dial-A-Ride transit 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 city limits. The program operates Monday through Friday from 7:00 AM to 8:00 PM, and on Saturday and Sunday, from 9:30 AM to 4:30 PM. The rides are provided at a cost of $0.50 per one-way trip. There are ten vehicles scheduled for daily service - all are equipped with wheelchair lifts. The capacity of each vehicle ranges between 10 and 14 people dependent upon the number of wheelchair riders. The total number of passenger rides for fiscal year 97-98 was about 58,000. Dial-A-Ride is unable to serve about 40 ride requests per month, although many of the ride requests can be accommodated at a different time or day.

3.4.2 OTHER EXISTING PUBLIC TRANSPORTATION FACILITIES

Considering Bend does not have an existing public transportation system, the number of existing "transit" related facilities is quite limited. There is currently one formalized Park and Ride facility located in the north parking lot of the ODOT, Region 4, administration office. Additionally, a specialized park and ride lot is at the Mr. Bachelor Super Shuttle lot, located at the northeast corner of Simpson Avenue and Columbia Street. Other more informal park and ride activities may occur there but the lot is primarily designated for use by Mt. Bacholor employees and their customers. 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 downtown area. Also, Commute Options for Central Oregon has been actively seeking other sites for Park and Ride activity and is currently working with ODOT to designate and improve some public right-of-way on the east side of Highway 97 between Robal and Cooley roads.

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).
- ***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 B.).

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

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.

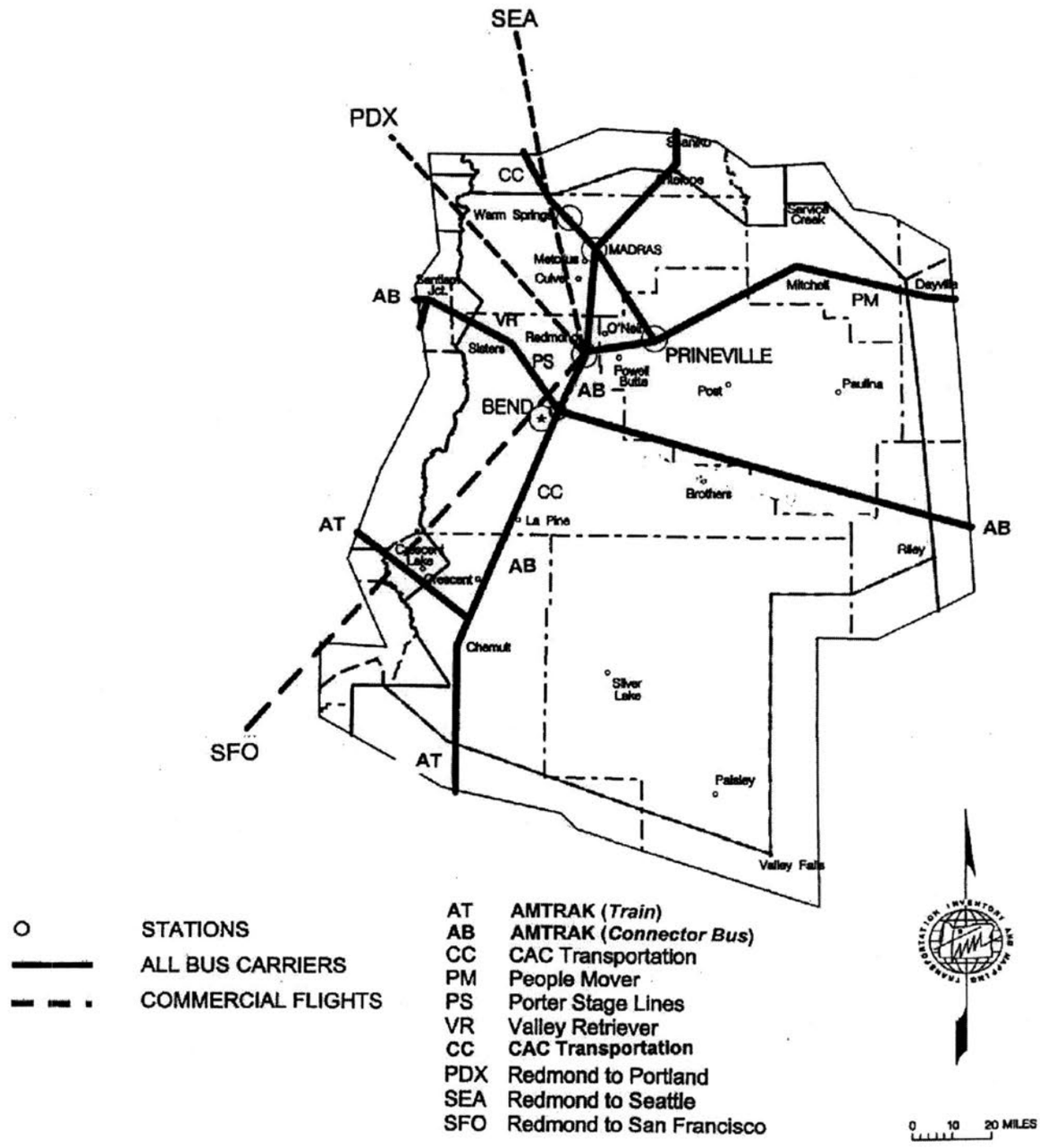
3.5.2 AIR SERVICE

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.

Figure 4
Central Oregon Public Transportation Services – Existing



Adopted: October 11, 2000

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.

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 judgement 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).

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

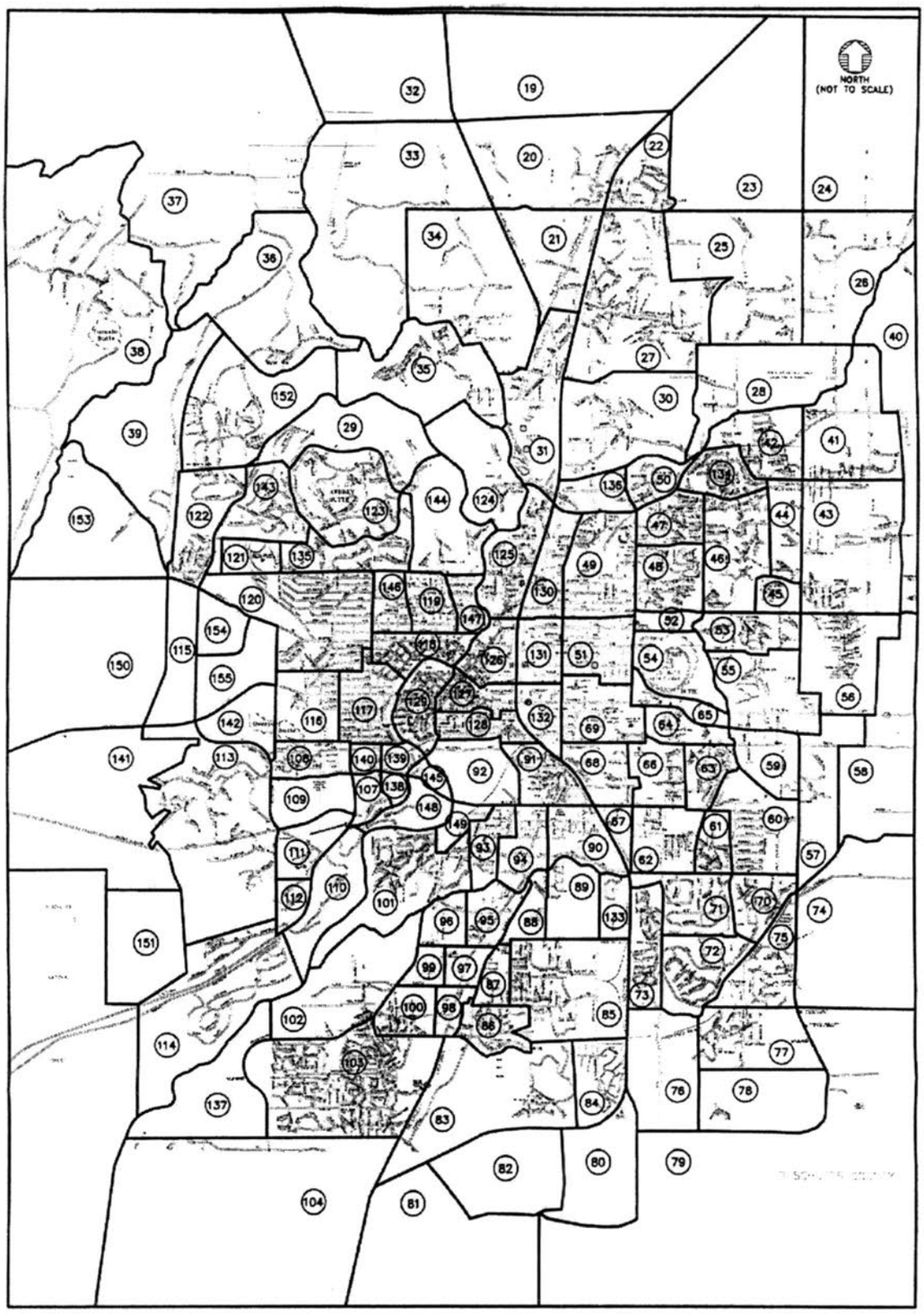
Rank	Major Street	Cross Street	Intersection Type	Total
1	Highway 97	Greenwood	4 leg, w/signal	43
2	Highway 97	Revere Avenue	4 leg, w/signal	32
	Highway 97	N. Division	3 leg, w/signal	32
3	Highway 97	Empire Boulevard	4 leg, w/signal	31
4	Highway 97	Division (S)/Brosterhous	4 leg, w/signal	30
5	Highway 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 8th Street	4 leg, w/signal	24
10	Highway 97	Reed Lane	4 leg, w/signal	23
11	Franklin Avenue	2nd Street	4 leg, w/stops on 2 sides	21
12	Greenwood	4th 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 B (in the KAI Report Appendices, and large-scale TAZ map - KAI Figure 1).

Figure 5
Map of Transportation Analysis Zones (TAZs)



Adopted: October 11, 2000

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 B]). 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 B]. 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 affect 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 network is illustrated on Figure 6. The *future* planned roadway network is illustrated on Figure 7.

4.1.0.3 Trip Generation

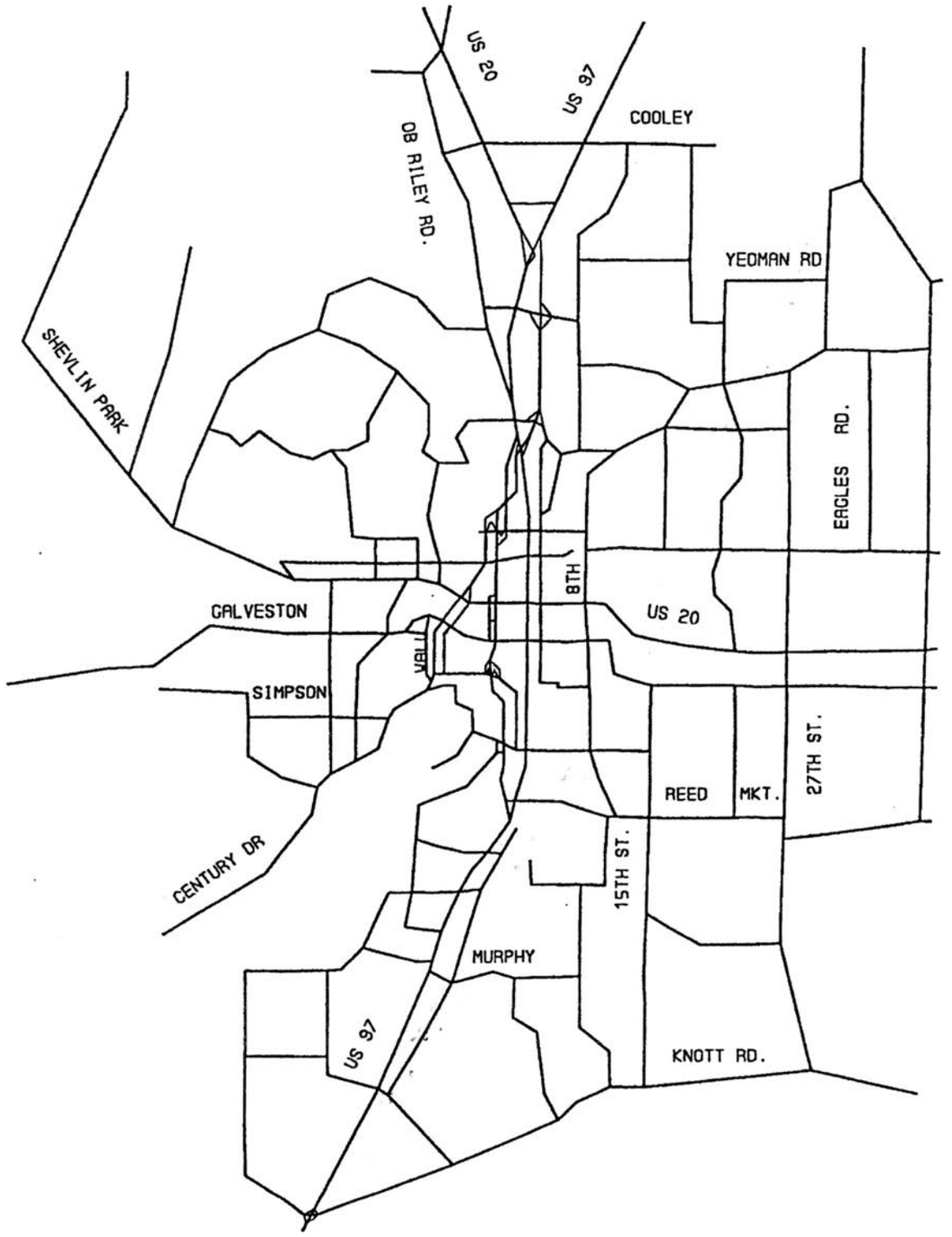
The first major step in estimating the existing traffic conditions was the calculation of trip generation based on the land use inputs (housing and employment). A total of 27,143 P.M. peak-hour, (summer) weekday trips were estimated for the existing (year 2000) system in the urban area. While actual 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 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 that 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 that 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.

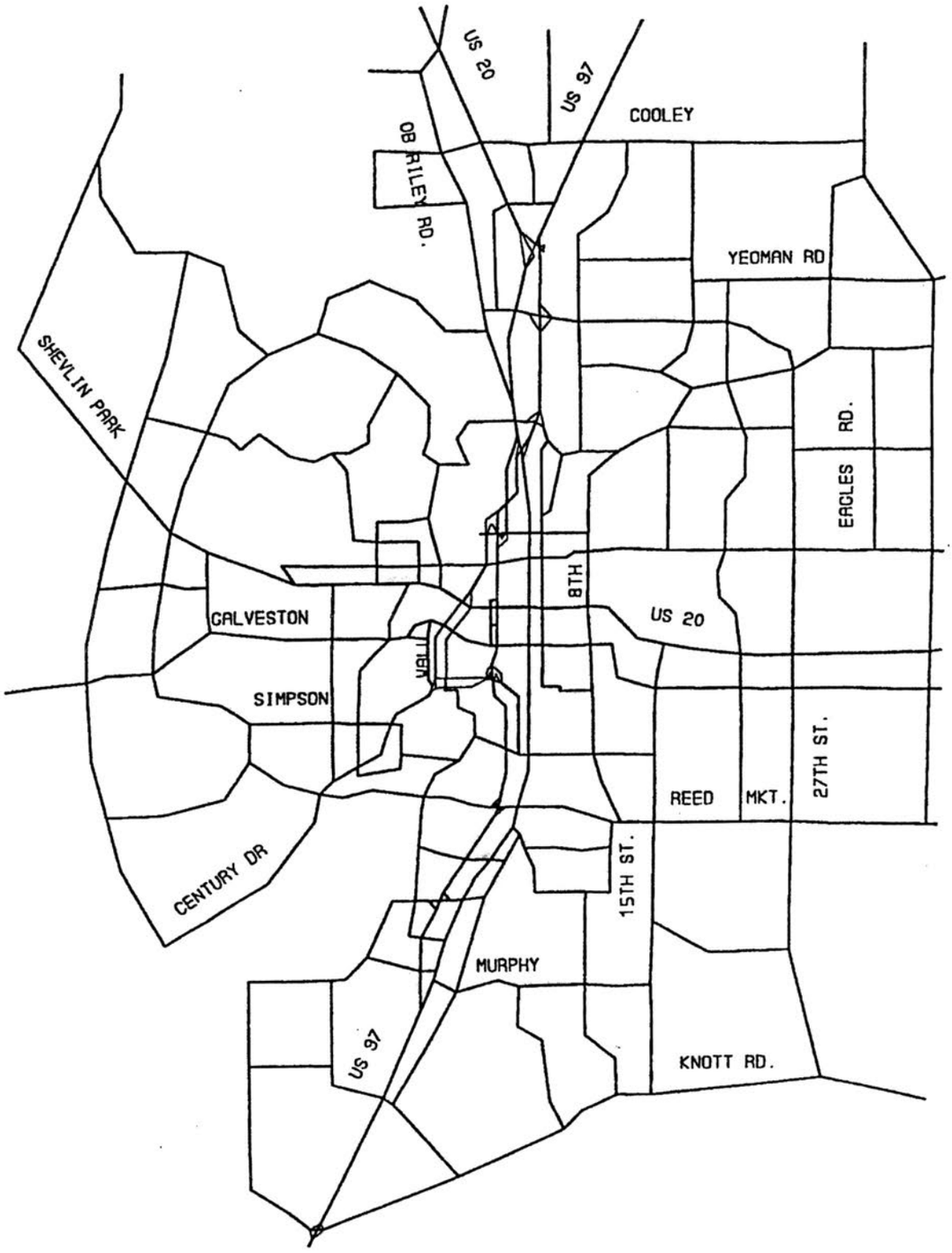
The Bend Chamber of Commerce was also contacted to further substantiate increased tourist related activity during the summer. Although the chamber does not compile information about hotel and motel occupancy rates, chamber staff felt that the 30 percent increase was a reasonable estimate. As it relates 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.)

Figure 6
EMME/2 Traffic Model – Existing Road Network



Adopted: October 11, 2000

Figure 7
EMME/2 Traffic Model – Future Road Network



Adopted: October 11, 2000

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

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). These roadway costs include the construction of missing curbs, sidewalks, bike lanes, and other vehicle lane improvement and widening costs, other "new" roadway

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.

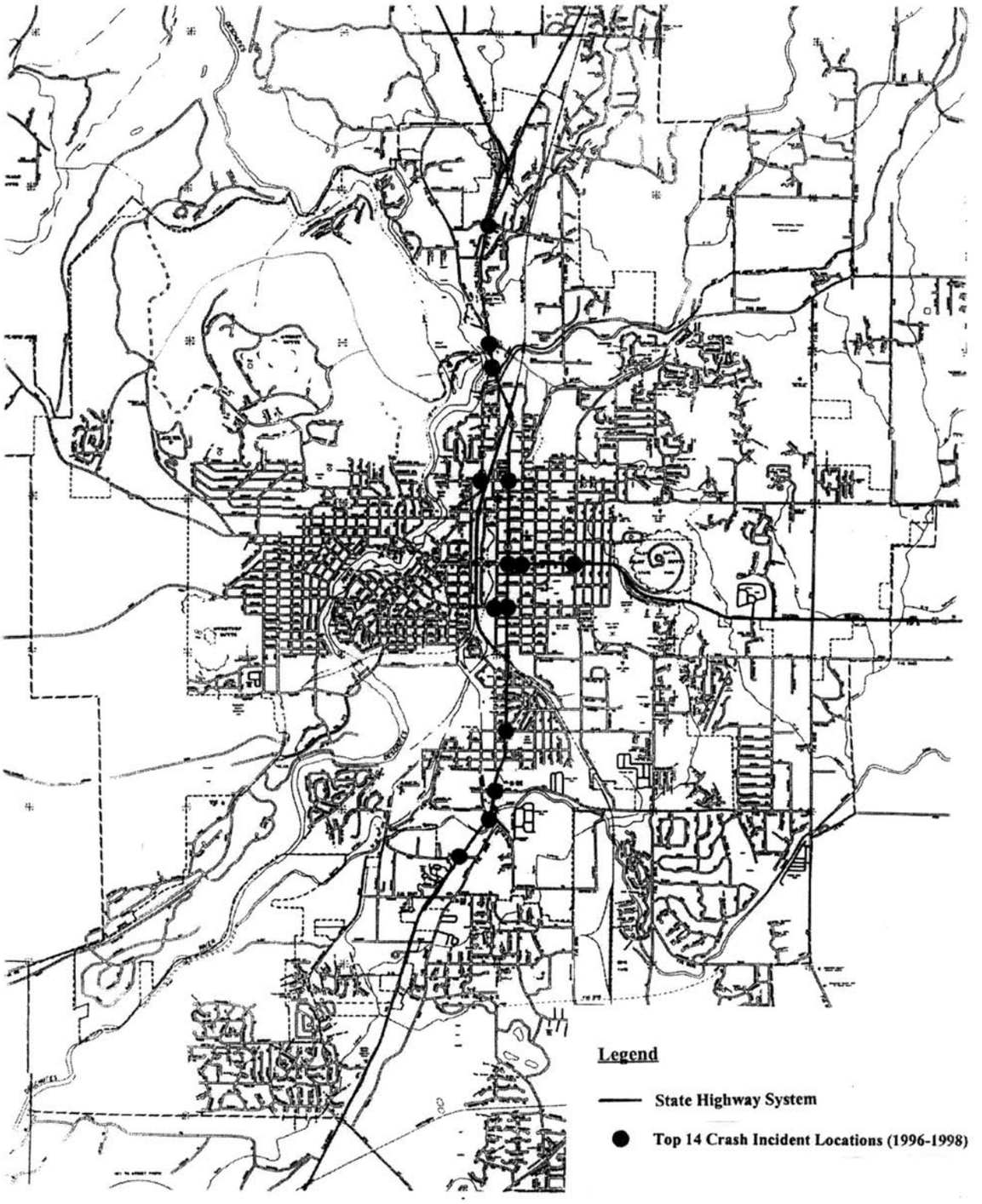
4.2.1.2 Safety Improvements

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.

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



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 judgement 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).

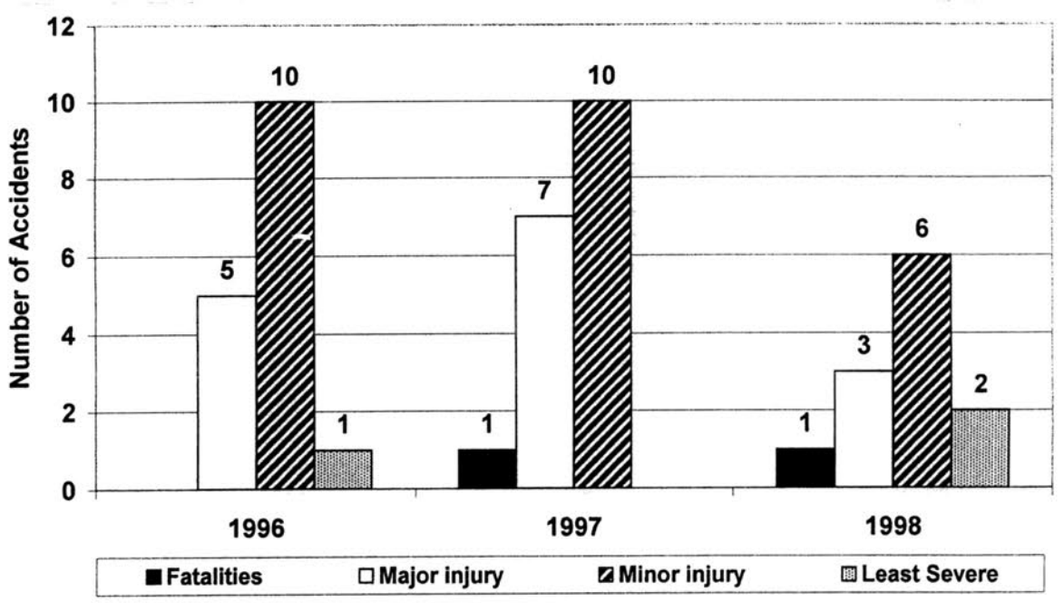
Figures 9 and 10 provide summary information concerning ODOT reported pedestrian and bicycle crash injury severity for a three-year period (1996-1998), in Deschutes County. Emergency room records indicate that there are many more related injury crashes involving *bicycles* that don't get reported in 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.

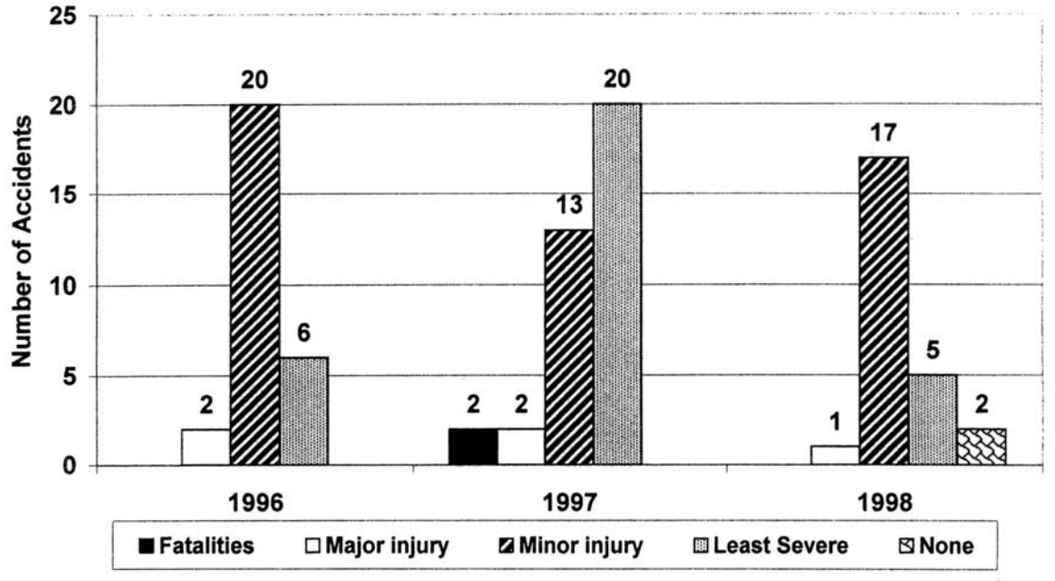
On July 1, 1999, the City annexed the area out to the UGB line (See: Figure 12). Thus, the City's responsibility for non-standard or poor condition roads grew dramatically. Beginning in 1999 , the City took over the responsibility for this area (per an IGA with the County). The City overlaid approximately 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.

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



Q:\DataSummaries\Pedsbw.xls Compiled by Deschutes County Safe Communities Source: ODOT, 7/1/99

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



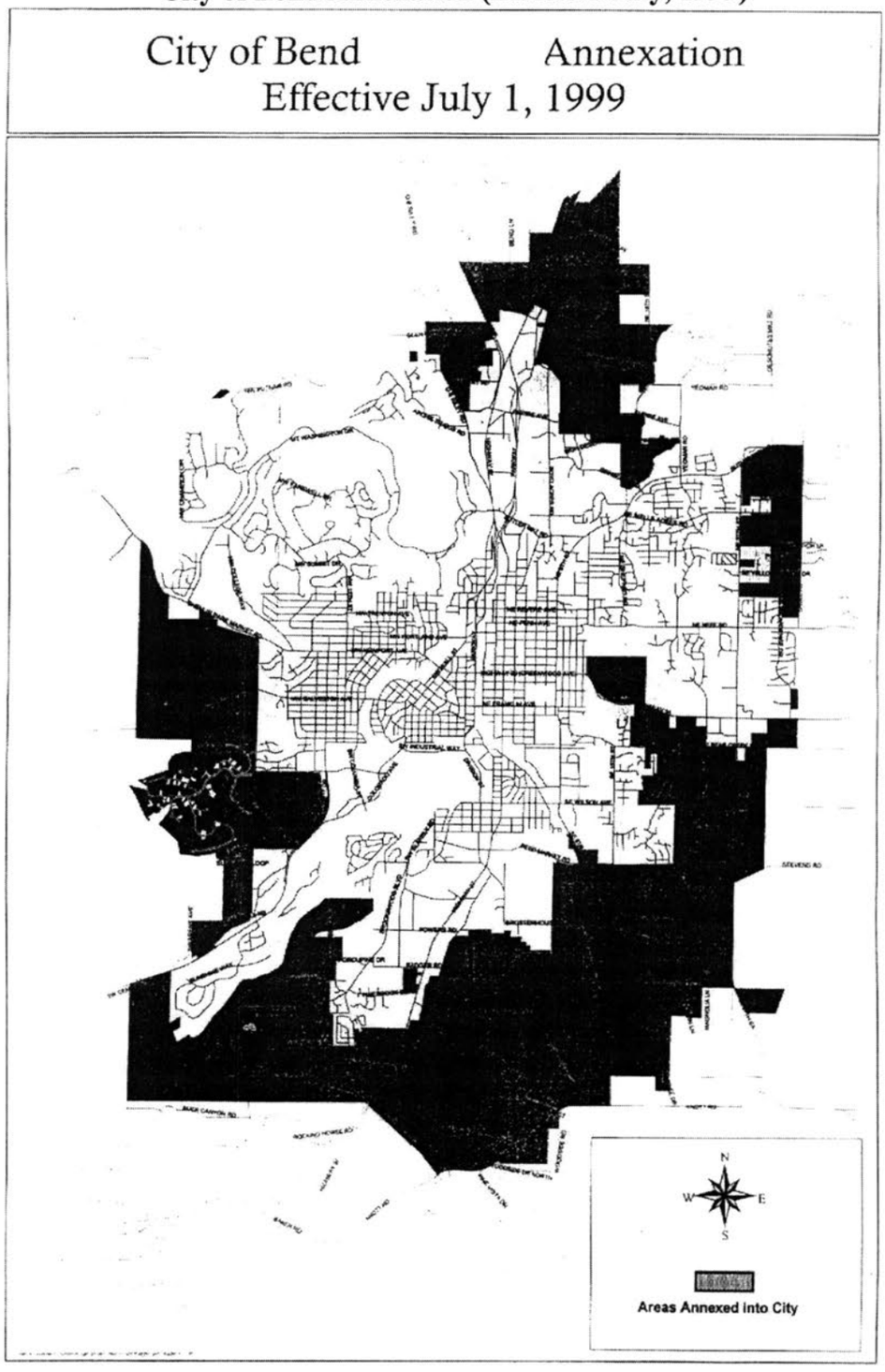
Adopted: October 11, 2000

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

Priority	Definition
0= Continued	Construction contracted as of June 30, 1999
1= Critical	Imperative for reliable street operations
2= Essential	Absolutely necessary for operation of system
3= Necessary	Needed for efficient operation of system
4= Desirable	Useful for proper operation of system
5= Pending	Of no immediate consequence

Project Description	Priority	(Amounts in thousands) 99-00	00-01	01-02	02-03	03-04
Street Overlay Project - may include the following:	1	800.0	800.0	800.0	800.0	800.0
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						
2- ATV'S 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**

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



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 A, 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

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 A. Approximately 32 more miles of trail improvements will be necessary to complete the primary trail system.

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)
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.

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 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.

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.

- 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 B).

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***.

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 B).

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

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 B). 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.

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 B).

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 B (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.

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

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.

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.

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*

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.

Table 10
Qualitative Comparison of the Alternatives

Impacts* *The impact is: Positive, Moderate or Negative*	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**

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.

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

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. 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.

5.5.2 Public Transportation

Fixed-route transit: In the transportation modeling of the 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 KAI Report illustrates what roadways would be served with transit and the respective TAZs that were adjusted for transit use (KAI - Figure 18). This was envisioned as a traditional type of fixed–route transit system and it was assumed that this full-scale transit network would serve the major travel corridors of the City in the year 2020 (i.e., the twenty year "planning horizon").

In 1996, the City completed a "feasibility study" of transit for the Bend urban area[B.4]. The study, prepared by a leading transit consultant, approached the question of how to provide transit service from a more practical, start-up type system. In this fashion, a more incremental look at fixed-route transit was prepared. It evaluated alternatives that

included a 3, 5 or 9-bus fixed-route system. The study also examined different route scenarios that were based on *coverage* versus *productivity* for the 3 and 5 bus alternatives. Only a *productivity* based route design was looked at for the 9-bus (7-route) system. The 9-bus system (evaluated in the feasibility report) is probably the scenario that best replicates the system envisioned in the transportation modeling effort (although, transit coverage in the model was greater than the 7-route system evaluated in the feasibility study).

The 5-bus transit system (based on *productivity*), suggested in the 1996 Transit Feasibility Study[B.4], is illustrated in Figure 13. This is a good depiction of the most likely type of "start-up" fixed-route transit system. The larger, more comprehensive 9-bus transit system, illustrated in Figure 14, better represents the transit system envisioned in the transportation modeling work. Again it should be noted, that no specific commitment has been made to any particular fixed-route transit system. The final design of a fixed-route system, including the location, number and type of transit stops remains the subject of additional study or analysis.

Additionally, in 2000, the City contracted with the same transit consultant to evaluate the current Dial-A-Ride system to evaluate possible changes in this system for improving and adding general public service[B.5]. This study proposed a six zone-route system. This system would consist of five zone-routes serving the downtown and the area bounded by Greenwood Avenue, Highway 97, Penn Avenue and 27th Street on hourly *headways*. Each zone-route bus would travel between one of the five zones and the destination area. Figure 15 shows the five zones that would be served as destination areas. Each of these five zone-routes would drop-off and pick-up passengers almost entirely in one zone and the destination area. In some instances, such as along zone boundaries, service may be provided into another area. Ride time would typically be no more than 40 minutes. The other route-zone is along Highway 97 and would serve as a shopping run that would travel from Mountain View Mall to Wal-Mart, deviating into all five zones by request. This service would have hourly headways during peak afternoon hours and two-hour headways off-peak. It is proposed that this system would operate using nine vehicles off-peak and ten vehicles during peak time.

A route zoning system is a demand-responsive service that picks riders up at their door or at the curb. It travels through defined service areas according to a published timetable in a predefined window of time. That same vehicle might pick up neighbors going to the downtown or the senior center and each one would be dropped off as defined by the route of the vehicle. Riders would still have to call in for service, but they could do it on the day of service with a reasonable lead-time of one or two hours. Zone-routes would be built around key destinations such as the medical center. Key stops could be designated based on use as the system develops. Some area trips that go outside of designated zones would still need to be served by one-to-one Dial-A-Ride with advance call-ins, but this system would minimize that service.

At this point, there has been no specific movement in the City to establish a fixed-route transit system. The City does not currently have sufficient funding to support the cost of operating a fixed-route transit system on its own. However, the City is now considering (and BTAC supports) a transportation funding measure for improving public transportation with a system similar to that recommended in the Dial-A-Ride study. Additionally, the City Council *has* declared that "*transit is feasible, at build-out*". Therefore, it is assumed that a transit system will be in place by the year 2020, if not before.

The major issue with public transportation service today is 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 Feasibility Study did include a citizen survey regarding transit issues with a principal focus on transit funding. This survey indicated that generally there was a strong community acknowledgment that Bend was now large enough to have a transit system. However if the issue were put on the ballot, the 1996 report suggested that voter support would be limited to a funding measure sufficient only to operate a 3-bus fixed-route system. Presently, the most recent public opinion survey (completed in 2000) indicates that voters would support a funding measure to expand the demand responsive system.

The *Recommended Transit Alternative* includes provision of an intra-city transportation service for the general public. **STEP 1a**: Recognizing the fact that the City has limited funds for transit operation, the City will actively seek voter approval of a funding measure sufficient to support a demand responsive system similar to that envisioned in the 2000 Dial-A-Ride study. Also, other state/federal grants will be pursued to augment the service or to increase transit capital investments. If the ballot measure is unsuccessful, the City will evaluate other strategies for gaining public transit funding for transit operations. These may include; redesigning or scaling back the funding measure and resubmitting it for voter consideration, and/or revisiting other transportation funding mechanisms that were considered by the citizen advisory committee (BTAC). **STEP 1b**: Includes the establishment of a demand responsive system similar to the existing Dial-A-Ride system. This demand responsive service would also provide, over a period of time, quantifiable data concerning transit trip origins and destinations. It is estimated that this service would serve the community for a period of a few years (or until enough ridership data is compiled to support the next incremental service step)*. **STEP 2**: Compilation of a transit ridership data base will help to determine common transit routes that may be better served by a fixed-route system. The next permutation of the transit system would be a "deviated", fixed-route system. Under this transit concept, transit vehicles run generally along a predefined fixed-route network, picking up riders along the way at designated stops and/or route *deviations,* as directed by a central dispatcher, to pick-up "Dial-A-Ride" patrons that have called in a recent ride request. *Deviation* from the fixed-route network is generally limited to a short distance (e.g., a quarter of a mile) to minimize travel time loss. Transit *steps* #1 and #2 are estimated to serve transit needs for approximately a five-year period* total. **STEP 3**: As transit rider demand increases

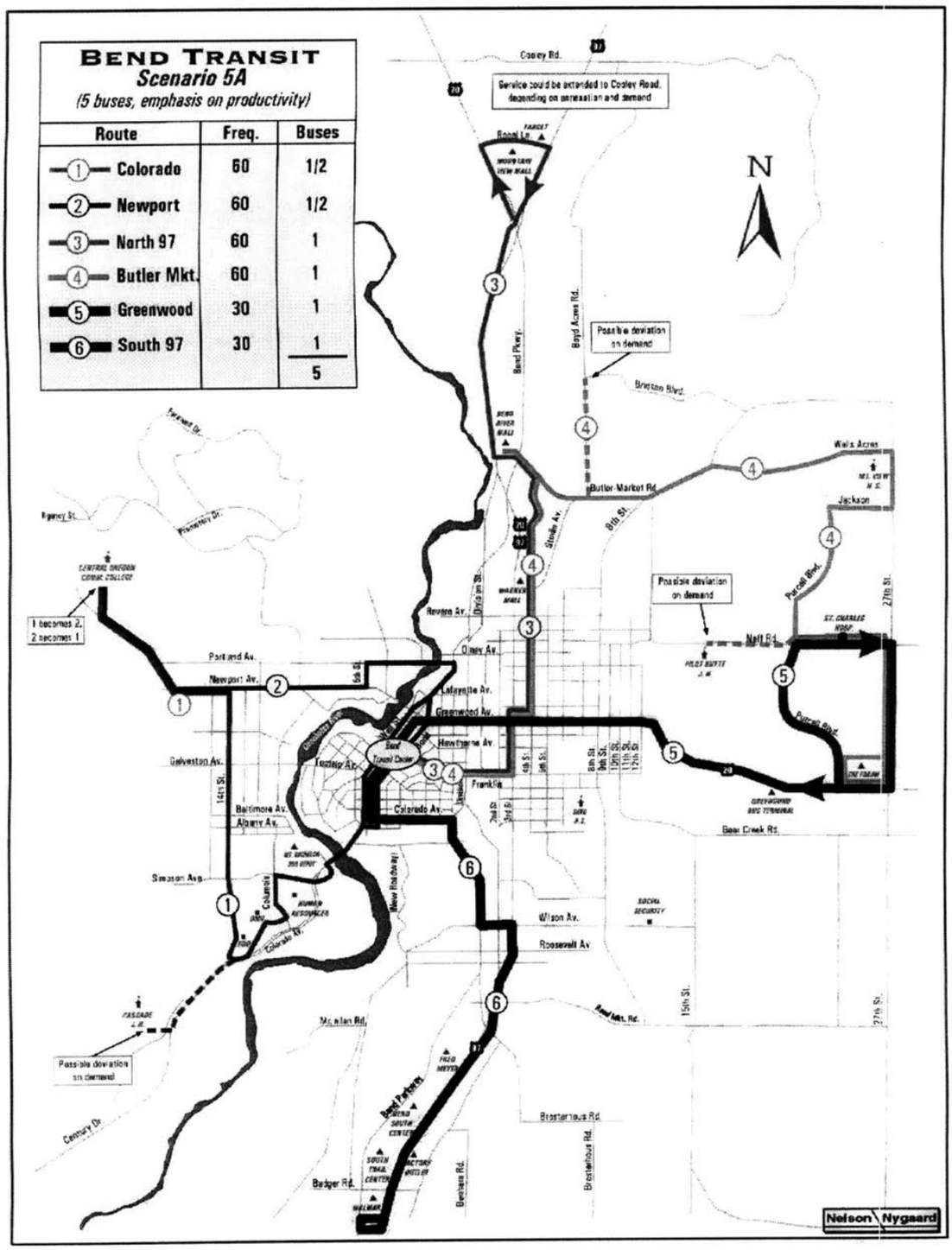
along the fixed-route, deviation service would be phased-out and fixed transit routes would be established (or if ridership data supported the service, *step* 3 could be implemented immediately after *step* 1 b). It is estimated that a rudimentary fixed-route system would be established within a 5 to 10-year time period* (most likely replicating the network illustrated in Figure 13). **STEP 4**: 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.

[*The time frames depicted are general in nature and would be based on securing sustainable transit funding resources and transit performance. An accelerated *step* schedule could be achieved (as opposed to the one articulated in this section) as additional funding resources may become available and transit system ridership warrants.]

Additionally, amendments shall also be made to the appropriate City Ordinances that will ensure that the design of new developments will accommodate, support and encourage transit travel. This would include transit supportive design elements in higher density residential and employment areas along all arterial and collector streets. The City engineering standards and specifications shall also be modified, as appropriate, to accommodate and provide details concerning transit service on roadways. The design of all arterial and collector streets shall incorporate appropriate elements such as augmented street sections (e.g., wider lane widths, increased sub grade sections), transit pull-outs and waiting areas, etc., that will encourage or better accommodate transit vehicle activity and/or patronage.

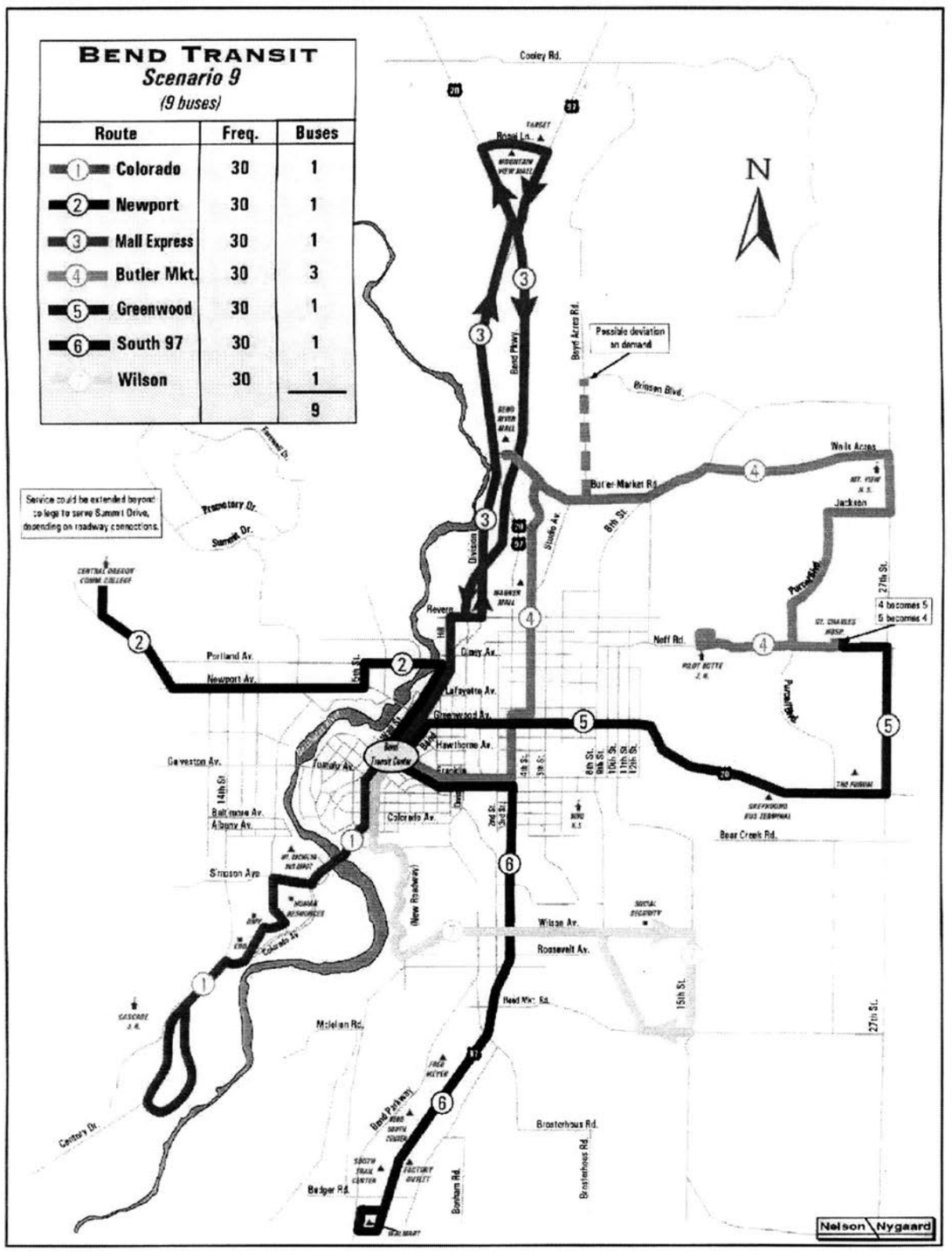
[See Section 6.4 Public Transportation System *for more details* concerning planned transit facilities]

Figure 13
5-Bus Route Alternative



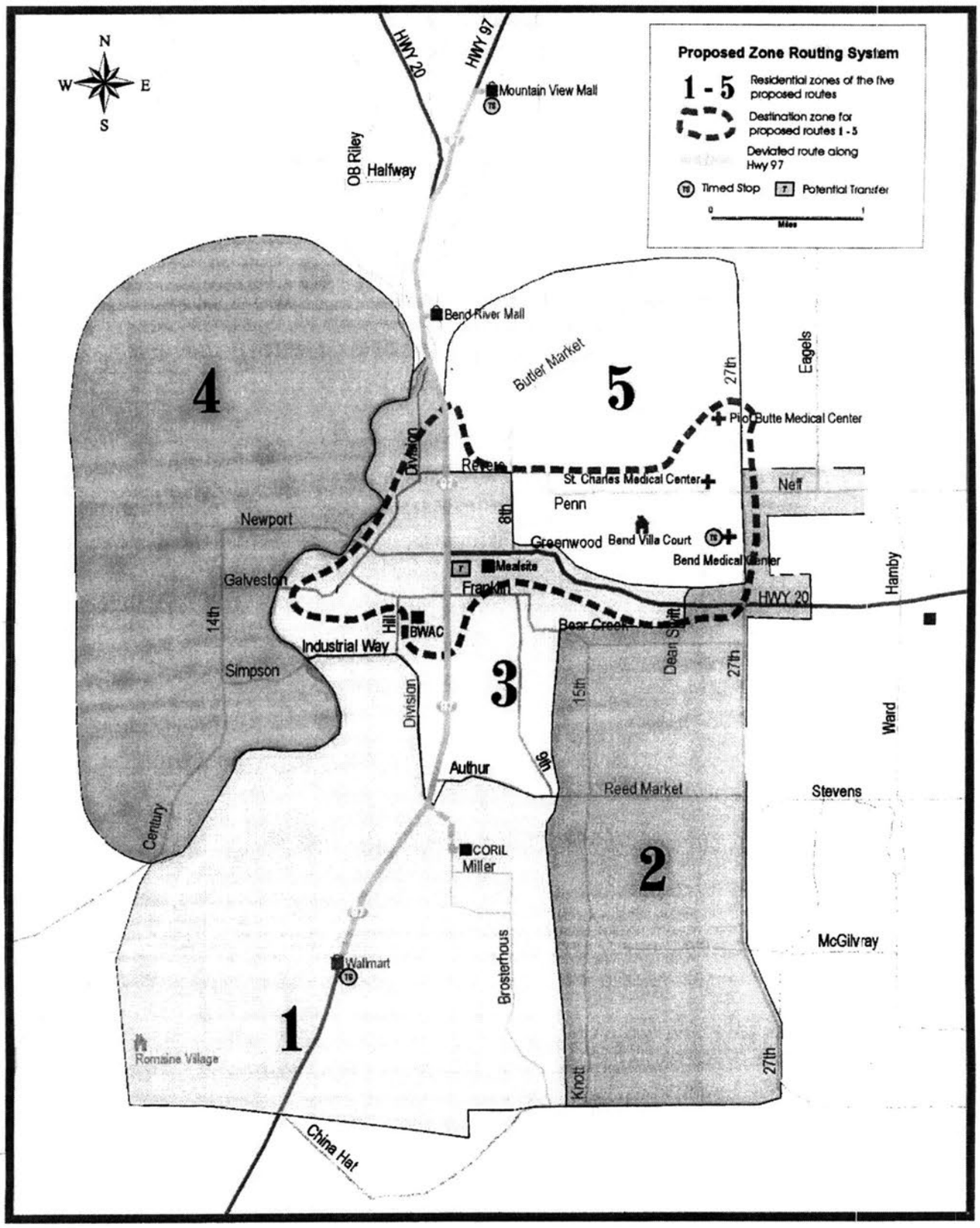
Adopted: October 11, 2000

Figure 14
9-Bus Route Alternative



Adopted: October 11, 2000

Figure 15
Proposed Zone Routing System (Dial-A-Ride)



Adopted: October 11, 2000

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

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

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 constructed on both sides of all new arterial and major collector streets (sidewalks are on one side of the street in steep slope areas). 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 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 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 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 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: Included in this TSP adoption process are revisions to the transportation system to facilitate improvement of the south access to the downtown from the Parkway. A number of alternatives were examined including changes of various streets to one-way roadways. The alternative that emerged as the best traffic capacity (and most cost effective) solution was to extend the Wall/Bond one-way system to the south to include the area between Franklin and Arizona avenues. This alternative also includes the reconstruction of Colorado Avenue as a westbound roadway, between Broadway Street and the Parkway, and Arizona (to be constructed) as an eastbound roadway, between Colorado (i.e., just west of Broadway) and the Parkway.

To address this element of the Transportation Plan, (the described section of) Arizona Avenue will be added to the roadway network of minor arterial streets (Figure 18). The Transportation Plan currently shows Bond Street extending between Arizona Avenue and Industrial Way and along Industrial Way. The TSP also calls for a study of whether an extension of Lava Road (see Figure 18), or some combination of both, should be used as the main connection between the Old Mill District, the downtown and the Parkway. Determining which of these alternative alignments should be used shall include a careful consideration of issues. These issues include a balancing of the adequacy of Old Mill District access and mitigating cut-through traffic in the neighborhood located between the Old Mill District and downtown.

The policies section of the TSP requires that before the Lava Road alternative to the Bond Street connection can be finalized as part of the TSP road system, the City must conduct a traffic study. This study shall include an analysis of the performance of the Bond Street alternatives, including traffic impacts on adjacent neighborhoods and how those impacts could be mitigated. If the City proceeds with the Lava Road extension, it shall prepare a plan for and fund traffic control and calming measures that will minimize cut-through traffic while allowing residents of the neighborhood reasonable ingress and egress. The area of primary concern is located between the Arizona/Colorado one way pair system and Franklin Blvd. If the Lava Road extension or a combination of alternatives using the Lava Road extension is chosen, the mitigation measures must be in place before the Lava Road extension alignment is implemented.

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 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.

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	*[$75,524]*	*[$101,005]*
#7b opt.2	Deschutes River Trail [3]		22	*[$4,818]*	*[$28,416]*
#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:

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

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	
Brosterhous, American Lane to Murphy	E	C	Y	3,900	$117,000	
Brosterhous, Chase to American Lane	N	C		2,000	$60,000	
Brosterhous, Hwy 97 to Parrell Rd.	N	C		400	$12,000	
Brosterhous, Murphy to Knott	E	C	Y	3,100	$93,000	
Brosterhous, 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 Brosterhous	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	

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 Brookswood	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

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)

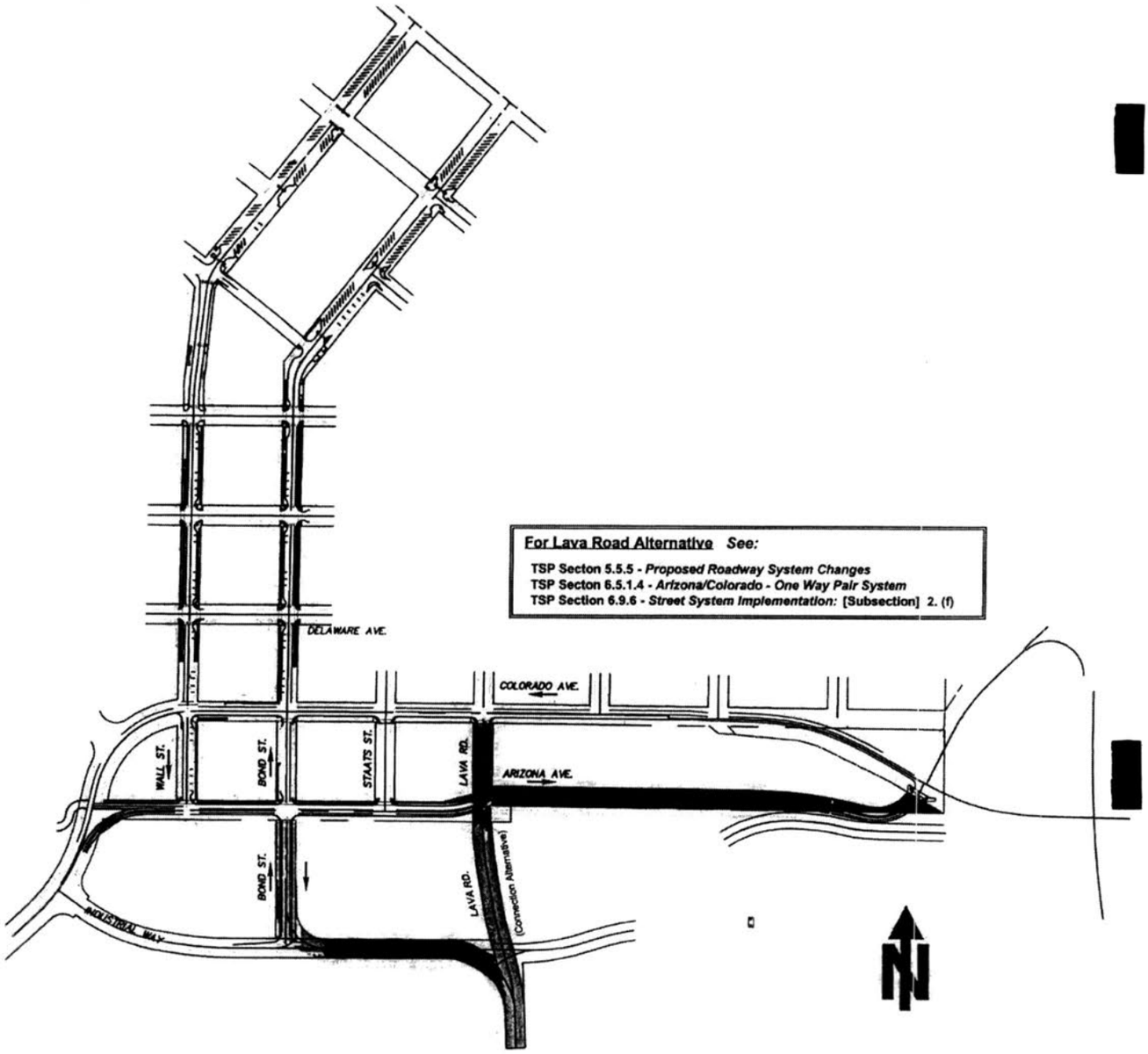
** Cost to be determined

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



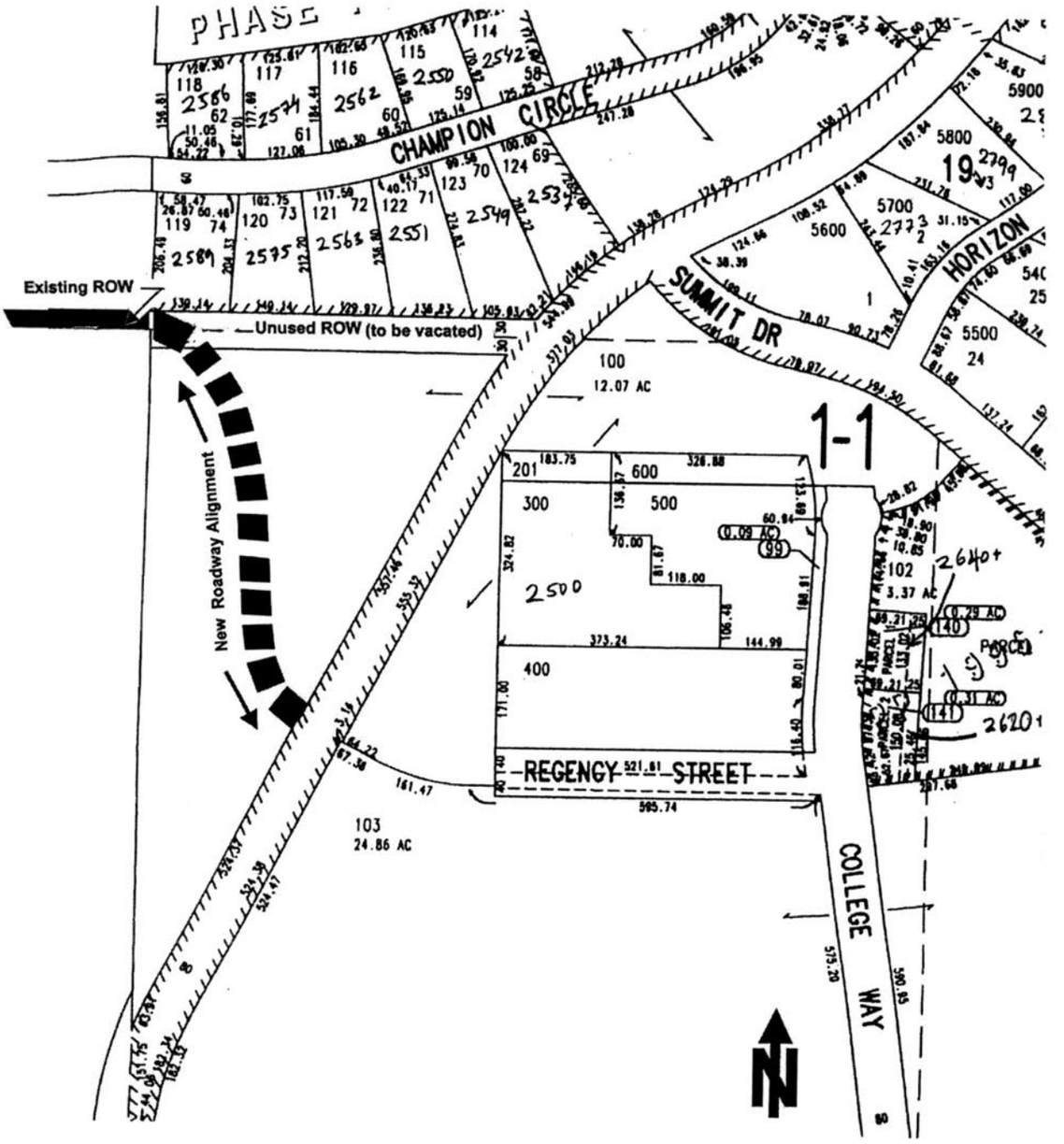
Adopted: October 11, 2000

Figure 18
Wall/Bond/Colorado/Arizona One-Way Pair (Couplet) System



Adopted: October 11, 2000

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



6.0 TRANSPORTATION SYSTEM PLAN

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 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.

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.

"... 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."

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.

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.

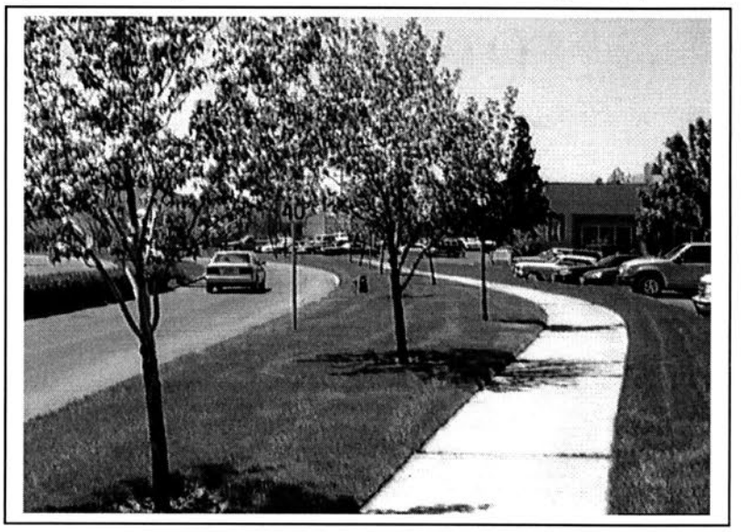


Figure 20. Landscape buffered sidewalk On Colorado Avenue
Photo by: City of Bend

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.

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.

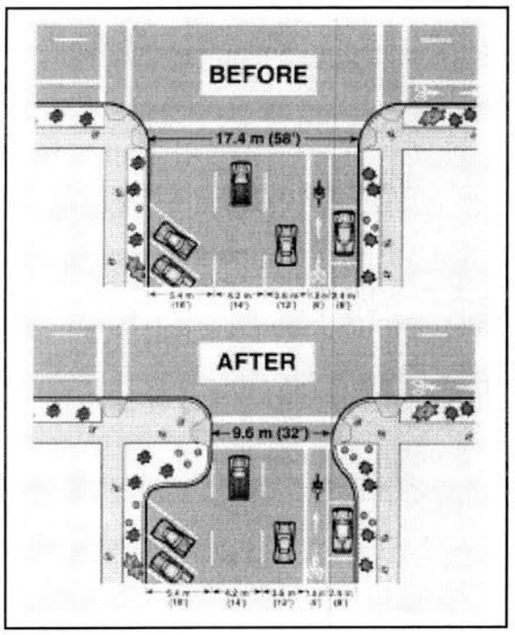


Figure 21. Example of curb extension Retrofit
Source: Oregon Bicycle & Pedestrian Plan

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.

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.

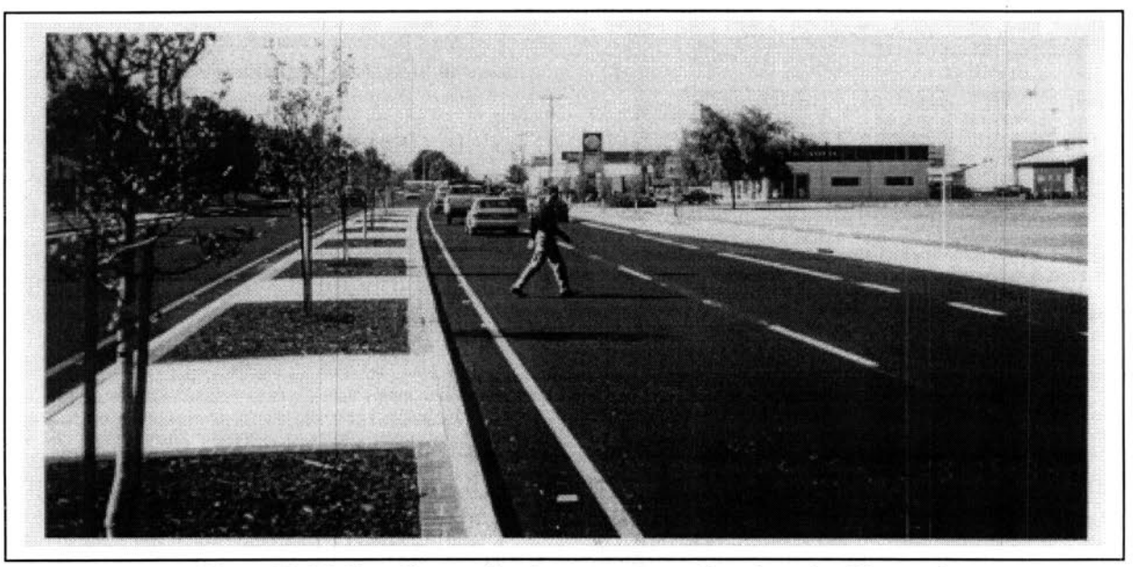


Figure 22. Median allows pedestrian to cross one direction of traffic at a time
Source: Oregon Bicycle & Pedestrian Program

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.

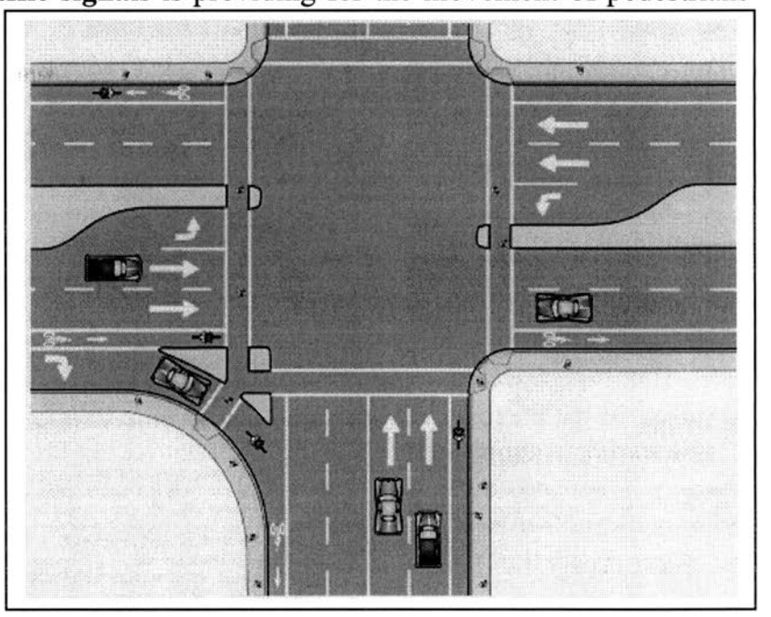


Figure 23. Pedestrian refuges at a signalized intersection
Source: Oregon Bicycle & Pedestrian Plan

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 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.



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

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.

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.

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.

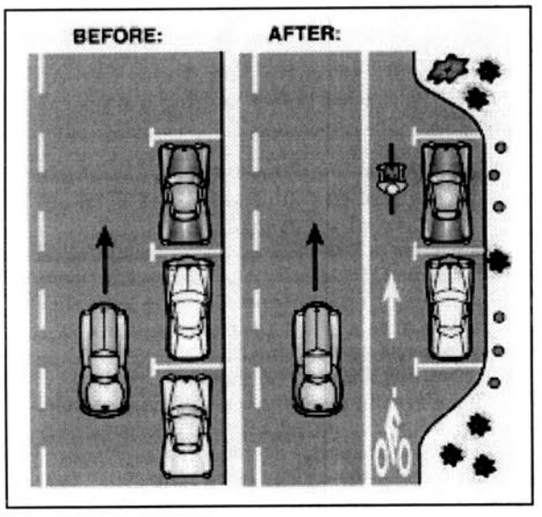


Figure 25. *Example of retrofitting street to accommodate bike lanes and on-street parking*
Source: Oregon Bicycle & Pedestrian Plan

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.

6.4 PUBLIC TRANSPORTATION SYSTEM

6.4.1 TRANSIT FEASIBILITY

Bend does not currently have a fixed-route transit system in place but does have a Dial-A-Ride system for seniors (60 and older) and eligible disabled persons. The Dial-A-Ride transit provides personalized door to door service but requires call-ahead reservations a day or more in advance of a planned trip.

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. 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.

In 2000[:B.5], an additional study (discussed in further detail in section 5.5.2) evaluated possible expansions and improvements to the existing Dial-A-Ride system. The report recommended (and BTAC supported) that the City pursue this strategy as an initial method of providing public transportation for the general public. BTAC also

recommended that the City pursue seeking voter approval of a transportation funding measure that would include operating funds for an expanded Dial-A-Ride system for general public use. The City will forward a funding measure to the voters to fulfill this recommendation in the fall of 2000. (The City is also examining other means of expanding and improving the existing Dial-A-Ride system - although service expansion would be far more limited without obtaining additional operating funds). [See also Sections; 5.5.2 *The Recommended Transit Alternative* and 6.9.5 Public Transportation System – *Policies, Implementation, Benchmarks and Funding*]

6.4.2 MULTI-MODAL STRATEGIES

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.

6.4.3 COMMUNITY MOBILITY

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.

6.4.4 PUBLIC TRANSPORTATION FACILITY DESIGN

6.4.4.1 Transit Centers

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 also can 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.

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. An example of a good location for this facility would be in the proximity of Heritage Square, where institutional uses such as the new Bend Public Library, the Bend-La Pine School District Administrative Offices and City Hall are sited.

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 location(s) and spatial requirements of facilities necessary for this transportation system function.

6.4.4.2 Major Transit Stops

Major transit stops are locations along the transit system where high levels of transit user and bus activity are likely to occur. 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. At the present, the following are proposed as major transit stops; the downtown transit center, St. Charles Medical Center, Central Oregon Community College, Mt. Bachelor shuttle lot and a regional intermodal facility – location to be determined (possibly at the ODOT, Region 4, site off of Empire Blvd. and Hwy 20 - which is currently delineated as a Park and Ride location.). Additional major transit stops may be defined as the system matures and other destinations with high transit ridership potential are identified.

6.4.4.3 Transit Friendly Design

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 help to assure that the walking link of the transit trip is a safe and pleasant experience. Providing benches, shelters and lighting can also increase the comfort of transit use. As routes are planned and local transit stops are located throughout the system, pullout lanes should be constructed 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 inter-modal trips to connect with transit.

6.4.4.4 Land Use Organization (transit oriented)

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 provides close proximity to the street and convenient pedestrian corridors, will also help

to invite transit trip activity. Developing ordinances that support the ease of pedestrian movements to and from transit stops will optimize transit rider potential.

6.4.4.5 Park and Ride Lots

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 town. 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.

Bend currently has one existing designated Park and Ride lot 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]. This has been a frustrating effort given property owner concerns over liability issues that have made it very difficult to secure joint use agreements within private parking lots. However, work continues to identify, locate and secure likely 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.

6.4.4.6 Transit Trunk Routes and Transitways

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 system. In larger cities, trunk routes also deliver riders from outlying areas where the rider may transfer from a feeder bus that doesn't travel to the core area. Larger cities may also have lessor trunk routes that travel exclusively between these outlying activity centers. Trunk routes typically provide transit service for longer hours of the day and weekend service. Trunk route stops or stations get more use, have greater waiting capacity (i.e., larger shelters) and often have more rider amenities (i.e., pay phones, drinking fountains, route information/maps, ticketing equipment, scheduling monitors, etc.).

Transitways are very specialized trunk routes that provide very high levels of transit service. Transit is given a very high priority on transitways to enhance transit service levels by increasing travel speeds and reducing travel delay/times. Typical transitway features are exclusive lanes or a shared use of High Occupancy Vehicle (HOV) lanes with other vehicle traffic (commonly found in large metropolitan areas in conjunction

with freeway systems), traffic signal/queue-bus bypass lanes and other transit preferential treatments.
Trunk route service has not yet been delineated within the Bend system although higher service levels would be most likely on the main east-west route between C.O.C.C. and St. Charles M.C. and possibly a north-south route in the center of the city. No transitways have been deemed necessary in the urban area in the Bend TSP at this time.

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 B). 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.

6.5.1 ROADWAY CLASSIFICATIONS

6.5.1.1 Expressways

Expressways are roadways designed to carry large volumes of traffic with limited traffic flow interruption. Direct property access is very limited. In the situation of the sections

of Highway 20 and 97 that are designated as expressways, established driveway access points are permitted on a case by case basis until alternative access becomes available. The new Parkway facility is being designed with limited roadway access to preserve capacity and provide improved safety, and to accommodate the travel needs of the Bend community. Grade separations, interchanges (at major intersections) and raised medians (along much of its length) are being included in the 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.

Expressways in the Bend urban area include U.S. Highway 20 north of the intersection with U.S. Highway 97 (the "wye" on the north end of town), east of 12th Street 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 "wye" and Greenwood, 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 Parkway alignment begins northeasterly of the "Sisters" (Highway 20/97) interchange. It extends southward adjacent to the 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. South of Revere, the Parkway follows (and will replace) existing Division Street to Cleveland Avenue, where it bears southwesterly and runs to the west of, and parallel to, Highway 97. The Parkway re-connects with Highway 97 south of Murphy Road. Upon completion, the U.S. Highway 97 designation will move from the existing East 3rd Street corridor to the Parkway (3rd St. will retain the "U. S. Highway 20" designation south to Greenwood Avenue).

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

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 and Colorado Avenue 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 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.

South of Colorado Avenue, Powers Road, Pinebrook Boulevard, and the south intersection with old Highway 97 will 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, Badger Road (on both sides) and an unnamed frontage road (on the west side, south of Pinebrook) will intersect the Parkway at grade but will be limited to right-in and right-out turn conditions (raised medians will prohibit lefts). Longer-term strategies include the grade separation and/or elimination of street connections to the Parkway as conditions may warrant and resources are dedicated to the development and implementation of local traffic circulation and as Parkway access alternatives are developed (see: Figure 26 and text *Highway 97 – South of the Parkway*).

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.

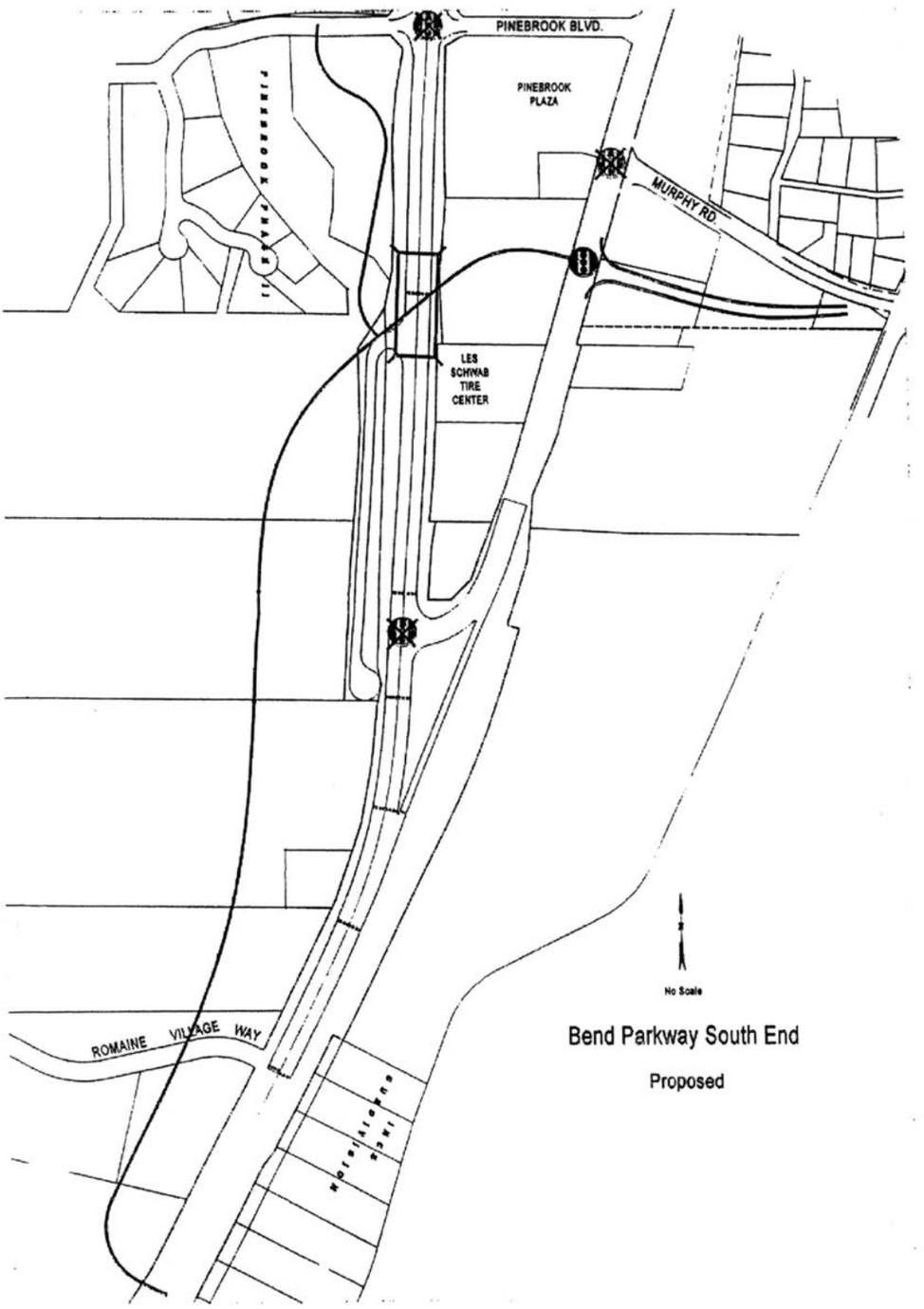
Several city street segments will be critical to the efficient function of the Parkway and careful review of development proposals and the regulation of access points along these streets is essential to protect the integrity of the expressway. Initial project construction may include the placement of 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*, and
11. Pinebrook Boulevard between the Parkway and East 3rd Street*.

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

Figure 26
Bend Parkway - South End
Proposed Frontage Road System and Extension of Murphy Road



Adopted: October 11, 2000

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 "wye" (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 and Robal roads. 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 20 – 12th Street to the "eastern" Urban Growth Boundary
East of 12th Street to the eastern Urban Growth Boundary, Highway 20 is designated as an expressway. The roadway follows an alignment around the south side of Pilot Butte and heads eastward beyond the urban area. From 12th Street eastward, the existing highway is comprised of two lanes around Pilot Butte merging to three, then it widens to a five-lane roadway near 27th Street. The roadway transitions back to a two-lane facility as it heads east outside of the UGB. Additional widening to five lanes, plus the construction of sidewalks, bike lanes and raised medians is planned for the area between 12th and 27th streets. The section of the highway around Pilot Butte will require realigning and a lowering of the roadway grade in order to accommodate the construction of a future intersection with 15th Street (to the south). The intersection at 15th Street would eventually be signalized. 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 in the Oregon Highway Plan 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.

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. The Cooley Road intersection may need to be developed as an interchange in the future.

A frontage road is planned along the eastern side of the highway between Cooley Road and Robal Road. This frontage road will connect with Cooley and Robal roads at intersecting points to be located a sufficient distance east of Highway 97 adequate to minimize impacts to highway intersection operation. Currently, ODOT is evaluating a variety of frontage road designs, including an alternative "backage road" (with no direct connection to Cooley Road) and possibly completion of this road as a part of the (state funded) Highway 97 median project. A frontage road 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 frontage road is planned to connect to the Hunnel Road collector and not tie directly to Cooley Road (see: Bend Urban Area Transportation Map Exhibit B). 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.

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. In the near term, signalization of the intersection of China Hat Road may be necessary to provide safe access to the highway system and to maintain local grid system circulation. As a longer-term strategy, land development adjacent to the highway should dedicate right of way, develop and direct access to an adjacent roadway or a frontage road system. ODOT has suggested evaluating 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). Once this system is in place (Figure 26), the Parkway traffic signals at Pinebrook Blvd. and the south Highway 97 intersection should be removed. 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 "wye" to 12th Street. 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.

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 97 to Greenwood Avenue and turns east, following Greenwood Avenue to 12th Street. 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.*

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 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.

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).

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 Arterials

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.

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.

Minor Arterial Street Descriptions

Southern River Crossing Reed Market Road, between Century Drive and Blakely Road/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.

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. The Cooley Road/Highway 97 intersection may need to be developed as a grade separated interchange in the future. 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. 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.

Located immediately north of the Mountain View Mall, ***Robal Road*** will provide an arterial connection between Highway 20 and Highway 97. In addition, ***Hunnel Road*** is planned to extend north from Robal Road 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. 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.

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 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: The conversion of Arizona and Colorado streets to a one way pair "couplet" system, between Broadway and the Parkway, is planned as a method of increasing arterial road capacity without the need to widen existing Colorado Avenue. This is also planned as a strategy to improve downtown access to and from the Parkway. Both roadways would be designated as minor arterials, with Colorado carrying the westbound traffic and bike lane, and Arizona Avenue the respective eastbound movements. The City will develop a street design; including turn lanes, landscaping and access control that will fit the specifics of this project. Bond Street (a major collector street) is planned to extend to the south of Colorado Avenue, through the Old Mill site, to meet (and connect) to the northern extension of Blakely Avenue, at the intersection of Wilson Avenue. Completion of the Bond Street extension would require the acquisition of right-of-way and construction of a new roadway for a relatively short distance (400-500 feet) between Arizona Avenue and Industrial Way. In order to facilitate this street extension, the City has been working with the BNSF Railroad to terminate the railroad tracks at a point east of this Bond Street extension (hence no need for a road-railroad crossing). A similar extension of Wall Street (also a major collector), between Arizona and Industrial Way, has been evaluated but is not currently determined necessary. Also, the Roadway System Plan currently shows Bond Street extending between Arizona Avenue and Industrial Way. As previously mentioned in the "Proposed Roadway System Changes" section of this TSP, the City will be studying alternative connections that include the use of Lava Road instead of or in combination with Bond for this street connection.

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.

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.]

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 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 ***Brookswood/Blakely Boulevard***, which extends from Wilson Avenue (on the north) and parallels Highway 97 south to Baker Road. Brookswood 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.

Table 11
Minor Arterials within the Urban Area

Minor Arterial Streets	From	To
Arizona (future: *eastbound* only)	Colorado (near Broadway)	Parkway
Bear Creek Rd. (also: 11th St. ext.)	Franklin Avenue	27th Street
Blakely Road	Brookswood Blvd.	Wilson Avenue
Bond Street	Wall Street	Franklin Avenue
Boyd Acres Road	Empire Avenue	Butler Market Road
Brookswood 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: *westbound* only)	Arizona	Parkway
Cooley Road	Highway 20	Deschutes Market Road
Division Street	Highway 97 (north)	Revere Avenue
East 15th Street	Highway 20	Knott Road
East 18th Street	Cooley Road	Empire Avenue
East 27th Street	Reed Market Road	Knott Road
East 4th Street	Butler Market Road	Franklin Avenue

East 8th/9th streets	Butler Market Road	Reed Market Road
Empire Avenue	O.B. Riley Road	Highway 20
Franklin Avenue	Wall Street	Bear Creek Rd. ext. (11th St.)
Galveston Avenue	Skyliners Road	Riverside/Tumalo
	Table 11 (continued)	
Greenwood Avenue	Newport Avenue	East 3rd 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)
Neff Road	8th Street	Beyond east UGB
Newport Avenue	Shevlin Park Market Rd.	Greenwood Avenue
Olney Avenue	Hill Street	8th Street
Reed Market Road	Century Drive	Blakely Road
Revere Avenue	Hill Street	8th 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 14th Street	Newport Avenue	Colorado Avenue
Wilson Avenue	Blakely/Bond	East 3rd 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 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.

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).

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 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.

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.

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 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.

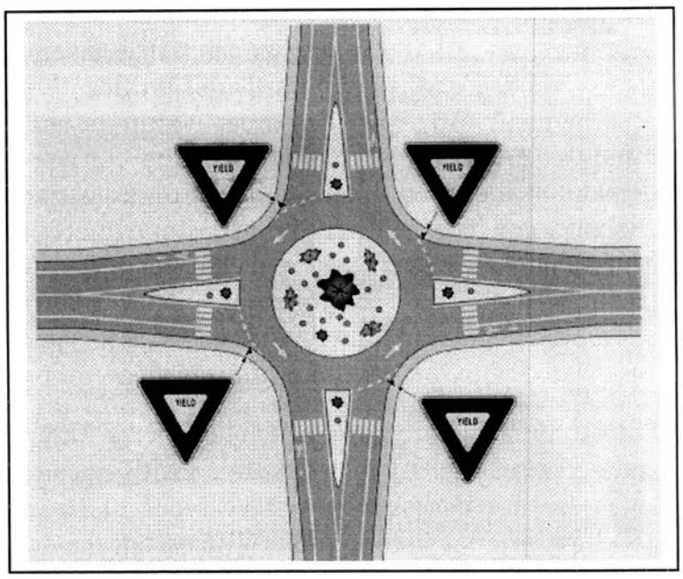


Figure 27. A typical Modern Urban Roundabout
Source: Oregon Bicycle & Pedestrian Plan

There are also fewer vehicle accidents in roundabouts due to slower speeds and the elimination of cross turning movements.

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 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.

6.5.2.6 Truck Routes

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.

Citizens have voiced issues about rock and cement trucks that travel the Newport Avenue corridor. This truck traffic is more local in nature and addressing this situation is difficult, due to the lack of alternative routes. Also citizens have expressed concern of the potential for the Empire Avenue/East 27th Street and Knott Road/27th Street corridors becoming Highway 20 truck bypass routes after the completion of those roadway connections and/or improvements. This facility will be designed as a local arterial, and as such, it is not intended to carry *through* truck traffic. The need to place truck restrictions on arterial streets and to establish other designated routes in the urban area will be monitored as truck volume or noise issues change.

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.

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 ten, existing at-grade road/railroad crossings in Bend. Major Collector crossings are located at China Hat, Country Club and Brosterhous 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. 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 St. 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").

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.

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.

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.

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.

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.

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

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.

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 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.

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.

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.

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 Primary Trail System Plan Map (Exhibit A). These trails, and future trail additions, shall support the need for non-motorized travel in the community.

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, and when practical on local streets within commercial and industrial areas. 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.

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.

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, dated October 1997, and subsequent amendments. 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.

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 shall be created and maintained following the design standards described in the Bend Urban Trails Plan, or subsequent updates.

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.

8. The City shall update inventories of existing bike lanes and sidewalks, and identify gaps and missing system segments, and, in conjunction with the Deschutes County Pedestrian and Bicycle Advisory Committee, prioritize these for completion.

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.

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

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.

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

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.

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.

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:

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.

14. A grid-like pattern of residential local streets shall be developed whenever practical in order to increase street connectivity within a neighborhood.

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 implement transportation demand management (TDM) and transportation system management (TSM) measures prior to major and minor arterial street widening beyond three lanes. If TDM and TSM techniques are determined insufficient in solving the transportation corridor problems, then an evaluation of the consequences that additional roadway widening may have on adjoining neighborhoods versus the benefits gained by additional street construction should be conducted as a part of the determination of need for a road widening project.

a) *Consequences* may include: reduced crossing comfort and safety for pedestrians and bicyclists, increased traffic noise impacts, residential or business displacements, increased storm water run-off and water quality impacts, the

potential for "generated" traffic and the disruption to neighborhood cohesiveness.

b) *Benefits* may include: improved traffic flow, bicycle and pedestrian improvements, reduced crash potential, reduced traffic diversion to adjacent neighborhood streets and improved air or noise quality (caused by congestion).

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.

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, and Century Drive along with 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.

Parkway:

28. The Bend Parkway will be planned, constructed, and managed to limit direct access to the facility to meet the objectives of the Access Oregon Highway (AOH) system, to protect the integrity of the route's through capacity, and to promote public safety.

29. 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.

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

Safety:

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

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

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

34. 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.

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

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

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:

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/Brookswood connection and determine the priority in light of the Southern Bridge Crossing project.

f) Regarding the study of road connection alternatives between Arizona and Industrial Way (i.e., Bond and Lava streets):

i) Before finalizing any alternative to the Bond Street connection to the Old Mill District that uses an extension of Lava Road, the City shall conduct a study, with public involvement from the affected neighborhood and other interested parties, of the relative performance of the Bond Street alternatives. This study shall include evaluating the adequacy of the street system to handle anticipated traffic loads, impacts on the affected neighborhood (located between downtown and the Old Mill District) and how those impacts could be mitigated.

ii) If the study shows that using the Lava Road extension alternative will operate at a more acceptable level of service, minimize neighborhood cut-through traffic and that neighborhood access will be adequately accommodated, the City shall proceed with the completion of the roadway improvements and traffic mitigation measures. It is important that the study demonstrate that adverse traffic impacts on the neighborhood can be mitigated without unduly compromising the residents' ability to enter and leave the neighborhood. Consequently, the study shall include the following elements:

(1) A mitigation plan that combines traffic control and traffic calming measures that will minimize cut-through traffic through the adjacent neighborhoods while allowing neighborhood residents reasonable ingress and egress to streets adjoining the neighborhood;

(2) Analyzing the level of service at nearby intersections and making any changes that may be necessary to attain at least an acceptable level of service so long as those improvements can be accomplished within the existing pavement.

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.

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.

Table 12
Street Functional Classification System
Typical Characteristics

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

Figure 28
Arterial Streetscape
Typicals

(SEE NEXT PAGE)

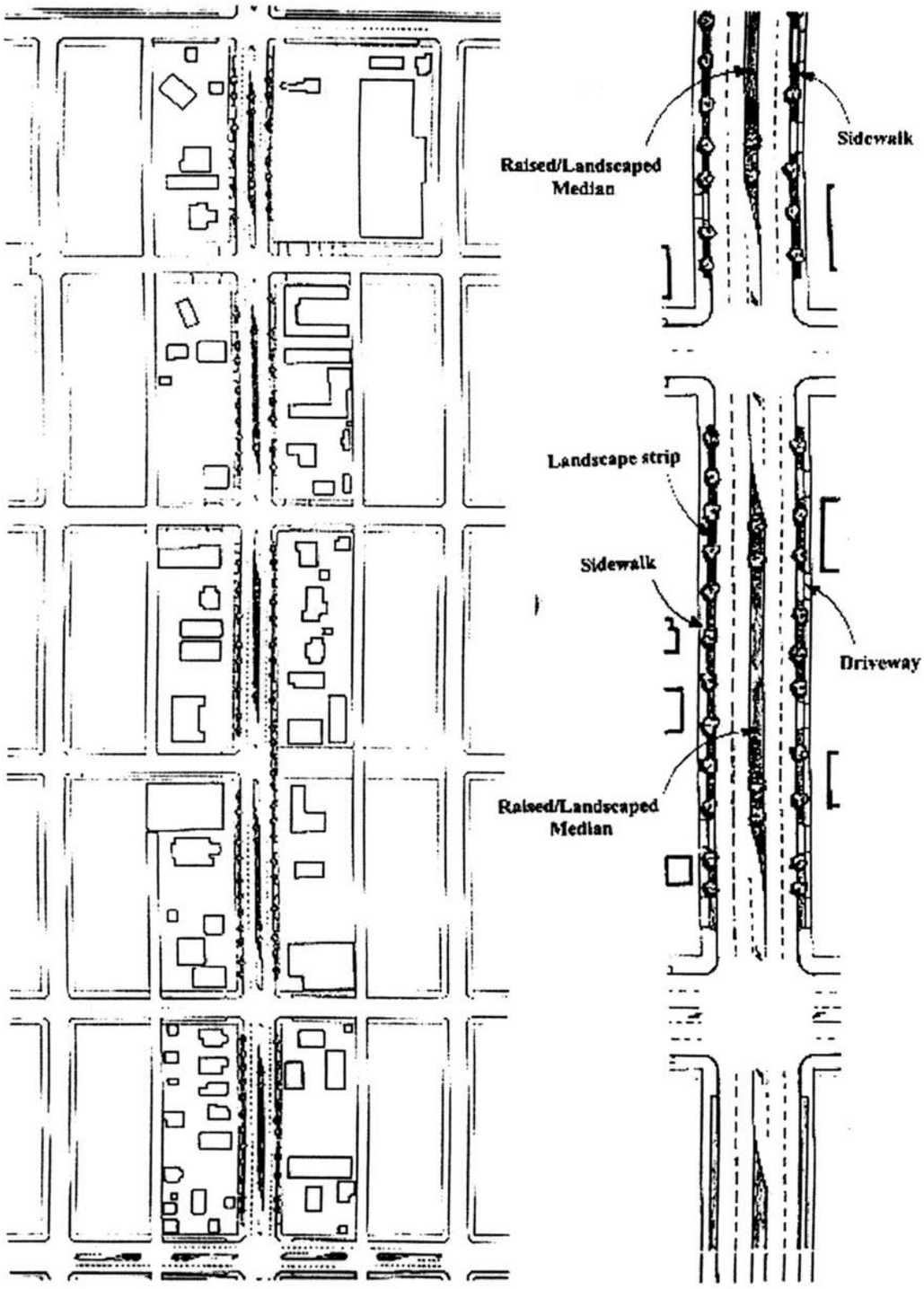
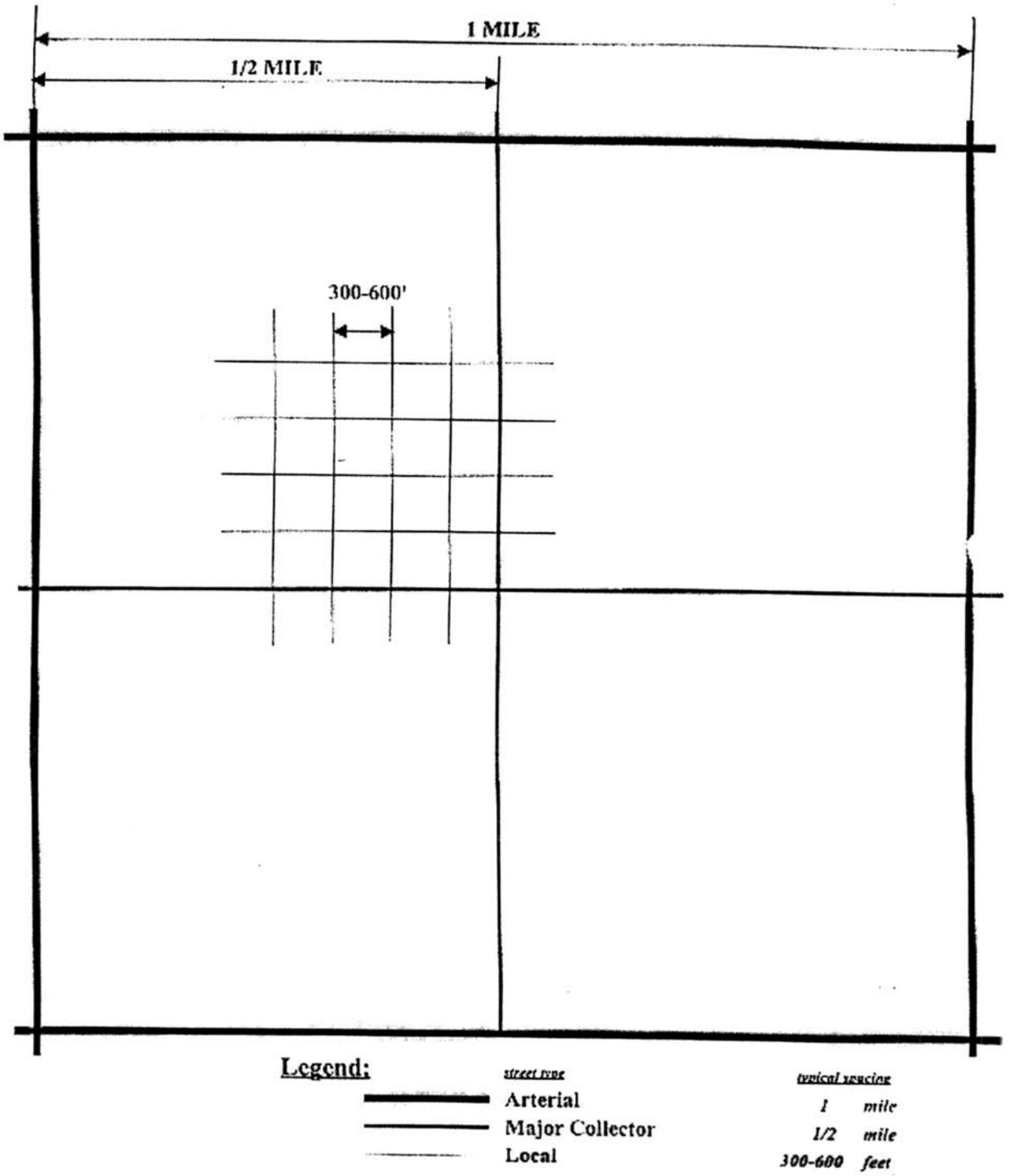

Raised/Landscaped Median
Sidewalk
Landscape strip
Sidewalk
Driveway
Raised/Landscaped Median

Figure 29
Street Grid System
Typical Street Spacing



Adopted: October 11, 2000

7.0 TRANSPORTATION SYSTEM IMPLEMENTATION

7.1 TRANSPORTATION IMPROVEMENT PLANNING

City of Bend: The City of Bend plans for its transportation system needs through a *Capital Improvement Program (CIP)* process. The CIP represents a five-year planning forecast of prioritized transportation system improvements. This document is updated yearly. Projects that are beyond the five-year program are prioritized but forecasts are not given for a specific year of construction. The CIP is included as a part of the regular annual budget planning process. The CIP addresses transportation elements that include roadway construction, modernization and maintenance needs, sidewalk, bike lanes and trail improvements. The Transportation System Modernization CIP for Fiscal Years 2001-2005 is illustrated in Appendix A-6.

Based on an assessment of transportation system priorities, transportation coordination needs, other funding opportunities (e.g., grant awards) and maintenance needs, staff prepares a list of potential transportation improvement projects and compiles these into a draft CIP. A hearing before the City Council is held on the draft to take public testimony. Citizen and community input are important in the process to help City Council make refinements to the CIP document. Council can direct staff to refine the document further by adding, deleting or reprioritizing projects in the CIP. The most current year of the final CIP is incorporated into the City's annual budget document. The budget process includes another round of public hearings. The City Budget is adopted by City Council by the end of June of each year.

Deschutes County: Deschutes County programs transportation improvement and maintenance projects through an annual process known as the Major Roads Capital Improvement Program (MRCIP). Projects on the County road system are prioritized accordingly. The County Board of Commissioners approves this document each fiscal year. The County's plan now includes a three-year list of short-term priorities. The County Transportation System Plan specifies other longer-term priorities. County improvements are typically focused on roadways outside the urban area (i.e., beyond City limits).

***State of Oregon*:** The Oregon Department of Transportation (ODOT) utilizes a system called the State Transportation Improvement Program (STIP)[:E.1] to plan for highway improvements along the state system. This is a four-year planning document that is updated on a biennial schedule (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 reasons, ODOT segregates the state into five distinct *regions*. The STIP is organized and addresses project funding by region. The Central Oregon area is included in Region 4. In the past few years, increasing transportation needs, combined with a lack of new funding sources, have placed more STIP emphasis on making investments in maintenance related projects rather than adding new modernization types of improvements.

Table 13
City of Bend
Transportation System Development Charge Projections

Fiscal Year:	2001	2002	2003	2004	2005	Total Five Year Period
Street SDC's	$5,505,988	$5,422,995	$5,118,053	$5,343,867	$5,581,284	$26,972,187
Less Reimbursed SDC's	1,600,670	$1,640,687	1,681,704	1,723,747	1,766,840	8,413,647
Net SDC Revenue	$3,905,318	$3,782,308	$3,436,349	$3,620,121	$3,814,444	$18,558,539

Assumptions

Inflation factor at 2.5%/year	1.000	1.025	1.051	1.077	1.104

SDC's at 100% of costs, excluding street ROW, including intersection ROW

SDC - Year 2000 $3,250 Per Equivalent Residential Unit (ERU)

Reimbursable SDC - Year 2000 $2,713 Per ERU (excludes ROW for intersections/in fill streets, city engineering/planning/project admin/admin)

Activity

Number of ERU's per year

	Residential	Commercial	Industrial	Total	Growth Rate	Total Estimated Homes	Estimated New Homes
FY 2001	844	800	50	1,694	4.0%	21,104	844
FY 2002	878	700	50	1,628	4.0%	21,948	878
FY 2003	799	650	50	1,499	3.5%	22,826	799
FY 2004	827	650	50	1,527	3.5%	23,625	827
FY 2005	856	650	50	1,556	3.5%	24,452	856

SDC reimbursement per year

	Residential	Commercial	Industrial	Total/year
Westside	200	150	0	350
Awbrey Butte/ Awbrey Glen	50	50	0	100
Other	30	100	10	140
				590

Table 14
City of Bend
Transportation System Development Charge
Revenue Projection (Year 2000 dollars)

Fiscal Year	Total ERUs	TSDC per ERU	Total Projected TSDC Revenue	Cumualtive Total Projected TSDC Revenue
FY 2001	1,694	$ 3,250	$ 5,505,500	$ 5,505,500
FY 2002	1,628	3,250	5,291,000	10,796,500
FY 2003	1,499	3,250	4,871,750	15,668,250
FY 2004	1,527	3,250	4,962,750	20,631,000
FY 2005	1,556	3,250	5,057,000	25,688,000
FY 2006	1,313	3,250	4,267,741	29,955,741
FY 2007	1,349	3,250	4,385,103	34,340,844
FY 2008	1,386	3,250	4,505,694	38,846,538
FY 2009	1,424	3,250	4,629,600	43,476,138
FY 2010	1,464	3,250	4,756,914	48,233,052
FY 2011	1,094	3,250	3,554,712	51,787,765
FY 2012	1,116	3,250	3,625,807	55,413,571
FY 2013	1,138	3,250	3,698,323	59,111,894
FY 2014	1,161	3,250	3,772,289	62,884,183
FY 2015	1,184	3,250	3,847,735	66,731,918
FY 2016	1,208	3,250	3,924,690	70,656,608
FY 2017	1,232	3,250	4,003,183	74,659,792
FY 2018	1,256	3,250	4,083,247	78,743,039
FY 2019	1,282	3,250	4,164,912	82,907,951
FY 2020	1,307	3,250	4,248,210	87,156,161

Twenty Year Projection of Equivalent Residential Units for TSDC's
Jul-00

Number of ERU's per year	Residential	Commercial	Industrial	Total		Growth Rate	Total Estimated Homes	Estimated New Homes
FY 2001	844	800	50		1,694	4.00%	21,104	844
FY 2002	878	700	50		1,628	4.00%	21,948	878
FY 2003	799	650	50		1,499	3.50%	22,826	799
FY 2004	827	650	50		1,527	3.50%	23,625	827
FY 2005	856	650	50		1,556	3.50%	24,452	856
FY 2006	696	567	50		1,313	2.75%	25,308	696
FY 2007	715	584	50		1,349	2.75%	26,004	715
FY 2008	735	602	50		1,386	2.75%	26,719	735
FY 2009	755	620	50		1,424	2.75%	27,454	755
FY 2010	776	638	50		1,464	2.75%	28,209	776
FY 2011	580	454	60		1,094	2.00%	28,985	580
FY 2012	591	464	60		1,116	2.00%	29,564	591
FY 2013	603	475	60		1,138	2.00%	30,156	603
FY 2014	615	486	60		1,161	2.00%	30,759	615
FY 2015	627	496	60		1,184	2.00%	31,374	627
FY 2016	640	508	60		1,208	2.00%	32,001	640
FY 2017	653	519	60		1,232	2.00%	32,641	653
FY 2018	666	531	60		1,256	2.00%	33,294	666
FY 2019	679	542	60		1,282	2.00%	33,960	679
FY 2020	693	554	60		1,307	2.00%	34,639	693

Adopted: October 11, 2000

87,156,161 ÷
3,250 =K
26,817 .2800076

The current FY 2000-2003 STIP[E.1] contains over $1.3 billion in projects and programs. Sources for funding include over $990 million in federal highway funds, $180 million in federal transit funds and $200 million in state transportation fees and tax receipts.

7.2 TRANSPORTATION FUNDING SOURCES

7.2.1 Existing

Transportation System Development Charges (TSDCs): Effective July 19, 2000 the City Council adopted increased TSDCs (formerly street SDCs) that are anticipated to fund one hundred percent of the City's anticipated responsibilities of the transportation system modernization projects included in the TSP. The TSDCs have a methodology that includes the full cost of transportation system modernization projects excluding right-of-way that is anticipated to be "exacted" from developers as a condition of approval for their developments. Table 13 is a schedule of anticipated TSDC revenue for the next five fiscal years, 2001-2005, and Table 14 is an analysis of projected TSDC revenue in 2000 dollars compared to the cost in 2000 dollars of the City's anticipated responsibilities for transportation system projects. The analysis supports the methodology that the adopted TSDC, based upon information available as of the adoption of the TSP, is adequate to fund all of the TSP transportation improvement projects that are anticipated to be the City's responsibility.

State Highway Trust Fund: A primary source of City street maintenance funds comes from the State Highway Trust Fund (SHTF). The SHTF is made up of a combination of statewide collected gas taxes, vehicle registration fees, fines and weight-mile taxes. The revenues are paid to cities and counties on a monthly basis from net receipts collected by the Motor Vehicles Division, Highway Division and the Motor Carrier Transportation Branch. State law stipulates that these funds are limited to road related purposes on public right-of-way only. Therefore, the expenditure of these funds cannot be used, for example, to fund off-street trails or transit (including operation, maintenance and/or capital improvement).

Roughly 60-percent of the total amount of the SHTF goes to the state of Oregon to fund highway maintenance and construction. The remaining 40-percent portion of these resources is distributed to cities and counties, according to formulas that are based on population and registered vehicles, respectively. The method of SHTF distribution, based on *population* for cities and *registered vehicles* for counties, provides assurance that counties do not suffer proportionate reductions if a City annexes new areas and/or experiences other increases in population. Bend is an example of one of these rapidly growing communities with recent population spurts due to annexation (to the UGB), in-migration and other natural increases. This has increased the City's population by 13,648 people. Consequently, the City will be receiving proportionate increases in state highway trust fund receipts. A summary of state funds received by the City for Fiscal Years 95-99 is illustrated in Table 15.

State Liquor and Cigarette Taxes and State Shared Revenues: The City also receives state revenue sharing - *Liquor and Cigarette Taxes and State Shared Revenues* on a formula basis. These taxes may be used for general government services, without program restrictions on their use. The cigarette taxes have also been used by the ODOT - Public Transit Division for the benefit of transportation services for the elderly and handicapped. The City has used grants from state *Special Transportation Funding* (STF) to purchase new and replacement Dial-A-Ride (DAR) vehicles. Since most of these formulas are based on per capita, growth in Bend's population should also generate increases in state shared funding resources. The cigarette and liquor taxes shared with the City have gone to the General Fund to support public safety. The State Revenue Sharing funds have been used by the City to support Dial-A-Ride, transportation maintenance and related operations.

County Funds: Bend's growth, that has been associated with the new annexation, will be accompanied by increased responsibilities in road maintenance and operation, as the inventory of City streets has expanded by over 100 miles of new roadways. Many of these newly annexed roadways are much older and some have been built to an *interim* road standard (i.e., not a full City street standard that may lack curbs, sidewalks and other urban features) and they may carry a higher financial responsibility/liability than other typical City streets.

To assist the City during a transition period, Deschutes County agreed to pay the City for five fiscal years a descending amount of funds beginning in fiscal year 1999 ($900k, $700k, $500k, $500k, and $500k) to help meet these roadway needs. Boosted by this additional funding, the City has made a significant investment in "overlays" to bring these roadways up to a higher standard – with about 18 miles of asphalt overlays being completed on these roadways during the last two construction seasons. The City (by way of an intergovernmental agreement with the County[A.9]) accepted the maintenance and operational responsibilities for roads within the UGB, on July 1, 1998, although they were not officially annexed into the City until July 1, 1999. As of June 30, 1998, the City also received all unexpended SDC funds collected by the County within the UGB/unincorporated area.

Federal Funding: Two back-to-back, six-year funding bills, authorized by Congress, have been a source of federal transportation funding to the City through the 1990s. These federal funding acts include both the Intermodal Surface Transportation Enhancement Act (ISTEA) and the Transportation Enhancement Act for the 21st Century (TEA-21). These acts have been a source of revenue for the City of Bend through both grant and revenue sharing programs. A summary of this federal revenue is included in Table 15.

Franchise Fees: The City collects franchise fees from local utility companies that utilize public right-of-ways for the conveyance of their services. Franchise fees are currently collected from Pacific Power and Light, Central Electric Co-op, Cascade

Natural Gas Company, Enron, Bend Cable Communications and U. S. West (now: *Quest*). A portion of the funds derived from the franchise fees are expended for maintenance and street improvement needs based on the priorities set by City Council. In the 1998/99 fiscal year, 55-percent of the funds were directed to the street fund. This apportionment is planned to increase by two percent per year until a 65-percent share is achieved (FY 2004). From that point on, unless changed by Council, it will remain a 65-percent share dedicated to the transportation operations fund. Effective with Fiscal Year 2001 revenue from these sources placed in the maintenance fund are anticipated to be used exclusively for transportation operations and maintenance.

Developer Exactions: Prior to the establishment of street (later: "transportation") SDCs, the City used a different method of exacting transportation system improvements. Development financial requirements have continued since the adoption of the transportation SDCs where transportation impacts have exceeded possible development related fee collection, but these "contributions" have lessened considerably since the adoption of the transportation SDC. These exactions, typically for qualified transportation improvements, are eligible for SDC reimbursement. Additionally, developers are required, without reimbursement, to build the local streets serving their developments.

Table 15
City of Bend -Transportation Improvement Funding
For Fiscal Years 1995-1999 (Thousand $'s)

Funding Source	94/95	95/96	96/97	97/98	98/99	5 yr. Total
Local:						
1. Street SDCs & Other		$737,630	$1,059,044	$1,883,595	$1,631,635	***$5,311,904***
2. Local Grants/Agreements				$81,933	$1,027,375	***$1,109,308***
3. Developer Contributions		$711,176		$212,029	$128,443	***$1,051,648***
4. Urban Renewal					$686,737	***$686,737***
5. Local - Franchise fees*					$1,284,948	***$1,284,948***
State:						
6. State Revenue Sharing	$160,229	$155,671	$191,387	$188,362	$188,335	***883,984***
7. State Grants		$7,440	$7,440	$65,187	$12,908	***$92,975***
8. State Highway Trust Fund	$1,289,513	$1,376,883	$1,380,926	$1,425,417	$1,569,921	***$7,042,660***
Federal:						
9. Federal ISTEA/TEA-21		$24,375		$13,576		***$37,951***
10. Federal Grants					$42,396	***$42,396***
11. Federal Intermodal Funds	$133,864	$125,364	$202,523	$140,388	$130,607	***$732,746***
Yearly Totals =	***$1,583,606***	***$3,138,539***	***$2,841,320***	***$4,010,487***	***$6,703,305***	***$18,277,257***

* Prior to 1998/99, Franchise Fees were recorded as revenues of the General Fund with approximately 55% being used to fund transfers to the Street Fund, the Dial-A-Ride program and the street lighting program.

***Urban Renewal Funding*:** Urban renewal, or tax increment financing, has been a financing tool that has been used by the City to improve certain "blighted" areas of the community. This method of funding has been used to fund a variety of projects in the downtown area including a variety of transportation related improvements. Additional

transportation projects that have been identified and approved by the Bend Development Board, using Urban Renewal Funding, are components of the south downtown access improvement. These transportation enhancements will include road, sidewalk and bicycle facility improvements to Wall and Bond streets (between Franklin and Arizona) and Colorado and Arizona avenues (between Broadway and the Parkway). These projects are part of a strategy to provide improved transportation connectivity between the downtown and the Parkway. These projects are TSDC projects and may be reimbursable to the urban renewal district.

7.2.2 Possible Additional Funding Sources

Local Gas Tax: The BTAC considered a local gas tax as a method of raising additional funding for transportation however decided against recommending this option at this time. City of Bend voters soundly defeated a local measure in 1992 by a 2-1 margin.

Local Vehicle Registration Fees: A local vehicle registration fee, if enacted, is expected to generate approximately $50,650 annually per each $1 increment in the fee (year 2000 estimate). This funding mechanism requires a majority of local voter support at a general election or a double majority at a non-general or primary election. The BTAC considered local vehicle registration fees as a method of raising additional funding for transportation however decided against recommending this option at this time.

Additional County Funding: Currently, a City-County staff task force has been assigned to examine County funding of specific roadway projects in the City and formulate a proposal for City Council and County Board review.

***Local Improvement Districts*:** The City has used Local Improvement Districts (LIDs) to finance projects within a defined area. The cost of a construction project (such as converting a series of unimproved local streets to an urban street standard) is spread to properties that are benefited (via a methodology that uniformly assigns the cost burden proportionately). For LIDs, the City utilizes its "Bancroft Bonding" ability to finance projects at a lower interest rate. Part of the *Consortium* proposal includes several LIDs to fund west side transportation improvements (see also the previous section on *TSDCs* and the following section on *Public/Private Partnerships*).

Transient Room Tax (TRT): The City currently levies a seven-percent tax on gross room receipts on Hotel/Motel rooms in the City. For each one percent of the tax, $264,200 is generated annually. Effective with fiscal year 2000, one-half of one percent of the tax (estimate of $132,100) is received into the transportation operations fund for transportation related use. The BTAC considered an increase to the TRT as a method of raising additional funding for transportation however decided against recommending this option at this time.

***State/Federal Grants*:** Also, the City has successfully secured numerous (state and federal) grants to assist in the funding of transportation related projects. Most notably, for a variety of bicycle and pedestrian facility improvement grants. Although these grants can reduce the City's share of a particular improvement cost, they are not likely to

be a reliable and sustainable long-term source of transportation funding. The City will prepare "ready-to-go" projects to submit for grant funding when grant opportunities do materialize. The City anticipates utilizing grants from the State's special bridge program, that is designed to assist local governments in meeting costly funding needs such as those required to make bridge repairs/improvements, to address these issues as they materialize.

Transportation System Modernization or Operation Tax Measures: Voter approved local option taxes or bond measures could generate approximately $400,000 annually per $.10 tax rate per thousand of taxable assessed value. The City Council, in concurrence with the BTAC recommendation, has referred a local funding measure to the November 2000 ballot seeking $.35 per $1,000 TAV for a five year period to fund various transportation system needs.

The projected revenue over the five-year period, if this measure is successful, is a total of $7 million. These monies would be allocated as follows: $2.5 million for expansion of the Dial-A-Ride system to include all citizens, $2 million for in-fill sidewalk construction, $1.5 million for trail development and maintenance, and $1 million for system maintenance.

At the end of the five-year period it is anticipated that the improvement needs for trail and sidewalk systems for in-fill projects will be substantially complete and that future expansions to the respective systems will be accomplished through TSDCs or exactions from developers. Prior to the end of the five-year period it is anticipated that transit funding will be further analyzed and addressed through voter approval. On-going maintenance monies will be addressed in a holistic approach that will consider tax support as well as other funding sources including but limited to those identified in the TSP.

Public/Private Partnerships: The City and an alliance of local developers and property owners (*The West Side Traffic Consortium*) are currently negotiating a proposal for consideration by the City Council that would provide for the construction of several significant transportation improvements. These would be funded through a combination of developer provided improvements and those provided through local improvement district financing. Proposals such as this may serve as a model for future similar such agreements when the cost and timing of various needed improvements exceed the financial ability of any one entity including the City.

Other Funding Sources:
Street utility/road user fees: This fee is similar to other utility fees. Such a fee could generate an expected $253,000 annually for each $1 per month charged to residential properties. The BTAC funding subcommittee expressed support for continued evaluation of this funding source.

Mileage fees:
Toll/congestion pricing:
Payroll taxes:
These sources were discussed and reviewed by the funding subcommittee of BTAC and were not supported at this time.

7.3 PROJECT PRIORITIZATION

City CIP Process: In developing the City Capital Improvement Program for transportation, the City has used a two-tiered system of project evaluation. Transportation system needs and priorities have been examined from both a "corridor" perspective and the "projects" within those corridors. Data for street projects have included safety information (crash histories) and capacity information (for existing and projected traffic conditions). Projects have also been prioritized based on criteria that include:

- Public health and safety,
- External requirements,
- Protection of capital facilities,
- Operating budget impacts,
- Life expectancy of the project,
- Relationship to adopted plans (and agreements),
- Availability of financing,
- Benefit to cost ratios*,
- Economic development potential,
- Project timeliness,
- Project prerequisite and
- Percent of population served.

*Not specifically used in the last CIP (due to a lack of information) but proposed as a criteria for future use.

A copy of the Bend FY 1999/2000 Capital Improvement Program[E.1] is included in the TSP as a resource document. Section 1 of that document depicts the prioritization of corridors. Section 3 depicts individual project rankings. And, Section 8 provides individual project descriptions. The document provides similar information and prioritization concerning other public utility and maintenance needs.

Private Development: Private developments are often times required as a condition of land use approval to construct transportation system improvement projects. Consequently, these transportation improvements frequently occur ahead of those projects that are programmed by the City CIP schedule.

Transportation System Priorities: Transportation system priorities for the community are summarized in Appendices A.4 and A.5. Priorities (and cost estimates) for each transportation system link have been identified. A priority schedule for intersection improvements has also been developed as many of these intersections will likely be improved ahead of roadway link improvements (Appendix A.3). The priorities are

separated into three categories; *near*, *intermediate* and *far term*. *Near term* priorities are projects that have been identified in the 5-year CIP process. *Intermediate* priorities are the list of other projects shown in the CIP that are beyond the funding capabilities of the current CIP, but none-the-less other important transportation needs. *Far term* priorities represent basically everything else needed to complete the entire transportation system. It should be noted that the CIP is updated each year and changes in transportation priorities will result as changes in the community occur (including new development), new funding is identified and/or other changes occur that may influence or shift transportation improvement strategies.

7.4 LONG TERM TRANSPORTATION NEEDS

7.4.1 Roadway System

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 Appendix A.

The City's funding strategy for these needs includes an estimated $119 million from TSDC's, $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 time frame. 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.

7.4.2 Non Roadway System

7.4.2.1 Public Transportation System

The TSP outlines a multi-step strategy for implementing public transportation services (see section 5.5.2). The initial step involves the establishment of an expanded *Dial-A-Ride system* to be available to the general public. This system would mature into a *Deviated Fixed-Route system*. These first two steps are envisioned as materializing over the first five years. Development of a more formalized *fixed-route system* (and

subsequent route network expansions) is expected to evolve over the next 5-15 year time period.

Operation funding for the initial five year period public transportation system is proposed to come from a local property tax funding measure ($2.5 Million over a five-year period) with possible additional capital grants coming from other state and federal programs. Funding beyond the five-year period (for the next transit system steps) is expected to come from subsequent voter approved measures, grants and/or other transportation funding strategies. Operating costs for the Five-Bus System is estimated to be approximately $800,000 per year and $1.2 M per year for the Nine-Bus System. Estimates for the fixed-route systems were derived from the 1996 Transit Feasibility Study as forecast for the 2000-2001 fiscal years (a more detailed breakdown of fixed-route system costs and revenues is detailed in Resource Document B-4, Figures 9-4 and 9-5). Adjustments may be necessary to account for other inflation factors or to project funding needs for future fiscal years.

7.4.2.2 Trail System

A substantial amount of the funding necessary to complete the trail system is expected to come from the local funding measure, developer exactions and other state and federal grants.

7.4.3 BTAC Recommendation

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.

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 street 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 transportation SDCs 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 on 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.

7.5 TRANSPORTATION FUNDING AND PRIORITIZATION POLICIES

Funding Policies:

1. The City, County and State shall work together to develop new sources of transportation funding for all transportation modes.

2. The selection of transportation improvements, within the City's yearly Capital Improvement Program plan, shall be subject to public review and comment through a City Council public hearing process.

3. The City shall annually prepare a 5-year capital improvement program for a balanced transportation system.

4. The City should explore ways in which to better inform and involve citizens in the development of transportation system budgets.

5. The City should consider taking steps to utilize transportation system development charges (SDCs) for the full range of road capacity improvements, including: transportation demand management, trails, transit, sidewalks and bike lanes.

6. Encourage the County to adopt Transportation SDCs and share funding for the cities' projects serving all County residents. This would help reduce sprawl by equalizing development costs between City and County properties. By having SDC money available for transportation improvements, the County could share gas tax revenues with the cities for maintenance of major transportation elements used by all county residents.

Benchmark Policy

The City shall establish transportation benchmarks to monitor progress toward fulfilling a balanced transportation system.

8. IMPLEMENTION 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 16
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) &	Provides more pedestrian friendly developments in commercial zones that serve neighborhoods	05 / 94

14(7)]		
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	Provides bicycle parking for employers and customers	06 / 93

almost all uses [24(8)]		
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	Reduces out of direction travel for pedestrian and bike travel and	06 / 93

are required for long blocks, or dead-end streets [6.020(3)]	encourages alternative mode travel	

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 17
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	Clarifies intent of earlier changes	10 / 2000

Bikeway [1.050]	regarding pedestrian and bike access corridors and bikeways	
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 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 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).

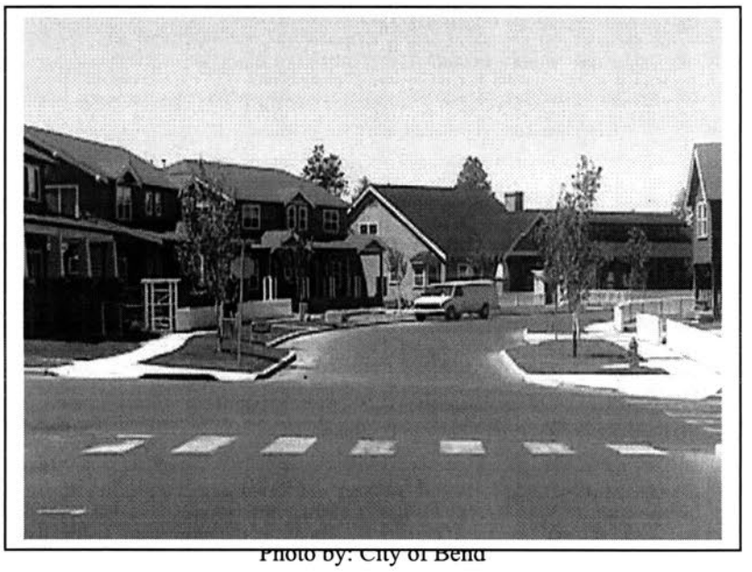


Photo by: City of Bend

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].

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.

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.

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.

LIST OF ACRONYMS

AADT/ADT	Average *Annual* Daily Traffic/Average Daily Traffic
AV	Assessed Value (also: TAV – Taxable Assessed Value)
AWDT	Average *Weekday* 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 21st 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

TRIMET	Tri-County Metropolitan – Transit District (Portland)

LIST OF ACRONYMS
(continued)

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 SYSTEM PLAN

Appendix A – Index

(NOTE: Street Inventory *status* as of June 2000)

A.1 Bend Urban Area Street Inventory: Existing Conditions (3 pages)
A.2 Bend Urban Area Street Inventory: Future Conditions (5 pages)
A.3 Intersection Improvements Priorities (1 page)
A.4 Bend Urban Area Street Inventory: Modernization Needs (3 pages)
A.5 Bend Urban Area Street Inventory: New Link Needs (2 pages)
A.6 BTAC Recommendations for the Transportation CIP (2 pages)
A.7 BTAC Funding Recommendations for the Five Year CIP (1 page)

Descriptions:

The inventory detail, in Appendix A, 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).

BEND URBAN AREA STREET INVENTORY

ARTERIAL STREETS

					EXISTING CONDITIONS									
CLASSIFICATION	STREET NAME	FROM	TO	Miles	ROW	Pave. Width	No. Lanes	Road Cond.	ADT	YR	Curb	Bike lane	Side walk	J
Expressway	PARKWAY (NEW 97) #	HWY 20/97 "Y"	COLORADO	3.07	100'+	74'+	4+	VG	13,400	'99	Y	Y	N	O
Expressway	HWY 97 (N)	N. UGB	COOLEY	0.61	170+	74	5	VG	20,100	'98	Y	Y	N	O
Expressway	HWY 97 (N)	COOLEY	HWY 20 (N)	0.89	100-210	74	5	VG	25,900	'98	Y	Y	N	O
Expressway	HWY 97 (S)	PARKWAY (S)	CHINA HAT	0.45	160	80	5	P-F	18,800	'98	N	Y	N	O
Expressway	HWY 97 (S)	CHINA HAT	S. URBAN RESERVE	0.45	160	80	5	P-F	18,800	'98	N	Y	N	O
Expressway	HWY. 20 (N)	N. URBAN RESERVE	COOLEY	0.57	200	70	5	VG	12,100	'98	N	Y	N	O
Expressway	HWY. 20 (N)	COOLEY	HWY 97 (N)	0.91	200	70	5	VG	12,100	'98	N	Y	N	O
Expressway	HWY. 20 (E)	12TH ST.	PURCELL	1.06	80	36-66	2-5	G	18,400	'98	P	Y	P	O
Expressway	HWY. 20 (E)	PURCELL	27TH ST.	0.25	80-100	58-72	2-5	G	17,505	'99	P	Y	P	O
Expressway	HWY. 20 (E)	27TH ST.	E. URBAN RESERVE	0.57	80	32	2-5	G	12,330	'99	N	Y	N	O
Principal Arterial	HWY. 20 (N)	HWY 97 (N)	EMPIRE	0.42	100-150	72	5	VG	38,900	'98	Y	Y	N	O
Principal Arterial	HWY. 20 (N)	EMPIRE	DIVISION ST. (N)	1.00	100-130	72-86	5	VG	44,900	'98	Y	Y	P	O
Principal Arterial	HWY. 20 (N) / 3rd St.	DIVISION ST. (N)	REVERE	0.70	80-135	54-64	4-5	VG	28,000	'98	P	N	P	O
Principal Arterial	HWY. 20 (N) / 3rd St.	REVERE	GREEENWOOD	0.53	80	64	5	VG	29,900	'98	Y	N	Y	O
Principal Arterial	3RD STREET, SE	GREENWOOD	FRANKLIN	0.27	80	64	5	VG	28,700	'98	Y	N	Y	O
Principal Arterial	3RD STREET, SE	FRANKLIN	WILSON	0.80	80-110	64	5	VG	28,400	'98	Y	N	Y	O
Principal Arterial	3RD STREET, SE	WILSON	DIVISION (S)	0.55	80-90	64-74	5	VG	27,600	'98	Y	P	Y	O
Principal Arterial	3RD STREET, SE	DIVISION (S)	POWERS	0.64	80-100	74	5	VG	41,600	'98	Y	Y	N	O
Principal Arterial	3RD STREET, SE	POWERS	MURPHY	0.63	75-110	74	5	P-F	35,100	'98	P	Y	N	O
Principal Arterial	3RD STREET, SE	MURPHY	PARKWAY (S)	0.51	90-210	76	5	P-F	20,900	'98	P	Y	P	O
Principal Arterial	HWY. 20 (E)	3RD ST. , NE	4TH ST.	0.09	80	66	5	VP	20,700	'98	Y	N	Y	O
Principal Arterial	HWY. 20 (E)	4TH ST.	8TH ST.	0.34	80	66	5	F	27,040	'99	Y	Y	Y	O
Principal Arterial	HWY. 20 (E)	8TH ST.	12TH ST.	0.23	80	48-66	2-5	F	25,171	'99	N	Y	N	O
Major Arterial	27TH ST, NE	BUTLER MKT. RD.	NEFF ROAD	1.33	70-80	42	3	VG	12,760	'00	P	Y	P	B
Major Arterial	27TH ST, NE	NEFF ROAD	HWY 20 (E)	0.75	80-90	30-48	2-5	VG	19,899	'99	P	P	P	B
Major Arterial	27TH ST, NE	HWY 20 (E)	BEAR CREEK RD.	0.26	70-80	36	2-5	VG	17,833	'99	N	Y	N	B
Major Arterial	27TH ST, SE	BEAR CREEK RD.	REED MARKET RD	1.00	80	34	2-3	F-G	13,735	'00	N	Y	N	B
Major Arterial	EMPIRE	HWY20 (N)	BOYD ACRES RD.	0.49	60-80	36-48	2-5	F	8,409	'97	Y	Y	Y	B
Major Arterial	EMPIRE	BOYD ACRES RD.	(TO THE EAST)	0.36	60-80	36-48	2-5	F	500	E	Y	N	Y	B
Major Arterial	EMPIRE	18TH ST, NE	YEOMAN (N/S)	0.49	80	36	2	VG	1,500	E	N	Y	N	B
Major Arterial	REED MKT. RD.	DIVISION	3RD ST., SE	0.08	60	38-48	2-3	VG	7,000	E	P	Y	P	B
Major Arterial	REED MKT. RD.	3RD ST., SE	9TH ST., SE	0.53	50-60	40-48	2-3	VG	13,077	'00	P	Y	P	B
Major Arterial	REED MKT. RD.	9TH ST., SE	15TH ST.	0.45	60-70	48	2-3	F-VG	11,382	'96	Y	Y	P	B
Major Arterial	REED MKT. RD.	15TH ST., SE	PETTYGREW	0.76	60-80	24-48	2-3	VG	9,593	'97	P	P	N	B
Major Arterial	REED MKT. RD.	PETTYGREW	27TH ST.	0.25	60-80	24	2	VG	7,775	'00	N	N	N	B
Minor Arterial	4TH ST. NE	BUTLER MKT. RD.	ADDISON	0.15	60-70	36	2-3	VG	3,386	'95	N	N	N	B
Minor Arterial	4TH ST, NE	ADDISON	STUDIO	0.57	60	36	2	VP	1,496	'95	P	Y	P	B
Minor Arterial	4TH ST, NE	STUDIO	REVERE	0.13	60	40	2-3	VP	9,480	'90	P	Y	P	B
Minor Arterial	4TH ST, NE	REVERE	GREENWOOD	0.53	60	40	2	VG	3,271	'96	Y	N	P	B
Minor Arterial	4TH ST, NE	GREENWOOD	FRANKLIN	0.28	60	30-38	2-3	VG	2,414	'96	Y	N	P	B
Minor Arterial	8TH ST., NE	BUTLER MKT. RD.	REVERE	0.68	60	30-46	2-3	VG	9,052	'00	P	Y	P	B
Minor Arterial	8TH ST., NE	REVERE	GREENWOOD	0.53	60	40	2-3	VG	13,815	'00	Y	Y	P	B
Minor Arterial	8TH ST., NE	GREENWOOD	FRANKLIN	0.28	60	40	2-3	VP	11,368	'00	Y	Y	P	B
Minor Arterial	8TH/9TH ST, NE/SE	FRANKLIN	WILSON	0.83	60-80	40-48	2-3	VG	10,263	'00	Y	Y	P	B
Minor Arterial	9TH ST., SE	WILSON	REED MARKET RD.	0.57	60-70	24	2-3	VP	5,314	'00	N	N	N	B
Minor Arterial	14TH ST., NW	NEWPORT	GALVESTON	0.38	60	30	2	VP	8,644	'99	Y	Y	P	B
Minor Arterial	14TH ST., NW/SW	GALVESTON	SIMPSON	0.63	60-100	40-44	2	VG	9,626	'99	P	Y	P	B
Minor Arterial	14TH ST., SW	SIMPSON	COLORADO	0.40	80-100	28	2-3	F	5,586	'99	N	P	N	B
Minor Arterial	15TH ST, NE/SE	BEAR CREEK RD.	WILSON	0.49	60	36-42	2-3	F-G	4,500	E	Y	Y	Y	B
Minor Arterial	15TH ST, SE	WILSON	REED MARKET	0.51	60-90	40	2-3	VP-P	5,800	'94	Y	Y	Y	B
Minor Arterial	15TH ST, SE	REED MARKET	KNOTT ROAD	2.05	60-80	36-48	2-3	F-VG	6,094	'96	P	Y	P	B/I
Minor Arterial	18th, NE ["A"]	COOLEY RD.	YEOMAN (E/W)	1.07	80	36-43	2-3	VG	1,158	'96	Y	Y	P	B
Minor Arterial	18th, NE ["A"]	YEOMAN (E/W)	EMPIRE	0.30	80	36-43	2-3	VG	1,158	'96	Y	Y	P	B
Minor Arterial	27TH ST. SE	REED MARKET RD	FERGUSON	0.95	60	32-40	2-3	P	10,566	'00	N	Y	N	B
Minor Arterial	27TH ST. SE	FERGUSON	RICKARD RD.	1.00	60	28-44	2-3	VG	7,330	'96	N	N	N	D
Local	BEAR CK. RD. (10TH)	FRANKLIN	ALDEN	0.23	60	30	2	F	7,000	'94	Y	Y	P	B
Minor Arterial	BEAR CK. RD.	ALDEN	15 TH ST.	0.28	60	36	2	VG	6,000	E	P	P	P	B
Minor Arterial	BEAR CK. RD	15 TH ST.	PETTYGREW	0.74	60-80	26-36	2	VG	4,351	'92	P	P	P	B
Minor Arterial	BEAR CK. RD.	PETTYGREW	27TH ST.	0.25	60-70	26	2	VG	3,663	'97	N	N	N	B
Minor Arterial	BLAKELY RD.	REED MKT. RD.	MC CLELLAN	0.27	60-70	22-26	2	VG	2,020	'96	N	N	N	B
Minor Arterial	BOND	WALL	GREENWOOD	0.09	80	58	2	VG	4,110	'94	Y	N	Y	B
Minor Arterial	BOND	GREENWOOD	FRANKLIN	0.22	80	56	2-3	VP	8,111	'94	Y	N	Y	B
Minor Arterial	BOYD ACRES RD	EMPIRE	BRINSON	0.34	60	36	2	VG	9,180	'90	N	Y	N	B
Minor Arterial	BOYD ACRES RD	BRINSON	BUTLER MARKET	0.63	60-70	36	2-3	VG	8,384	'97	N	Y	N	B
Minor Arterial	BROOKSWOOD	POWERS	PINEBROOK	0.61	60-80	36-38	2	VG	3,835	'97	N	Y	N	B
Minor Arterial	BROOKSWOOD	PINEBROOK	LODGEPOLE	0.30	60	34-44	2	VG	4,073	'97	N	Y	N	B
Minor Arterial	BROOKSWOOD	LODGEPOLE	POPLAR	1.16	40-70	36	2	VG	1,882	'95	N	Y	N	B
Minor Arterial	BROOKSWOOD	POPLAR	S. UGB	0.20	80	36	2	VG	1,514	'95	N	Y	N	B

Under Construction 2000

page total = 39.9 Miles E = Traffic Count Estimate

BEND URBAN AREA STREET INVENTORY

ARTERIAL STREETS (continued)

CLASSIFICATION	STREET NAME	FROM	TO	Miles	EXISTING CONDITIONS									
					ROW	Pave. Width	No. Lanes	Road Cond.	ADT	YR	Curb	Bike lane	Side walk	J
Minor Arterial	BUTLER MKT. RD	HWY 97 (N)	4TH ST.	0.19	80	48-60	3-5	VG	9,469	'95	Y	Y	Y	B
Minor Arterial	BUTLER MKT. RD	4TH ST.	BOYD ACRES	0.27	80	36-40	3	VG	9,223	'95	Y	Y	Y	B
Minor Arterial	BUTLER MKT. RD	BOYD ACRES RD.	8TH ST./STUDIO	0.51	60-70	36-40	2-3	VG	10,543	'94	Y	Y	P	B
Minor Arterial	BUTLER MKT. RD	8TH ST./STUDIO	WELLS ACRES RD	0.38	60-80	30-40	2-3	VG	17,428	'00	N	Y	P	B
Minor Arterial	BUTLER MKT. RD	WELLS ACRES RD	YEOMAN (N/S)	0.59	70-80	30-40	3	VG	10,939	'97	N	Y	N	B
Minor Arterial	BUTLER MKT. RD	YEOMAN (N/S)	27TH ST.	0.49	70-80	40-44	3	VG	12,509	'00	N	Y	N	B
Minor Arterial	BUTLER MKT. RD	27TH ST.	DESCH. MARKET	0.30	70-80	44-46	3	VG	9,064	'96	N	Y	N	D
Minor Arterial	BUTLER MKT. RD	DESCH. MARKET	E. URBAN RESERVE	0.50	60	30	3	G	4,668	'00	N	N	N	D
Minor Arterial	CENTURY DR.	COLORADO	MT. WASHINGTON	0.30	70-120	50-62	3	F	7,208	'00	P	Y	N	O
Minor Arterial	CENTURY DR.	MT. WASHINGTON	E. CAMPBELL RD.	0.95	60-70	36-54	2-3	F	4,132	'00	N	Y	N	O
Minor Arterial	CENTURY DR.	E. CAMPBELL RD.	W. UGB	1.25	60-70	36	3	F	4,900	'97	N	Y	N	O
Minor Arterial	COLORADO	CENTURY DR.	SIMPSON	0.72	80	32	3	F-P	5,895	'00	Y	N	P	O
Minor Arterial	COLORADO	SIMPSON	WALL	0.44	80	40	3	VP-P	15,626	'00	Y	P	P	O
Minor Arterial	COLORADO	WALL	DIVISION	0.45	60	40	3	VP-P	14,963	'00	Y	Y	Y	O
Minor Arterial	COOLEY RD	HWY 20	HWY 97 (N)	0.76	60-80	20-32	2	P	1,338	'95	N	N	N	D
Minor Arterial	COOLEY RD	HWY 97 (N)	RANCH VALLEY DR.	0.55	80	36	2	P	3,589	'97	N	Y	N	B
Minor Arterial	COOLEY RD.	RANCH VIL. DR.	NE 18TH ST.	0.25	80	36	2-3	VG	2,254	'96	P	Y	P	B/I
Minor Arterial	DIVISION ST.	HWY 97 (N)	BROSTERHOUS/3RD ST	2.97	60-100	48	3	VG/F	21,000	'94	Y	Y	P	B
Minor Arterial	EMPIRE	O.B. RILEY RD.	HWY 97/HWY20 (N)	0.28	40-60	24-44	2-3	F-VG	2,312	'97	P	N	P	B
Minor Arterial	FRANKLIN	WALL	DIVISION	0.45	80	36-56	3-4	VP	14,996	'99	Y	N	P	B
Minor Arterial	FRANKLIN	DIVISION	3RD ST., NE	0.25	80	36-56	3-4	VG	1,800	E	Y	P	Y	B
Minor Arterial	FRANKLIN	3RD ST., NE	4TH ST.	0.09	80	36-56	3	VP	8,800	'97	Y	N	Y	B
Minor Arterial	FRANKLIN	4TH ST., NE	8TH ST.	0.34	80	36	2	VG	8,800	'97	Y	Y	Y	B
Minor Arterial	FRANKLIN	8TH ST., NE	10TH ST.	0.11	80	36	2	VP	6,350	'97	Y	Y	Y	B
Minor Arterial	GALVESTON AVE.	17TH ST., NW	14TH ST.	0.32	80	22-42	2	VG	1,562	'99	Y	N	N	B
Minor Arterial	GALVESTON AVE.	14TH ST., NW	12TH ST.	0.15	80	44	2	VP	9,838	'99	Y	Y	P	B
Minor Arterial	GALVESTON AVE.	12TH ST., NW	RIVERSIDE AVE.	0.28	80	40-44	2	VP	14,770	'99	Y	Y	P	B
Minor Arterial	GREENWOOD AVE.	WALL	DIVISION	0.28	80	56	4-5	P-VP	15,595	'94	Y	N	Y	B
Minor Arterial	GREENWOOD AVE.	DIVISION	3RD ST., NE	0.25	80	56	4-5	VP-F	17,960	'93	Y	N	Y	B
Minor Arterial	HUNNEL ROAD	DEAD END	ROBAL ROAD	0.49	80	48	3	VG	500	E	Y	N	N	B
Minor Arterial	HWY 20:FRONTAGE	N. TERMINI	EMPIRE BLVD.	0.38	45	22	2	F	1,000	E	N	N	N	O
Minor Arterial	KNOTT RD.	CHINA HAT	15TH ST.	1.59	80	32	2	VG	7,987	'00	N	Y	N	B
Minor Arterial	KNOTT RD.	15TH ST., SE	RICKARD	1.33	60-70	28	2	VG	6,017	'97	N	N	N	B
Minor Arterial	MT. WASHINGTON	HWY 97N	SUMMIT	1.89	80	42	2-3	F	3,780	'99	Y	Y	P	B
Minor Arterial	MT. WASHINGTON	SUMMIT	PUTNAM	1.52	80	48	2-3	VG	1,162	'99	Y	Y	P	B
Minor Arterial	MT. WASHINGTON	PUTNAM	SHEVLIN PK.	1.36	80	40	2-3	VG	2,623	'99	Y	Y	Y	B
Minor Arterial	MT. WASHINGTON #	SHEVLIN PK. RD.	SKYLINER RD	1.00	80	40	2-3	VG	NEW	'00	Y	Y	Y	B
Minor Arterial	MT. WASHINGTON	TROON	CENTURY DR.	1.00	80	40	2-3	VG	1,377	'99	N	Y	N	B
Minor Arterial	NEFF RD./PENN	8TH STREET	PURCELL	1.00	60-80	26-44	2-3	P-VG	11,192	'96	P	Y	P	B
Minor Arterial	NEFF RD.	PURCELL	27TH ST.	0.49	80	44	2-3	VG	9,037	'97	P	Y	P	B
Minor Arterial	NEFF RD.	27TH ST., NE	EAST UGB	0.63	70-80	30-44	2-3	VG	5,993	'97	P	Y	P	B
Minor Arterial	NEFF RD.	EAST UGB	E. URBAN RESERVE	0.11	70-80	30-44	2-3	VG	1,500	E	P	Y	P	D
Minor Arterial	NEWPORT	COLLEGE WAY	14TH ST.	0.28	60	36	3	P-F	13,182	'99	Y	Y	Y	B
Minor Arterial	NEWPORT	14TH ST., NW	9TH ST.	0.34	80	36	3	P-F	14,819	'99	Y	Y	Y	B
Minor Arterial	NEWPORT	9TH ST., NW	AWBREY RD.	0.45	60-80	36	2-3	P-F	15,648	'99	Y	Y	Y	B
Minor Arterial	NEWPORT	AWBREY RD.	WALL	0.20	60	36-40	2-3	P-F	15,465	'99	Y	N	Y	B
Minor Arterial	OLNEY AVE.	WALL (HILL)	3RD ST., NE	0.34	60	36-40	2-3	P-F	2,312	'99	Y	N	Y	B
Minor Arterial	OLNEY AVE. #	3RD ST., NE	6TH ST.	0.17	60	36	2	P-VP	258	'99	Y	N	N	B
Minor Arterial	OLNEY AVE. #	6TH ST., NE	NEFF / 8TH	0.19	60-80	36	2-3	VG	NEW	'00	Y	Y	Y	B
Minor Arterial	REVERE	HILL	DIVISION	0.22	80	64-75	4	VG	14,929	'93	Y	Y	Y	B
Minor Arterial	REVERE	DIVISION	3RD/HWY97	0.17	80	48-64	4-5	VP-P	12,504	'93	Y	N	P	B
Minor Arterial	REVERE	3RD/HWY97	4TH ST.	0.09	80	64	4-5	P	15,215	'94	Y	N	Y	B
Minor Arterial	REVERE	4TH ST.	8TH ST.	0.34	80	36	2	VP	12,121	'94	N	Y	P	B
Minor Arterial	RIVERSIDE	GALVESTON	WALL	0.49	80	40-49	2	P	7,138	'99	P	N	P	B
Minor Arterial	ROBAL ROAD #	HWY 20	HUNNEL	0.20	80	48-74	2-5	VG	NEW	'00	Y	Y	Y	B
Minor Arterial	ROBAL ROAD	HUNNEL	HWY 97	0.15	80	48-74	2-5	VG	5,000	E	Y	Y	Y	B
Minor Arterial	SHEVLIN PK. RD.	W. URBAN RESERVE	MT. WASHINGTON	1.57	60-70	36	2	F	2,290	'99	N	Y	N	B
Minor Arterial	SHEVLIN PK. RD.	MT. WASHINGTON	COLLEGE WAY	1.00	60-70	36	2	VG	5,169	'99	N	Y	N	B
Minor Arterial	SIMPSON AVE.	MT. WASHINGTON	14TH ST.	0.61	55-80	24-36	2	VP-P	2,390	'99	P	P	P	B
Minor Arterial	SIMPSON AVE.	14TH ST., NW/SW	COLORADO	0.42	80	40	2-3	VG	6,509	'99	P	Y	P	B
Minor Arterial	SKYLINERS RD.	W. UGB	MT. WASHINGTON	0.52	80	24	2	F	554	'99	N	N	N	B
Minor Arterial	SKYLINERS RD.	MT. WASHINGTON	17TH ST.	0.85	90	24	2	F	554	'99	N	N	N	B
Minor Arterial	WALL (HILL/DES.PL)	REVERE	PORTLAND	0.30	60-80	36-62	3-4	VP-VG	16,357	'99	Y	P	P	B
Minor Arterial	WALL/HILL	PORTLAND	GREENWOOD	0.30	80-85	56	2-3	VP	11,381	'99	Y	N	P	B
Minor Arterial	WALL	GREENWOOD	FRANKLIN	0.21	^80	56	2-3	VP	10,797	'98	Y	N	Y	B
Minor Arterial	WILSON	BLAKELY/BOND ST.	PARKWAY	0.32	80	36-48	3	VG	N/A	'99	Y	Y	Y	B
Minor Arterial	WILSON	PARKWAY	3RD ST., SE	0.28	60	36-48	3	VP-F	5,200	'97	N	N	N	B

\# Under Construction 2000

page total = 37.5 Miles E = Traffic Count Estimate

Total Art. exist. = 77.4 Miles

Appendix A.1 (continued)

BEND URBAN AREA STREET INVENTORY

COLLECTOR STREETS

CLASSIFICATION		STREET NAME	FROM	TO	Miles	EXISTING CONDITIONS									
						ROW	Pave. Width	No. Lanes	Road Cond.	ADT	YR	Curb	Bike lane	Side walk	J
Major	Collector	2ND, SE	SCOTT ST.	WILSON AVE.	0.38	50-60	36	2	VG	1,500	E	P	N	P	B
Major	Collector	4TH ST, NE	FRANKLIN	GLENWOOD (ALDEN)	0.31	60	36	2	VG	1,000	E	Y	N	N	D
Major	Collector	9TH, NW	TRENTON	NEWPORT	0.21	80	32-40	2	P	3,292	'99	Y	Y	Y	B
Major	Collector	12TH, NW	SUMMIT AVE.	TRENTON	0.47	60-80	22-25	2	P-F	1,826	'99	Y	Y	Y	B
Major	Collector	ALDEN	4TH ST.	GLENWOOD	0.09	60	22-36	2	P	1,000	E	N	N	N	B
Major	Collector	AMERICAN LANE	REED MKT. RD.	BROSTERHOUS	0.44	60	36	2	VG	4,978	'97	N	N	N	B
Major	Collector	ARCHIE BRIGGS RD.	MT. WASHINGTON	O.B. RILEY	1.25	40-60	24-28	2	VG	1,133	'95	N	N	N	B
Major	Collector	AWBREY	WILMINGTON	MT. WASHINGTON	0.42	60	36-48	2	P-VP	291	'99	Y	Y	P	B
Major	Collector	AWBREY	PORTLAND	WILMINGTON	0.40	60-80	30	2	P-VP	403	'99	Y	N	P	B
Major	Collector	AWBREY	NEWPORT	PORTLAND	0.17	60	30	2	P-VP	906	'99	Y	N	P	B
Major	Collector	BEAR CK. RD.	27TH ST.	E. UGB	0.51	60-70	26	2	P	1,360	'97	N	N	N	D
Major	Collector	BOND	FRANKLIN	COLORADO AVE.	0.38	60-80	36-56	2-3	P-VG	2,961	'97	Y	N	Y	B
Major	Collector	BOND	INDUSTRIAL WAY	WILSON AVE.	0.57	60-80	36-56	2-3	P-VG	2,961	'97	Y	N	Y	B
Major	Collector	BRINSON BLVD.	BOYD AC. RD.	BUTLER MKT.	0.85	60	36	2-3	P	3,635	'98	P	N	N	B
Major	Collector	BROSTERHOUS	HWY 97 (S)	CHASE ROAD	0.47	60	24-48	2-3	VG	3,375	'96	N	N	N	B
Major	Collector	BROSTERHOUS	CHASE ROAD	KNOTT ROAD	2.06	60	26-40	2-3	VG	2,239	'97	P	P	N	B
Major	Collector	CHASE ROAD	PARRELL RD.	MOWITCH	0.17	60	22	2	F	1,089	'95	N	N	N	B
Major	Collector	CHINA HAT	HWY 97 (S)	KNOTT ROAD	0.76	80?	36-50	2-3	F	1,776	'95	Y	Y	P	D
Major	Collector	COLLEGE WAY	NEWPORT	SAGINAW	0.34	80	36-44	2	VG	6,218	'99	Y	Y	N	B
Major	Collector	COOLEY RD.	O.B. RILEY	HWY 20 (N)	0.30	60	20	2	P	258	'95	N	N	N	D
Major	Collector	COUNTRY CLUB	MURPHY RD.	KNOTT ROAD	1.10	50-70	28-36	2	P-VG	2,454	'96	P	P	P	B
Major	Collector	DESCHUTES MKT.	HAMEHOOK RD.	YEOMAN (E/W)	0.93	60-70	26	2	F	4,241	'96	N	N	N	D
Major	Collector	DESCHUTES MKT.	YEOMAN (E/W)	BUTLER MKT.	0.51	60	26	2	F	4,285	'96	N	N	N	D
Major	Collector	FERGUSON RD.	SE 15TH	SE 27TH ST.	1.17	60-70	36	2	F/VG	1,590	'97	P	Y	P	B
Major	Collector	GLENWOOD	ALDEN	9TH ST.	0.28	60	36	2	P-F	1,000	E	Y	N	N	B
Major	Collector	HAWTHORNE AVE.	WALL ST.	DIVISION ST.	0.34	60-80	34	2	VG	8,000	E	Y	N	Y	B
Major	Collector	HAWTHORNE AVE.	NE 1ST	NE 4TH	0.25	60	36	2	N/A	500	E	N	N	N	B
Major	Collector	LODGEPOLE	BROOKSWOOD	MAHOGANY	0.28	60	36	2	VG	1,100	'95	Y	N	N	B
Major	Collector	LODGEPOLE	MAHOGANY	POPLAR	0.55	60	36	2	VG	2,000	E	N	Y	N	B
Major	Collector	MURPHY RD.	HWY 97 (S)	PARRELL RD.	0.19	60	36	2-3	VG	4,412	'96	Y	Y	P	B
Major	Collector	MURPHY RD.	PARRELL RD.	COUNTRY CLUB	0.34	40-60	36	2	VG	5,071	'96	Y	Y	N	B
Major	Collector	MURPHY RD.	COUNTRY CLUB	BROSTERHOUS	0.64	60	36	2	VG	3,274	'96	Y	Y	P	B
Major	Collector	O.B. RILEY	COOLEY RD.	EMPIRE	1.34	60	36	2	G	1,786	'91	N	Y	N	B/I
Major	Collector	O.B. RILEY	EMPIRE	HWY 97 (N)	0.76	60-100	36-56	2-4	VG	3,562	'97	P	P	P	B
Major	Collector	PARRELL RD.	BROSTERHOUS	POWERS	0.55	60	34	2	F	4,170	'97	N	Y	N	B
Major	Collector	PARRELL RD.	POWERS	MURPHY	0.76	60	34	2	F-VG	2,875	'97	N	Y	N	B
Major	Collector	PARRELL RD.	MURPHY	CHINA HAT	1.00	60	22-32	2	P	353	'94	N	N	N	B
Major	Collector	PETTIGREW	BEAR CREEK RD.	REED MKT. RD.	1.00	60	26	2	VG	1,647	'95	N	N	N	B
Major	Collector	PONDEROSA	POPLAR	HWY 97(S)	0.55	60	36	2	G	2,430	'93	N	Y	N	B
Major	Collector	PORTLAND AVE.	COLLEGE WAY	9TH ST., NE	0.70	60-80	36	2	VG	2,596	'99	Y	N	P	B
Major	Collector	PORTLAND AVE.	9TH ST., NE	WALL ST.	0.81	60-100	30-36	2	VG/P	8,866	'99	Y	N	P	B
Major	Collector	POWERS	BROOKSWOOD	HWY 97(S)	0.59	30-60	36-48	2	VG	2,584	'95	Y	Y	N	B
Major	Collector	POWERS	HWY 97(S)	PARRELL RD.	0.14	30	20	2	P	736	'96	N	N	N	B
Major	Collector	PURCELL BLVD.	BUTLER MKT. RD.	OCKER DR.	0.51	60	40	2	VP-F	857	'98	Y	N	Y	B
Major	Collector	PURCELL BLVD.	PATTERSON CT.	NEFF	0.40	60	40	2	VP-P	1,500	E	Y	N	P	B
Major	Collector	PURCELL BLVD.	NEFF	HWY 20	0.45	60	40	2	VG	3,559	'99	Y	Y	Y	B
Major	Collector	PURCELL BLVD.	HWY 20	TWIN KNOLLS	0.11	60	40	2	VG	500	E	N	N	N	B
Major	Collector	PUTMAN	BUCK DR	MT. WASH. DR.	0.76	60	40	2	VG	500	E	Y	N	N	B
Major	Collector	SCOTT AVE.	DIVISION ST.	SE 2ND.	0.34	60	20-36	2	VG	1,000	E	P	N	N	B
Major	Collector	SKYLINERS RD.	W.URB	W.UGB	1.00	80	24	2	F	454	'96	N	N	N	D
Major	Collector	STUDIO RD.	4TH ST., NE	BUTLER MARKET RD.	0.51	60-70	40	2	VG	2500	E	Y	Y	P	B
Major	Collector	SUMMIT AVE.	MT. WASH. DR. (W)	MT. WASH. DR. (E)	2.23	80	36-48	2	P-VG	1,427	'99	Y	Y	Y	B
Major	Collector	WALL ST.	FRANKLIN AVE.	COLORADO AVE.	0.44	60-80	30-56	2	P-VG	1,660	'97	Y	N	Y	B
Major	Collector	WELLS ACRE RD.	BUTLER MKT.	PURCELL	0.57	60	40	2	VP-P	2,720	'91	Y	N	P	B
Major	Collector	WELLS ACRE RD.	PURCELL	NE 27TH	0.42	60	40	2	VG	2,761	'96	Y	N	P	B
Major	Collector	WILSON AVE.	SE 3RD	SE 9TH ST.	0.55	60-75	36-45	2-3	VP	9,006	'93	Y	Y	P	B
Major	Collector	WILSON AVE.	SE 9TH ST.	SE 15TH. ST.	0.45	70-100	36-45	2-3	VG	8,487	E	Y	Y	P	B
Major	Collector	YEOMAN (N/S)	BUTLER MKT.	YEOMAN E/W	0.76	40-50	24	2	P	2,864	'96	N	N	N	B
Major	Collector	YEOMAN (E/W)	YEOMAN (N/S)	DESCH. MARKET RD.	0.74	40	22	2	P	718	'92	N	N	N	B

Under Construction 2000

Total Collectors existing = 35.60 Miles

E = Traffic Count Estimate

J = Jurisdiction O=ODOT, D=Deschutes County B=City of Bend

BEND LONG RANGE PLANNING

Appendix A.2

BEND URBAN AREA STREET INVENTORY

ARTERIAL STREETS

					FUTURE CONDITIONS						
CLASSIFICATION	STREET NAME	FROM	TO	Miles	ROW	Paved Width	No. Lanes	Curb	Bike Lane	Side walk	J
Expressway	PARKWAY (NEW 97) #	HWY 20/97 "Y"	COLORADO	3.07	100'+	74'+	4+	Y	Y	Y	O
Expressway	HWY 97 (N)	N. UGB	COOLEY	0.61	100'+	74'	5	Y	Y	Y	O
Expressway	HWY 97 (N)	COOLEY	HWY 20 (N)	0.89	100'+	74'	5	Y	Y	Y	O
Expressway	HWY 97 (S)	PARKWAY (S)	CHINA HAT	0.45	100'	74'	5	Y	Y	Y	O
Expressway	HWY 97 (S)	CHINA HAT	S. URBAN RESERVE	0.45	100'	74'	5	Y	Y	Y	O
Expressway	HWY. 20 (N)	N. URBAN RESERVE	COOLEY	0.57	100'+	74'+	5+	Y	Y	Y	O
Expressway	HWY. 20 (N)	COOLEY	HWY 97 (N)	0.91	100'+	74'+	5+	Y	Y	Y	O
Expressway	HWY. 20 (E)	12TH ST.	PURCELL	1.06	100'	74'	5	Y	Y	Y	O
Expressway	HWY. 20 (E)	PURCELL	27TH ST.	0.25	100'	74'	5	Y	Y	Y	O
Expressway	HWY. 20 (E)	27TH ST.	E. URBAN RESERVE	0.57	100'	48-74'	3-5	Y	Y	Y	O
Principal Arterial	HWY. 20 (N)	HWY 97 (N)	EMPIRE	0.42	100'+	74'	5	Y	Y	Y	O
Principal Arterial	HWY. 20 (N)	EMPIRE	DIVISION ST. (N)	1.00	100'+	74'+	5+	Y	Y	Y	O
Principal Arterial	HWY. 20 (N) / 3rd St.	DIVISION ST. (N)	REVERE	0.70	100'+	74'	5	Y	Y	Y	O
Principal Arterial	HWY. 20 (N) / 3rd St.	REVERE	GREEENWOOD	0.53	80-100'	74'	5	Y	Y	Y	O
Principal Arterial	3RD STREET, SE	GREENWOOD	FRANKLIN	0.27	80-100'	74'	5	Y	Y	Y	O
Principal Arterial	3RD STREET, SE	FRANKLIN	WILSON	0.80	80-100'	74'	5	Y	Y	Y	O
Principal Arterial	3RD STREET, SE	WILSON	DIVISION (S)	0.55	80-100'	74'	5	Y	Y	Y	O
Principal Arterial	3RD STREET, SE	DIVISION (S)	POWERS	0.64	100'	74'	5	Y	Y	Y	O
Principal Arterial	3RD STREET, SE	POWERS	MURPHY	0.63	100'	74'	5	Y	Y	Y	O
Principal Arterial	3RD STREET, SE	MURPHY	PARKWAY (S)	0.51	100'	74'	5	Y	Y	Y	O
Principal Arterial	HWY. 20 (E)	3RD ST. , NE	4TH ST.	0.09	80-100'	74'	5	Y	Y	Y	O
Principal Arterial	HWY. 20 (E)	4TH ST.	8TH ST.	0.34	80-100'	74'	5	Y	Y	Y	O
Principal Arterial	HWY. 20 (E)	8TH ST.	12TH ST.	0.23	80-100'	74'	5	Y	Y	Y	O
Major Arterial	27TH ST, NE.	BUTLER MKT. RD.	NEFF ROAD	1.33	80-100'	74'	5	Y	Y	Y	B
Major Arterial	27TH ST, NE	NEFF ROAD	HWY 20 (E)	0.75	100'	74'	5	Y	Y	Y	B
Major Arterial	27TH ST, NE	HWY 20 (E)	BEAR CREEK RD.	0.26	100'	74'	5	Y	Y	Y	B
Major Arterial	27TH ST, SE	BEAR CREEK RD.	REED MARKET RD	1.00	100'	74'	5	Y	Y	Y	B
Major Arterial	EMPIRE	HWY20 (N)	BOYD ACRES RD.	0.49	100'	74'	5	Y	Y	Y	B
Major Arterial	EMPIRE	BOYD ACRES RD.	(TO THE EAST)	0.36	100'	74'	5	Y	Y	Y	B
Major Arterial	EMPIRE	18TH ST, NE	YEOMAN (N/S)	0.49	100'	74'	5	Y	Y	Y	B
Major Arterial	REED MKT. RD.	DIVISION	3RD ST., SE	0.08	80-100'	74'	5	Y	Y	Y	B
Major Arterial	REED MKT. RD.	3RD ST., SE	9TH ST., SE	0.53	80-100'	74'	5	Y	Y	Y	B
Major Arterial	REED MKT. RD.	9TH ST., SE	15TH ST.	0.45	80-100'	74'	5	Y	Y	Y	B
Major Arterial	REED MKT. RD.	15TH ST., SE	PETTYGREW	0.76	80-100'	74'	5	Y	Y	Y	B
Major Arterial	REED MKT. RD.	PETTYGREW	27TH ST.	0.25	80-100'	74'	5	Y	Y	Y	B
Minor Arterial	4TH ST. NE	BUTLER MKT. RD.	ADDISON	0.15	80'	48'	3	Y	Y	Y	B
Minor Arterial	4TH ST, NE	ADDISON	STUDIO	0.57	80'	48'	3	Y	Y	Y	B
Minor Arterial	4TH ST, NE	STUDIO	REVERE	0.13	80'	48'	3	Y	Y	Y	B
Minor Arterial	4TH ST, NE	REVERE	GREENWOOD	0.53	80'	48'	3	Y	Y	Y	B
Minor Arterial	4TH ST, NE	GREENWOOD	FRANKLIN	0.28	80'	48'	3	Y	Y	Y	B
Minor Arterial	8TH ST., NE	BUTLER MKT. RD.	REVERE	0.68	80'	48'	3	Y	Y	Y	B
Minor Arterial	8TH ST., NE	REVERE	GREENWOOD	0.53	80'	48'	3	Y	Y	Y	B
Minor Arterial	8TH ST., NE	GREENWOOD	FRANKLIN	0.28	80'	48'	3	Y	Y	Y	B
Minor Arterial	8TH/9TH ST, NE/SE	FRANKLIN	WILSON	0.83	80'	48'	3	Y	Y	Y	B
Minor Arterial	9TH ST., SE	WILSON	REED MARKET RD.	0.57	80'	48'	3	Y	Y	Y	B
Minor Arterial	14TH ST., NW	NEWPORT	GALVESTON	0.38	80'	48'	3	Y	Y	Y	B
Minor Arterial	14TH ST., NW/SW	GALVESTON	SIMPSON	0.63	80'	48'	3	Y	Y	Y	B
Minor Arterial	14TH ST., SW	SIMPSON	COLORADO	0.40	80'	48'	3	Y	Y	Y	B
Minor Arterial	15TH ST, NE/SE	BEAR CREEK RD.	WILSON	0.49	80'	48'	3	Y	Y	Y	B
Minor Arterial	15TH ST, SE	WILSON	REED MARKET	0.51	80'	48'	3	Y	Y	Y	B
Minor Arterial	15TH ST, SE	REED MARKET	KNOTT ROAD	2.05	80'	48'	3	Y	Y	Y	B/D
Minor Arterial	18th, NE ["A"]	COOLEY RD.	YEOMAN (E/W)	1.07	80'	48'	3	Y	Y	Y	B
Minor Arterial	18th, NE ["A"]	YEOMAN (E/W)	EMPIRE	0.30	80'	48'	3	Y	Y	Y	B
Minor Arterial	27TH ST, SE	REED MARKET RD	FERGUSON	0.95	80'	48'	3	Y	Y	Y	B
Minor Arterial	27TH ST, SE	FERGUSON	RICKARD RD.	1.00	80'	48'	3	Y	Y	Y	D
Local	BEAR CK. RD. (10TH)	FRANKLIN	ALDEN	0.23	80'	48'	3	N	N	N	B
Minor Arterial	BEAR CK. RD.	ALDEN	15 TH ST.	0.28	80'	48'	3	Y	Y	Y	B
Minor Arterial	BEAR CK. RD.	15 TH ST.	PETTYGREW	0.74	80'	48'	3	Y	Y	Y	B
Minor Arterial	BEAR CK. RD.	PETTYGREW	27TH ST.	0.25	80'	48'	3	Y	Y	Y	B
Minor Arterial	BLAKELY RD.	REED MKT. RD.	MC CLELLAN	0.27	80'	48'	3	Y	Y	Y	B
Minor Arterial	BOND	WALL	GREENWOOD	0.09	80'	58'	2-3	Y	Y	Y	B
Minor Arterial	BOND	GREENWOOD	FRANKLIN	0.22	80'	56'	2-3	Y	Y	Y	B
Minor Arterial	BOYD ACRES RD	EMPIRE	BRINSON	0.34	80'	48'	3	Y	Y	Y	B
Minor Arterial	BOYD ACRES RD	BRINSON	BUTLER MARKET	0.63	80'	48'	3	Y	Y	Y	B
Minor Arterial	BROOKSWOOD	POWERS	PINEBROOK	0.61	80'	48'	3	Y	Y	Y	B
Minor Arterial	BROOKSWOOD	PINEBROOK	LODGEPOLE	0.30	80'	48'	3	Y	Y	Y	B
Minor Arterial	BROOKSWOOD	LODGEPOLE	POPLAR	1.16	80'	48'	3	Y	Y	Y	B
Minor Arterial	BROOKSWOOD	POPLAR	S. UGB	0.20	80'	48'	3	Y	Y	Y	B

Under Constuction 2000

page total = 39.9 Miles

Appendix A.2 (continued)

BEND URBAN AREA STREET INVENTORY

ARTERIAL STREETS - (continued)

CLASSIFICATION	STREET NAME	FROM	TO	Miles	FUTURE CONDITIONS						
					ROW	Paved Width	No. Lanes	Curb	Bike Lane	Side walk	J
Minor Arterial	BUTLER MKT. RD	HWY 97 (N)	4TH ST.	0.19	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	BUTLER MKT. RD	4TH ST.	BOYD ACRES	0.27	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	BUTLER MKT. RD	BOYD ACRES RD.	8TH ST./STUDIO	0.51	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	BUTLER MKT. RD	8TH ST./STUDIO	WELLS ACRES RD	0.38	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	BUTLER MKT. RD	WELLS ACRES RD	YEOMAN (N/S)	0.59	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	BUTLER MKT. RD	YEOMAN (N/S)	27TH ST.	0.49	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	BUTLER MKT. RD	27TH ST.	DESCH. MARKET	0.30	80'	48'	3	Y	Y	Y	D
Minor Arterial	BUTLER MKT. RD	DESCH. MARKET	E. URBAN RESERVE	0.50	80'	48'	3	Y	Y	Y	D
Minor Arterial	CENTURY DR.	COLORADO	MT. WASHINGTON	0.30	80'	48'	3	Y	Y	Y	O
Minor Arterial	CENTURY DR.	MT. WASHINGTON	E. CAMPBELL RD.	0.95	80'	48'	3	Y	Y	Y	O
Minor Arterial	CENTURY DR.	E. CAMPBELL RD.	W. UGB	1.25	80'	48'	3	Y	Y	Y	O
Minor Arterial	COLORADO	CENTURY DR.	SIMPSON	0.72	80'	48'	3	Y	Y	Y	O
Minor Arterial	COLORADO	SIMPSON	WALL	0.44	80'	48'	3	Y	Y	Y	O
Minor Arterial	COLORADO	WALL	DIVISION	0.45	80'	48'	2	Y	Y	Y	O
Minor Arterial	COOLEY RD	HWY 20	HWY 97 (N)	0.76	80'	48'	3	Y	Y	Y	D
Minor Arterial	COOLEY RD	HWY 97 (N)	RANCH VALLEY DR.	0.55	80'	48'	3	Y	Y	Y	B
Minor Arterial	COOLEY RD.	RANCH VIL. DR.	NE 18TH ST.	0.25	80'	48'	3	Y	Y	Y	B/D
Minor Arterial	DIVISION ST.	HWY 97 (N)	BROSTERHOUS/3RD ST	2.97	80'	48'	3	Y	Y	Y	B
Minor Arterial	EMPIRE	O.B. RILEY RD.	HWY 97/HWY20 (N)	0.28	80'	48'	3	Y	Y	Y	B
Minor Arterial	FRANKLIN	WALL	DIVISION	0.45	80'	48'	3	Y	Y	Y	B
Minor Arterial	FRANKLIN	DIVISION	3RD ST. , NE	0.25	80'	48'	3	Y	Y	Y	B
Minor Arterial	FRANKLIN	3RD ST. , NE	4TH ST.	0.09	80'	48'	3	Y	Y	Y	B
Minor Arterial	FRANKLIN	4TH ST., NE	8TH ST.	0.34	80'	48'	3	Y	Y	Y	B
Minor Arterial	FRANKLIN	8TH ST., NE	10TH ST.	0.11	80'	48'	3	Y	Y	Y	B
Minor Arterial	GALVESTON AVE.	17TH ST., NW	14TH ST.	0.32	80'	48'	3	Y	Y	Y	B
Minor Arterial	GALVESTON AVE.	14TH ST., NW	12TH ST.	0.15	80'	48'	3	Y	Y	Y	B
Minor Arterial	GALVESTON AVE.	12TH ST., NW	RIVERSIDE AVE.	0.28	80'	48'	3	Y	Y	Y	B
Minor Arterial	GREENWOOD AVE.	WALL	DIVISION	0.28	80'	48'	3	Y	Y	Y	B
Minor Arterial	GREENWOOD AVE.	DIVISION	3RD ST. , NE	0.25	80'	48'	3	Y	Y	Y	B
Minor Arterial	HUNNEL ROAD	DEAD END	ROBAL ROAD	0.49	80'	48'	3	Y	Y	Y	B
Minor Arterial	HWY 20:FRONTAGE	N. TERMINI	EMPIRE BLVD.	0.38	60'	36'	3	Y	Y	Y	O
Minor Arterial	KNOTT RD.	CHINA HAT	15TH ST.	1.59	80'	48'	3	Y	Y	Y	B
Minor Arterial	KNOTT RD.	15TH ST., SE	RICKARD	1.33	80'	48'	3	Y	Y	Y	B
Minor Arterial	MT. WASHINGTON	HWY 97N	SUMMIT	1.89	80'	48'	3	Y	Y	Y	B
Minor Arterial	MT. WASHINGTON	SUMMIT	PUTNAM	1.52	80'	48'	3	Y	Y	Y	B
Minor Arterial	MT. WASHINGTON	PUTNAM	SHEVLIN PK.	1.36	80'	48'	3	Y	Y	Y	B
Minor Arterial	MT. WASHINGTON #	SHEVLIN PK. RD.	SKYLINER RD	1.00	80	48	3	Y	Y	Y	B
Minor Arterial	MT. WASHINGTON	TROON	CENTURY DR.	1.00	80	48-74'	3-5	Y	Y	Y	B
Minor Arterial	NEFF RD./PENN	8TH STREET	PURCELL	1.00	80'	48'	3	Y	Y	Y	B
Minor Arterial	NEFF RD.	PURCELL	27TH ST.	0.49	80'	48'	3	Y	Y	Y	B
Minor Arterial	NEFF RD.	27TH ST., NE	EAST UGB	0.63	80'	48'	3	Y	Y	Y	B
Minor Arterial	NEFF RD.	EAST UGB	E. URBAN RESERVE	0.11	80'	48'	3	Y	Y	Y	D
Minor Arterial	NEWPORT	COLLEGE WAY	14TH ST.	0.28	80'	48'	3	Y	Y	Y	B
Minor Arterial	NEWPORT	14TH ST., NW	9TH ST.	0.34	80'	48'	3	Y	Y	Y	B
Minor Arterial	NEWPORT	9TH ST., NW	AWBREY RD.	0.45	80'	48'	3	Y	Y	Y	B
Minor Arterial	NEWPORT	AWBREY RD.	WALL	0.20	80'	48'	3	Y	Y	Y	B
Minor Arterial	OLNEY AVE.	WALL (HILL)	3RD ST., NE	0.34	80'	48'	3	Y	Y	Y	B
Minor Arterial	OLNEY AVE. #	3RD ST., NE	6TH ST.	0.17	80'	48'	3	Y	Y	Y	B
Minor Arterial	OLNEY AVE. #	6TH ST., NE	NEFF / 8TH	0.19	60-80	36-48	2-3	Y	Y	Y	B
Minor Arterial	REVERE	HILL	DIVISION	0.22	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	REVERE	DIVISION	3RD/HWY97	0.17	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	REVERE	3RD/HWY97	4TH ST.	0.09	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	REVERE	4TH ST.	8TH ST.	0.34	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	RIVERSIDE	GALVESTON	WALL	0.49	80'	48'	3	Y	Y	Y	B
Minor Arterial	ROBAL ROAD #	HWY 20	HUNNEL	0.20	80'	48	3-5	Y	Y	Y	B
Minor Arterial	ROBAL ROAD	HUNNEL	HWY 97	0.15	80'	48	3-5	Y	Y	Y	B
Minor Arterial	SHEVLIN PK. RD.	W. URBAN RESERVE	MT. WASHINGTON	1.57	80'	48'	3	Y	Y	Y	B
Minor Arterial	SHEVLIN PK. RD.	MT. WASHINGTON	COLLEGE WAY	1.00	80'	48'	3	Y	Y	Y	B
Minor Arterial	SIMPSON AVE.	MT. WASHINGTON	14TH ST.	0.61	80'	48'	3	Y	Y	Y	B
Minor Arterial	SIMPSON AVE.	14TH ST., NW/SW	COLORADO	0.42	80'	48'	3	Y	Y	Y	B
Minor Arterial	SKYLINERS RD.	W. UGB	MT. WASHINGTON	0.52	80'	48'	3	Y	Y	Y	B
Minor Arterial	SKYLINERS RD.	MT. WASHINGTON	17TH ST.	0.85	80'	48'	3	Y	Y	Y	B
Minor Arterial	WALL (HILL/DES.PL.)	REVERE	PORTLAND	0.30	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	WALL/HILL	PORTLAND	GREENWOOD	0.30	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	WALL	GREENWOOD	FRANKLIN	0.21	80'	56'	3	Y	Y	Y	B
Minor Arterial	WILSON	BLAKELY/BOND ST.	PARKWAY	0.32	80	48'	3	Y	Y	Y	B
Minor Arterial	WILSON	PARKWAY	3RD ST., SE	0.28	80'	48'	3	Y	Y	Y	B

Under Constuction 2000

page total = 37.5 Miles

Total Art. exist. = 77.4 Miles

Appendix A.2 (continued)

BEND URBAN AREA STREET INVENTORY

ARTERIAL STREETS (FUTURE)

CLASSIFICATION	STREET NAME	FROM	TO	Miles	FUTURE CONDITIONS						
					ROW	Paved Width	No. Lanes	Curb	Bike Lane	Side walk	J
Expressway	PARKWAY (NEW 97) #	COLORADO	HWY 97(S)	3.83	100'+	74'+	4+	Y	Y	P	O
Major Arterial	EMPIRE AVE.	ROAD TERMINUS	18TH ST.	0.40	100'	74'	5	Y	Y	Y	B
Major Arterial	EMPIRE AVE.	YEOMAN N/S	BUTLER MARKET RD.	0.57	80	48'-72'	3-5	Y	Y	Y	B
Major Arterial	REED MARKET RD	DIVISION	BLAKELY	0.57	80'	48'	3-5	Y	Y	Y	B
Minor Arterial	11TH ST., NE	FRANKLIN	ALDEN	0.32	80'	48'	3	Y	Y	Y	B
Minor Arterial	15TH ST., NE	BEAR CR.	HWY 20	0.39	80'	48'	3	Y	Y	Y	B
Minor Arterial	ARIZONA (EB 1-way)	COLORADO	DIVISION	0.57	60'	48'	2	Y	Y	Y	R/O
Minor Arterial	BLAKELY RD.	WILSON EXT.	BLAKELY COURT	0.57	80'	48'	3	Y	Y	Y	B
Minor Arterial	BROOKSWOOD	MC CLELLAN	POWERS	0.76	80'	48'	3	Y	Y	Y	B
Minor Arterial	COOLEY RD.	NE 18TH ST.	DESCHUTES MKT. RD.	1.25	80'	48'	3	Y	Y	Y	D
Minor Arterial	HUNNEL RD.	ROBAL RD.	COOLEY RD.	0.32	80'	48'	3	Y	Y	Y	B
Minor Arterial	HWY 20:FRONTAGE	COOLEY ROAD	ROBAL ROAD	0.23	80'	48'	3	Y	Y	Y	O/D
Minor Arterial	MT. WASHINGTON	SKYLINERS RD.	TROON	0.49	80-100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	REED MARKET RD	BLAKELY	BOND	0.06	100'	48-74'	3-5	Y	Y	Y	B
Minor Arterial	REED MARKET RD	BOND	CENTURY DR.	0.95	80'	36'	2	Y	Y	Y	B

Under Constuction 2000

Total Future additions = 9.5 Miles

J = Jurisdiction:O=ODOT, D=Deschutes County
B=City of Bend

Appendix A.2 (continued)

BEND URBAN AREA STREET INVENTORY

COLLECTOR STREETS

CLASSIFICATION		STREET NAME	FROM	TO	Miles	FUTURE CONDITIONS						
						ROW	Paved Width	No. Lanes	Curb	Bike Lane	Side walk	J
Major	Collector	2ND, SE	SCOTT ST.	WILSON AVE.	0.38	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	4TH ST, NE	FRANKLIN	GLENWOOD (ALDEN)	0.31	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	9TH, NW	TRENTON	NEWPORT	0.21	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	12TH, NW	SUMMIT AVE.	TRENTON	0.47	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	ALDEN	4TH ST.	GLENWOOD	0.09	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	AMERICAN LANE	REED MKT. RD.	BROSTERHOUS	0.44	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	ARCHIE BRIGGS RD.	MT. WASHINGTON	O.B. RILEY	1.25	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	AWBREY	WILMINGTON	MT. WASHINGTON	0.42	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	AWBREY	PORTLAND	WILMINGTON	0.40	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	AWBREY	NEWPORT	PORTLAND	0.17	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	BEAR CK. RD.	27TH ST.	E. UGB	0.51	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	BOND	FRANKLIN	COLORADO AVE.	0.38	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	BOND	INDUSTRIAL WAY	WILSON AVE.	0.57	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	BRINSON BLVD.	BOYD AC. RD.	BUTLER MKT.	0.85	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	BROSTERHOUS	HWY 97 (S)	CHASE ROAD	0.47	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	BROSTERHOUS	CHASE ROAD	KNOTT ROAD	2.06	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	CHASE ROAD	PARRELL RD.	MOWITCH	0.17	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	CHINA HAT	HWY 97 (S)	KNOTT ROAD	0.76	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	COLLEGE WAY	NEWPORT	SAGINAW	0.34	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	COOLEY RD.	O.B. RILEY	HWY 20 (N)	0.30	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	COUNTRY CLUB	MURPHY RD.	KNOTT ROAD	1.10	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	DESCHUTES MKT.	HAMEHOOK RD.	YEOMAN (E/W)	0.93	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	DESCHUTES MKT.	YEOMAN (E/W)	BUTLER MKT.	0.51	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	FERGUSON RD.	SE 15TH	SE 27TH ST.	1.17	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	GLENWOOD	ALDEN	9TH ST.	0.28	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	HAWTHORNE AVE.	WALL ST.	DIVISION ST.	0.34	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	HAWTHORNE AVE.	NE 1ST	NE 4TH	0.25	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	LODGEPOLE	BROOKSWOOD	MAHOGANY	0.28	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	LODGEPOLE	MAHOGANY	POPLAR	0.55	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	MURPHY RD.	HWY 97 (S)	PARRELL RD.	0.19	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	MURPHY RD.	PARRELL RD.	COUNTRY CLUB	0.34	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	MURPHY RD.	COUNTRY CLUB	BROSTERHOUS	0.64	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	O.B. RILEY	COOLEY RD.	EMPIRE	1.34	60-70'	36-46'	2-3	Y	Y	Y	B/D
Major	Collector	O.B. RILEY	EMPIRE	HWY 97 (N)	0.76	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PARRELL RD.	BROSTERHOUS	POWERS	0.55	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PARRELL RD.	POWERS	MURPHY	0.76	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PARRELL RD.	MURPHY	CHINA HAT	1.00	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PETTIGREW	BEAR CREEK RD.	REED MKT. RD.	1.00	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PONDEROSA	POPLAR	HWY 97(S)	0.55	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PORTLAND AVE.	COLLEGE WAY	9TH ST., NE	0.70	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collectnr	PORTLAND AVE.	9TH ST., NE	WALL ST.	0.81	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	POWERS	BROOKSWOOD	HWY 97(S)	0.59	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	POWERS	HWY 97(S)	PARRELL RD.	0.14	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PURCELL BLVD.	BUTLER MKT. RD.	OCKER DR.	0.51	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PURCELL BLVD.	PATTERSON CT.	NEFF	0.40	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PURCELL BLVD.	NEFF	HWY 20	0.45	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PURCELL BLVD.	HWY 20	TWIN KNOLLS	0.11	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PUTMAN	BUCK DR	MT. WASH. DR.	0.76	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	SCOTT AVE.	DIVISION ST.	SE 2ND.	0.34	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	SKYLINERS RD.	W.URB	W.UGB	1.00	60	36	3	Y	Y	Y	D
Major	Collector	STUDIO RD.	4TH ST., NE	BUTLER MARKET RD.	0.51	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	SUMMIT AVE.	MT. WASH. DR. (W)	MT. WASH. DR. (E)	2.23	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	WALL ST.	FRANKLIN AVE.	COLORADO AVE.	0.44	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	WELLS ACRE RD.	BUTLER MKT.	PURCELL	0.57	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	WELLS ACRE RD.	PURCELL	NE 27TH	0.42	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	WILSON AVE.	SE 3RD	SE 9TH ST.	0.55	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	WILSON AVE.	SE 9TH ST.	SE 15TH. ST.	0.45	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	YEOMAN (N/S)	BUTLER MKT.	YEOMAN E/W	0.76	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	YEOMAN (E/W)	YEOMAN (N/S)	DESCH. MARKET RD.	0.74	60-70'	36-46'	2-3	Y	Y	Y	B

Under Constuction 2000

Total Collectors existing = 35.60 Miles

J = Jurisdiction:O=ODOT, D=Deschutes County
B=City of Bend

BEND LONG RANGE PLANNING

Appendix A.2 (continued)

BEND URBAN AREA STREET INVENTORY

COLLECTOR STREETS (Future)

CLASSIFICATION		STREET NAME	FROM	TO	Miles	FUTURE CONDITIONS ROW	Paved Width	No. Lanes	Curb	Bike Lane	Side walk	J
Major	Collector	AMERICAN LN. (NEW)	REED MKT. RD.	AMERICAN LN. (OLD)	0.07	60	36'	2-3	Y	Y	Y	B
Major	Collector	BOND (OR ALT.)	COLORADO	INDUSTRIAL WAY	0.14	60-70'	36'	2-3	Y	Y	Y	B
Major	Collector	BUCK DR/TUM. CK RD	W. URBAN RESERVE	PUTNAM	0.73	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	CHASE	MOWITCH	BROSTERHOUS	0.28	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	HAWTHORNE	DIVISION	NE 1ST.	0.08	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	MURPHY RD.	BROSTERHOUS	SE 15TH ST.	0.47	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PURCELL BLVD.	OCKER	HOLIDAY AVE.	0.42	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	PURCELL BLVD.	TWIN KNOLLS	BEAR CR. RD.	0.11	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	REED MKT. RD.	27TH ST., SE	E. UGB	0.27	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	'B' [NE 15TH/18TH]	EMPIRE	BRINSON BLVD.	0.50	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	'C' [BEAL]	NE 27TH.	E. URBAN RESERVE	0.76	60-70'	36-46'	2-3	Y	Y	Y	B/D
Major	Collector	'D' [AMERICAN LN]	REED MKT. RD.	AMERICAN LN	0.08	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	'E' [TRAP CT.]	BROSTERHOUS	AMERICAN LN	0.45	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	'F' [SUMMIT]	'G' ROAD	MT. WASH. DR.	0.49	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	'G' [SKYLINE RANCH]	SHEVLIN PARK RD.	BUCK/PUTNAM	1.65	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	'H 1' [WESTSIDE N/S]	SHEVLIN PARK RD.	SKYLINER RD.	1.50	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	'H 2' [WESTSIDE N/S]	SKYLINER RD.	CENTURY DRIVE	2.14	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	'I 1' [WESTSIDE E/W]	'MT. WASH. DRIVE	'J' COLLECTOR	0.68	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	'I 2' [WESTSIDE E/W]	'H' COLLECTOR	MT. WASH. DRIVE	0.34	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	'J' [WESTSIDE N/S]	SHEVLIN PARK RD.	SKYLINER ROAD	0.34	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	'K' [WESTSIDE E/W]	'H 2' COLLECTOR	MT. WASH. DRIVE	1.29	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	'L' [NORTH LOOP]	O.B. RILEY	O.B. RILEY	1.61	60-70'	36-46'	2-3	Y	Y	Y	D
Major	Collector	'M' [NORTH N/S]	ROBAL ROAD	EMPIRE BLVD.	0.72	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	NINTH STREET	TRENTON	"N. TO FUTURE ST"	0.23	60	32'	2	Y	Y	Y	B
Major	Collector	WALL STREET	COLORADO	ARIZONA	0.06	60	30'	2	Y	Y	Y	B
Major	Collector	YEOMAN E/W	18TH STREET	YEOMAN N/S	0.25	60-70'	36-46'	2-3	Y	Y	Y	B
Major	Collector	YEOMAN E/W	DESCHUTES MKT.	E. URBAN RESERVE	0.25	60-70'	36-46'	2-3	Y	Y	Y	D

Under Constuction 2000

Total Future additions = 15.9 Miles

J = Jurisdiction O=ODOT, D=Deschutes County B=City of Bend

BEND LONG RANGE PLANNING

Appendix A.3

Intersection Improvement Priorities

			Estimated Intersection Improvement Costs		
			1-5 yrs.	6-10 yrs.	11-20+ yrs.
	Stop control legs (existing) =	#			
3rd Street	Brosterhous	E		$465,000	
3rd Street	Wilson	E			$150,000
9th Street	Wilson	4		$350,000	
14th Street	Simpson*	2		$300,000	
15th Street	Knott	2			$300,000
15th Street	Wilson	1			$300,000
27th Street	Bear Crk. Rd.	2	$400,000		
27th Street	Butler Rd.	1	$550,000		
27th Street	Forum Drive	1	$350,000		
27th Street	Reed Market Rd.	2	$525,000		
27th Street	Wells Acres Rd.	2			$150,000
3rd Street	Olney	2	$150,000		
Arizona	Bond	3	$150,000		
Bear Creek Road	15th Street	3			$300,000
Bear Creek Road	Purcell/Pettigrew	1		$725,000	
Bond	Arizona	0	$150,000		
Boyd Acres Road	Brinson Blvd.	1		$362,000	
Brosterhous	American Ln.	1			$300,000
Butler Market Rd.	4th Street	3			$225,000
Butler Market Rd.	Wells Acres Rd.	1			$300,000
Butler Market Rd.	Yeoman N/S	2		$547,500	
Butler Road	Brinson Blvd.	2		$365,000	
Century Drive	Mt. Washington*	2	$740,000		
Colorado	Bond	2	$150,000		
Colorado	Simpson	4	$350,000		
Colorado	Wall	2	$150,000		
Empire	Boyd Acres Rd	2	$530,000		
Empire Avenue	18th Street	1	$300,000		
Franklin	4th Street	2			$225,000
Franklin	8th Street	4	$600,000		
Galveston	14th Street*	4	$150,000		
Greenwood	4th Street	2		$220,000	
Greenwood	8th Street	E	$750,000		
Greenwood	Hill Street	2		$450,000	
Highway 20	15th Street	0	$150,000		
Highway 20	Cooley Rd.	2			$300,000
Highway 97	China Hat	2			$300,000
Highway 97	Cooley (Interch.design)	2		$110,000	
Mt. Washington	Shevlin Park Rd.*	1	$350,000		
Mt. Washington	Skyliners Rd.*	0	$150,000		
Mt. Washington	Summit (east)	1			$300,000
Neff	Purcell	2		$650,000	
Newport	14th Street*	1	$150,000		
Newport	12/13th Street#	2		$110,000	
Newport	9th Street*	2	$235,000		
Newport	College Way*	1	$550,000		
Newport	New N/S Collector St.	0		$225,000	
Olney Avenue	4th Street	2			$300,000
Penn/Neff	8th Street	4	$263,500		
Portland	9th Street	2		$220,000	
Portland	Awbrey Road	2			$150,000
Portland	Hill	4	$170,000		
Reed Market	15th Street	4		$550,000	
Reed Market Ext.	Blakely Road	0			$300,000
Reed Market Road	9th Street	4	$500,000		
Revere	4th Street	4			$150,000
Revere	8th Street	4		$450,000	
Studio Rd. (Butler)	Butler Rd.(8th St.)	3		$300,000	

E = Existing Signal Improvement

* *West Side Transportation Consortium Project*

\# *Intersection Geometry Improvement Only*

Appendix A.4
BEND URBAN AREA STREET INVENTORY

Modernization Needs*:Arterials

* planning level estimates

CLASSIFICATION		STREET NAME	FROM	TO	Costs: linear ft	W	Plan	2000 $'s Total	Future x 1.5 Total	Jurisdiction	Priority#
Expressway		PARKWAY (NEW 97) #	HWY 20/97 "Y"	COLORADO	16200	74	74	$0	$0	ODOT	near
Expressway		HWY 97 (N)	N. UGB	COOLEY	3200	74	74	$64,000	$96,000	ODOT	far
Expressway		HWY 97 (N)	COOLEY	HWY 20 (N)	4700	74	74	$94,000	$141,000	ODOT	far
Expressway		HWY 97 (S)	PARKWAY (S)	CHINA HAT	2400	80	74	$48,000	$72,000	ODOT	far
Expressway		HWY 97 (S)	CHINA HAT	S. URBAN RESERVE	2400	80	74	$48,000	$72,000	ODOT	far
Expressway		HWY. 20 (N)	N. URBAN RESERVE	COOLEY	3000	70	74	$60,000	$90,000	ODOT	far
Expressway		HWY. 20 (N)	COOLEY	HWY 97 (N)	4800	70	74	$96,000	$144,000	ODOT	far
Expressway		HWY. 20 (E)	12TH ST.	PURCELL	5600	43	74	$1,700,000	$2,550,000	ODOT	far
Expressway		HWY. 20 (E)	PURCELL	27TH ST.	1300	65	74	$158,167	$237,250	ODOT	far
Expressway		HWY. 20 (E)	27TH ST.	E. URBAN RESERVE	3000	43	48	$525,000	$787,500	ODOT	far
Principal	Arterial	HWY. 20 (N)	HWY 97 (N)	EMPIRE	2200	72	74	$44,000	$66,000	ODOT	far
Principal	Arterial	HWY. 20 (N)	EMPIRE	DIVISION ST. (N)	5280	79	74	$79,200	$118,800	ODOT	far
Principal	Arterial	HWY. 20 (N) / 3rd St.	DIVISION ST. (N)	REVERE	3700	52	60	$816,500	$1,224,750	ODOT	far
Principal	Arterial	HWY. 20 (N) / 3rd St.	REVERE	GREENWOOD	2800	64	74	$420,000	$630,000	ODOT	far
Principal	Arterial	3RD STREET, SE	GREENWOOD	FRANKLIN	1450	64	74	$217,500	$326,250	ODOT	far
Principal	Arterial	3RD STREET, SE	FRANKLIN	WILSON	4250	47	74	$5,772,500	$8,658,750	ODOT	far
Principal	Arterial	3RD STREET, SE	WILSON	DIVISION (S)	2900	69	74	$217,500	$326,250	ODOT	far
Principal	Arterial	3RD STREET, SE	DIVISION (S)	POWERS	3400	74	74	$68,000	$102,000	ODOT	far
Principal	Arterial	3RD STREET, SE	POWERS	MURPHY	3300	74	74	$66,000	$99,000	ODOT	far
Principal	Arterial	3RD STREET, SE	MURPHY	PARKWAY (S)	2700	76	74	$40,500	$60,750	ODOT	far
Principal	Arterial	HWY. 20 (E)	3RD ST., NE	4TH ST.	450	66	66	$220,000	$330,000	ODOT	far
Principal	Arterial	HWY. 20 (E)	4TH ST.	8TH ST.	1800	66	66	$750,000	$1,125,000	ODOT	far
Principal	Arterial	HWY. 20 (E)	8TH ST.	12TH ST.	1200	51	74	$1,578,000	$2,367,000	ODOT	intermediate
Major	Arterial	27TH ST, NE	BUTLER MKT. RD.	NEFF ROAD	7000	42	74	$2,360,000	$3,540,000	Bend	intermediate
Major	Arterial	27TH ST, NE	NEFF ROAD	HWY 20 (E)	3950	36	74	$1,171,385	$1,757,078	Bend	near
Major	Arterial	27TH ST, NE	HWY 20 (E)	BEAR CREEK RD.	1350	36	74	$365,615	$548,423	Bend	near
Major	Arterial	27TH ST, SE	BEAR CREEK RD.	REED MARKET RD	5280	34	74	$3,145,600	$4,718,400	Bend	far
Major	Arterial	EMPIRE	HWY20 (N)	BOYD ACRES RD.	2600	42	48	$546,000	$819,000	Bend	far
Major	Arterial	EMPIRE	BOYD ACRES RD.	(TO THE EAST)	1900	40	48	$974,600	$1,461,900	Bend	far
Major	Arterial	EMPIRE	18TH ST, NE	YEOMAN (N/S)	2600	36	74	$1,300,000	$1,950,000	Bend	far
Major	Arterial	REED MKT. RD.	DIVISION	3RD ST., SE	400	42	74	$212,000	$318,000	Bend	far
Major	Arterial	REED MKT. RD.	3RD ST., SE	9TH ST., SE	2800	44	74	$1,526,000	$2,289,000	Bend	far
Major	Arterial	REED MKT. RD.	9TH ST., SE	15TH ST.	2400	48	74	$1,580,000	$2,370,000	Bend	far
Major	Arterial	REED MKT. RD.	15TH ST., SE	PETTYGREW	4000	36	48	$1,160,000	$1,740,000	Bend	far
Major	Arterial	REED MKT. RD.	PETTYGREW	27TH ST.	1300	24	48	$1,108,000	$1,662,000	Bend	far
Minor	Arterial	4TH ST. NE	BUTLER MKT. RD.	ADDISON	800	36	48	$172,000	$258,000	Bend	far
Minor	Arterial	4TH ST, NE	ADDISON	STUDIO	3000	36	48	$705,000	$1,057,500	Bend	far
Minor	Arterial	4TH ST, NE	STUDIO	REVERE	700	40	48	$136,500	$204,750	Bend	far
Minor	Arterial	4TH ST, NE	REVERE	GREENWOOD	2800	40	48	$546,000	$819,000	Bend	far
Minor	Arterial	4TH ST, NE	GREENWOOD	FRANKLIN	1500	34	48	$382,500	$573,750	Bend	far
Minor	Arterial	8TH ST., NE	BUTLER MKT. RD.	REVERE	3600	38	48	$774,000	$1,161,000	Bend	far
Minor	Arterial	8TH ST., NE	REVERE	GREENWOOD	2800	40	48	$982,000	$1,473,000	Bend	far
Minor	Arterial	8TH ST., NE	GREENWOOD	FRANKLIN	1500	40	48	$885,000	$1,327,500	Bend	far
Minor	Arterial	8TH/9TH ST, NE/SE	FRANKLIN	WILSON	4400	44	48	$286,000	$429,000	Bend	far
Minor	Arterial	9TH ST., SE	WILSON	REED MARKET RD.	3000	24	48	$1,000,000	$1,500,000	Bend	intermediate
Minor	Arterial	14TH ST., NW	NEWPORT	GALVESTON	2000	30	48	$950,000	$1,425,000	Bend	intermediate
Minor	Arterial	14TH ST., NW/SW	GALVESTON	SIMPSON	3300	42	48	$531,000	$796,500	Bend	far
Minor	Arterial	14TH ST., SW	SIMPSON	COLORADO	2100	28	48	$462,000	$693,000	Bend	far
Minor	Arterial	15TH ST, NE/SE	BEAR CREEK RD.	WILSON	2600	39	48	$494,000	$741,000	Bend	far
Minor	Arterial	15TH ST, SE	WILSON	REED MARKET	2700	40	48	$833,500	$1,250,250	Bend	far
Minor	Arterial	15TH ST, SE	REED MARKET	KNOTT ROAD	10800	42	48	$1,350,000	$2,025,000	Bend/Co.	far
Minor	Arterial	18th, NE ["A"]	COOLEY RD.	YEOMAN (E/W)	5640	36	48	$721,920	$1,082,880	Bend	far
Minor	Arterial	18th, NE ["A"]	YEOMAN (E/W)	EMPIRE	1560	36	48	$202,800	$304,200	Bend	far
Minor	Arterial	27TH ST, SE	REED MARKET RD	FERGUSON	5000	36	48	$1,200,000	$1,800,000	Bend	far
Minor	Arterial	27TH ST, SE	FERGUSON	RICKARD RD.	5280	36	48	$1,267,200	$1,900,800	County	far
	Local	BEAR CK. RD. (10TH)	FRANKLIN	ALDEN	1200	30	30	$0	$0	Bend	far
Minor	Arterial	BEAR CK. RD.	ALDEN	15 TH ST.	1500	36	48	$345,000	$517,500	Bend	far
Minor	Arterial	BEAR CK. RD.	15 TH ST.	PETTYGREW	3900	31	48	$916,500	$1,374,750	Bend	far
Minor	Arterial	BEAR CK. RD.	PETTYGREW	27TH ST.	1300	26	48	$409,500	$614,250	Bend	far
Minor	Arterial	BLAKELY RD.	REED MKT. RD.	MC CLELLAN	1400	24	48	$469,000	$703,500	Bend	far
Minor	Arterial	BOND	WALL	GREENWOOD	500	58	58	$0	$0	Bend	far
Minor	Arterial	BOND	GREENWOOD	FRANKLIN	1150	56	56	$0	$0	Bend	far
Minor	Arterial	BOYD ACRES RD	EMPIRE	BRINSON	1800	36	48	$794,000	$1,191,000	Bend	far
Minor	Arterial	BOYD ACRES RD	BRINSON	BUTLER MARKET	3300	36	48	$709,500	$1,064,250	Bend	far
Minor	Arterial	BROOKSWOOD	POWERS	PINEBROOK	3200	37	36	$224,000	$336,000	Bend	far
Minor	Arterial	BROOKSWOOD	PINEBROOK	LODGEPOLE	1600	39	36	$192,000	$288,000	Bend	far
Minor	Arterial	BROOKSWOOD	LODGEPOLE	POPLAR	6100	36	36	$427,000	$640,500	Bend	far
Minor	Arterial	BROOKSWOOD	POPLAR	S. UGB	1080	36	36	$21,600	$32,400	Bend	far

Under Constuction 2000

210720

Appendix A.4 (continued)

BEND URBAN AREA STREET INVENTORY

Modernization Needs*:Arterials — Costs: **2000 $'s** | **Future x 1.5**

* planning level estimates

CLASSIFICATION		STREET NAME	FROM	TO	Needs ft	W	Plan	Total	Total	Jurisdiction	Priority##
Minor	Arterial	BUTLER MKT. RD	HWY 97 (N)	4TH ST.	1000	48	48	$50,000	$75,000	Bend	far
Minor	Arterial	BUTLER MKT. RD	4TH ST.	BOYD ACRES	1400	48	48	$0	$0	Bend	far
Minor	Arterial	BUTLER MKT. RD	BOYD ACRES RD.	8TH ST./STUDIO	2700	40	48	$556,500	$834,750	Bend	far
Minor	Arterial	BUTLER MKT. RD	8TH ST./STUDIO	WELLS ACRES RD	2000	35	74	$1,275,000	$1,912,500	Bend	far
Minor	Arterial	BUTLER MKT. RD	WELLS ACRES RD	YEOMAN (N/S)	3100	35	74	$1,923,500	$2,885,250	Bend	far
Minor	Arterial	BUTLER MKT. RD	YEOMAN (N/S)	27TH ST.	2600	40	48	$875,000	$1,312,500	Bend	far
Minor	Arterial	BUTLER MKT. RD	27TH ST.	DESCH. MARKET	1600	44	48	$72,000	$108,000	County	far
Minor	Arterial	BUTLER MKT. RD	DESCH. MARKET	E. URBAN RESERVE	2640	30	48	$792,000	$1,188,000	County	far
Minor	Arterial	CENTURY DR.	COLORADO	MT. WASHINGTON	1600	56	74	$320,000	$480,000	ODOT	far
Minor	Arterial	CENTURY DR.	MT. WASHINGTON	E. CAMPBELL RD.	5000	45	36	$475,000	$712,500	ODOT	far
Minor	Arterial	CENTURY DR.	E. CAMPBELL RD.	W. UGB	6600	36	36	$627,000	$940,500	ODOT	far
Minor	Arterial	COLORADO	CENTURY DR.	SIMPSON	3800	32	48	$665,000	$997,500	ODOT	far
Minor	Arterial	COLORADO	SIMPSON	WALL	2300	40	48	$557,000	$835,500	ODOT	far
Minor	Arterial	COLORADO	WALL	DIVISION	2400	40	36	$460,000	$690,000	ODOT	near
Minor	Arterial	COOLEY RD	HWY 20	HWY 97 (N)	4000	26	36	$680,000	$1,020,000	County	far
Minor	Arterial	COOLEY RD	HWY 97 (N)	RANCH VALLEY DR.	2900	36	48	$516,000	$774,000	Bend	far
Minor	Arterial	COOLEY RD.	RANCH VIL. DR.	NE 18TH ST.	1300	36	36	$13,000	$19,500	Bend/Co.	far
Minor	Arterial	DIVISION ST.	HWY 97 (N)	BROSTERHOUS/3RD ST	15700	48	48	$235,500	$353,250	Bend	far
Minor	Arterial	EMPIRE	O.B. RILEY RD.	HWY 97/HWY20 (N)	1500	34	48	$450,000	$675,000	Bend	far
Minor	Arterial	FRANKLIN	WALL	DIVISION	2400	46	74	$800,000	$1,200,000	Bend	far
Minor	Arterial	FRANKLIN	DIVISION	3RD ST. , NE	1300	72	74	$4,650,000	$6,975,000	Bend	intermediate
Minor	Arterial	FRANKLIN	3RD ST. , NE	4TH ST.	450	40	48	$368,000	$552,000	Bend	near
Minor	Arterial	FRANKLIN	4TH ST., NE	8TH ST.	1800	36	48	$216,000	$324,000	Bend	far
Minor	Arterial	FRANKLIN	8TH ST., NE	10TH ST.	600	36	48	$72,000	$108,000	Bend	far
Minor	Arterial	GALVESTON AVE.	17TH ST., NW	14TH ST.	1700	32	36	$34,000	$51,000	Bend	far
Minor	Arterial	GALVESTON AVE.	14TH ST., NW	12TH ST.	800	44	48	$12,000	$18,000	Bend	far
Minor	Arterial	GALVESTON AVE.	12TH ST., NW	RIVERSIDE AVE.	1500	42	48	$112,500	$168,750	Bend	far
Minor	Arterial	GREENWOOD AVE.	WALL	DIVISION	1500	56	74	$185,000	$277,500	Bend	near
Minor	Arterial	GREENWOOD AVE.	DIVISION	3RD ST. , NE	1300	56	74	$419,000	$628,500	Bend	near
Minor	Arterial	HUNNEL ROAD	DEAD END	ROBAL ROAD	2600	48	48	$52,000	$78,000	Bend	far
Minor	Arterial	HWY 20:FRONTAGE	N. TERMINI	EMPIRE BLVD.	2000	22	30	$350,000	$525,000	ODOT	far
Minor	Arterial	KNOTT RD.	CHINA HAT	15TH ST.	8400	32	36	$168,000	$252,000	Bend	far
Minor	Arterial	KNOTT RD.	15TH ST., SE	RICKARD	7000	28	36	$1,225,000	$1,837,500	Bend	far
Minor	Arterial	MT. WASHINGTON	HWY 97N	SUMMIT	10000	48	48	$710,000	$1,065,000	Bend	near
Minor	Arterial	MT. WASHINGTON	SUMMIT	PUTNAM	8000	48	48	$80,000	$120,000	Bend	far
Minor	Arterial	MT. WASHINGTON	PUTNAM	SHEVLIN PK.	7200	40	48	$576,000	$864,000	Bend	far
Minor	Arterial	MT. WASHINGTON #	SHEVLIN PK. RD.	SKYLINER RD	5280	48	48	$350,000	$525,000	Bend	far
Minor	Arterial	MT. WASHINGTON	TROON	CENTURY DR.	5300	40	48	$1,270,000	$1,905,000	Bend	far
Minor	Arterial	NEFF RD./PENN	8TH STREET	PURCELL	5280	35	48	$1,293,100	$1,939,650	Bend	far
Minor	Arterial	NEFF RD.	PURCELL	27TH ST.	2600	44	48	$39,000	$58,500	Bend	far
Minor	Arterial	NEFF RD.	27TH ST., NE	EAST UGB	3300	36	48	$528,000	$792,000	Bend	far
Minor	Arterial	NEFF RD.	EAST UGB	E. URBAN RESERVE	600	30	36	$60,000	$90,000	Bend	far
Minor	Arterial	NEWPORT	COLLEGE WAY	14TH ST.	1500	36	36	$700,000	$1,050,000	Bend	far
Minor	Arterial	NEWPORT	14TH ST., NW	9TH ST.	1800	36	36	$345,000	$517,500	Bend	far
Minor	Arterial	NEWPORT	9TH ST., NW	AWBREY RD.	2400	36	78	$1,500,000	$2,250,000	Bend	intermediate
Minor	Arterial	NEWPORT	AWBREY RD.	WALL	1050	38	74	$1,983,000	$2,974,500	Bend	intermediate
Minor	Arterial	OLNEY AVE.	WALL (HILL)	3RD ST., NE	1800	36	48	$396,000	$0	Bend	near
Minor	Arterial	OLNEY AVE. #	3RD ST., NE	6TH ST.	900	36	36	$0	$0	Bend	near
Minor	Arterial	OLNEY AVE. #	6TH ST., NE	NEFF / 8TH	1000	36	36	$0	$0	Bend	near
Minor	Arterial	REVERE	HILL	DIVISION	1150	69	74	$74,750	$112,125	Bend	far
Minor	Arterial	REVERE	DIVISION	3RD/HWY97	900	56	74	$175,500	$263,250	Bend	far
Minor	Arterial	REVERE	3RD/HWY97	4TH ST.	450	64	74	$45,000	$67,500	Bend	far
Minor	Arterial	REVERE	4TH ST.	8TH ST.	1800	36	74	$750,000	$1,125,000	Bend	intermediate
Minor	Arterial	RIVERSIDE	GALVESTON	WALL	2600	45	48	$26,000	$39,000	Bend	far
Minor	Arterial	ROBAL ROAD #	HWY 20	HUNNEL	1080	48	48	$0	$0	Bend	far
Minor	Arterial	ROBAL ROAD	HUNNEL	HWY 97	780	48	48	$7,800	$11,700	Bend	far
Minor	Arterial	SHEVLIN PK. RD.	W. URBAN RESERVE	MT. WASHINGTON	8300	36	36	$788,500	$1,182,750	Bend	far
Minor	Arterial	SHEVLIN PK. RD.	MT. WASHINGTON	COLLEGE WAY	5280	36	48	$1,135,200	$1,702,800	Bend	far
Minor	Arterial	SIMPSON AVE.	MT. WASHINGTON	14TH ST.	3200	30	48	$784,000	$1,176,000	Bend	far
Minor	Arterial	SIMPSON AVE.	14TH ST., NW/SW	COLORADO	2200	40	48	$209,000	$313,500	Bend	far
Minor	Arterial	SKYLINERS RD.	W. UGB	MT. WASHINGTON	2760	24	36	$386,400	$579,600	Bend	far
Minor	Arterial	SKYLINERS RD.	MT. WASHINGTON	17TH ST.	4500	24	36	$630,000	$945,000	Bend	far
Minor	Arterial	WALL (HILL/DES.PL)	REVERE	PORTLAND	1600	49	74	$496,000	$744,000	Bend	far
Minor	Arterial	WALL/HILL	PORTLAND	GREENWOOD	1600	56	74	$522,000	$783,000	Bend	near
Minor	Arterial	WALL	GREENWOOD	FRANKLIN	1100	56	56	$0	$0	Bend	far
Minor	Arterial	WILSON	BLAKELY/BOND ST.	PARKWAY	1700	48	48	$0	$0	Bend	far
Minor	Arterial	WILSON	PARKWAY	3RD ST., SE	1500	40	48	$1,800,000	$2,700,000	Bend	far

\# Under Constuction 2000 — 198000 — ## Priority unless otherwise changed by development activity or City Council action

Note: If the existing street width is less than 5 feet of the Plan standard width, than no modernization was calculated

Appendix A.4 (continued)

BEND URBAN AREA STREET INVENTORY

Modernization Needs*:Major Collector

* planning level estimates

Costs : **2000 $'s** | **Future x 1.5**

CLASSIFICATION		STREET NAME	FROM	To	linear ft	W	Plan	Total	Total	Jurisdiction	Priority##
Major	Collector	2ND, SE	SCOTT ST.	WILSON AVE.	2000	36	36	$80,000	$120,000	Bend	far
Major	Collector	4TH ST, NE	FRANKLIN	GLENWOOD (ALDEN)	1650	36	36	$33,000	$49,500	Bend	far
Major	Collector	9TH, NW	TRENTON	NEWPORT	1100	36	36	$220,000	$330,000	Bend	far
Major	Collector	12TH, NW	SUMMIT AVE.	TRENTON	2500	36	36	$0	$0	Bend	far
Major	Collector	ALDEN	4TH ST.	GLENWOOD	500	36	36	$10,000	$15,000	Bend	far
Major	Collector	AMERICAN LANE	REED MKT. RD.	BROSTERHOUS	2300	30	36	$995,700	$1,493,550	Bend	far
Major	Collector	ARCHIE BRIGGS RD.	MT. WASHINGTON	O.B. RILEY	6600	26	36	$1,841,000	$2,761,500	Bend	far
Major	Collector	AWBREY	WILMINGTON	MT. WASHINGTON	2220	42	36	$33,300	$49,950	Bend	far
Major	Collector	AWBREY	PORTLAND	WILMINGTON	2100	30	36	$126,000	$189,000	Bend	far
Major	Collector	AWBREY	NEWPORT	PORTLAND	900	30	36	$54,000	$81,000	Bend	far
Major	Collector	BEAR CK. RD.	27TH ST.	E. UGB	2700	26	48	$499,500	$749,250	County	far
Major	Collector	BOND	FRANKLIN	COLORADO AVE.	2000	36	36	$200,000	$300,000	Bend	near
Major	Collector	BOND	INDUSTRIAL WAY	WILSON AVE.	3000	36	36	$0	$0	Bend	far
Major	Collector	BRINSON BLVD.	BOYD AC. RD.	BUTLER MKT.	4500	36	36	$90,000	$135,000	Bend	far
Major	Collector	BROSTERHOUS	HWY 97 (S)	CHASE ROAD	2500	24	36	$275,000	$412,500	Bend	far
Major	Collector	BROSTERHOUS	CHASE ROAD	KNOTT ROAD	10900	26	36	$1,535,500	$2,303,250	Bend	far
Major	Collector	CHASE ROAD	PARRELL RD.	MOWITCH	900	22	36	$112,500	$168,750	Bend	far
Major	Collector	CHINA HAT	HWY 97 (S)	KNOTT ROAD	4000	36	36	$60,000	$90,000	County	far
Major	Collector	COLLEGE WAY	NEWPORT	SAGINAW	1800	40	36	$36,000	$54,000	Bend	far
Major	Collector	COOLEY RD.	O.B. RILEY	HWY 20 (N)	1600	20	36	$224,000	$336,000	County	far
Major	Collector	COUNTRY CLUB	MURPHY RD.	KNOTT ROAD	5800	32	36	$87,000	$130,500	Bend	far
Major	Collector	DESCHUTES MKT.	HAMEHOOK RD.	YEOMAN (E/W)	4900	26	36	$465,500	$698,250	County	far
Major	Collector	DESCHUTES MKT.	YEOMAN (E/W)	BUTLER MKT.	2700	26	36	$256,500	$384,750	County	far
Major	Collector	FERGUSON RD.	SE 15TH	SE 27TH ST.	6200	30	36	$341,000	$511,500	Bend	far
Major	Collector	GLENWOOD	ALDEN	9TH ST.	1500	36	36	$30,000	$45,000	Bend	far
Major	Collector	HAWTHORNE AVE.	WALL ST.	DIVISION ST.	1800	34	36	$0	$0	Bend	far
Major	Collector	HAWTHORNE AVE.	NE 1ST	NE 4TH	1300	36	36	$26,000	$39,000	Bend	far
Major	Collector	LODGEPOLE	BROOKSWOOD	MAHOGANY	1500	36	36	$30,000	$45,000	Bend	far
Major	Collector	LODGEPOLE	MAHOGANY	POPLAR	2900	36	36	$58,000	$87,000	Bend	far
Major	Collector	MURPHY RD.	HWY 97 (S)	PARRELL RD.	1000	36	36	$15,000	$22,500	Bend	far
Major	Collector	MURPHY RD.	PARRELL RD.	COUNTRY CLUB	1800	36	36	$126,000	$189,000	Bend	far
Major	Collector	MURPHY RD.	COUNTRY CLUB	BROSTERHOUS	3400	36	36	$51,000	$76,500	Bend	far
Major	Collector	O.B. RILEY	COOLEY RD.	EMPIRE	7100	36	36	$142,000	$213,000	Bend/Co	far
Major	Collector	O.B. RILEY	EMPIRE	HWY 97 (N)	4000	36	36	$60,000	$90,000	Bend	far
Major	Collector	PARRELL RD.	BROSTERHOUS	POWERS	2900	34	36	$58,000	$87,000	Bend	far
Major	Collector	PARRELL RD.	POWERS	MURPHY	4000	34	36	$80,000	$120,000	Bend	far
Major	Collector	PARRELL RD.	MURPHY	CHINA HAT	5280	27	36	$462,000	$693,000	Bend	far
Major	Collector	PETTIGREW	BEAR CREEK RD.	REED MKT. RD.	5300	26	36	$503,500	$755,250	Bend	far
Major	Collector	PONDEROSA	POPLAR	HWY 97(S)	2900	36	36	$58,000	$87,000	Bend	far
Major	Collector	PORTLAND AVE.	COLLEGE WAY	9TH ST., NE	3700	36	36	$37,000	$55,500	Bend	far
Major	Collector	PORTLAND AVE.	9TH ST., NE	WALL ST.	4300	33	52	$940,000	$1,410,000	Bend	intermediate
Major	Collector	POWERS	BROOKSWOOD	HWY 97(S)	3100	32	48	$666,500	$999,750	Bend	far
Major	Collector	POWERS	HWY 97(S)	PARRELL RD.	750	24	36	$195,000	$292,500	Bend	far
Major	Collector	PURCELL BLVD.	BUTLER MKT. RD.	OCKER DR.	2700	40	36	$0	$0	Bend	far
Major	Collector	PURCELL BLVD.	PATTERSON CT.	NEFF	2100	40	36	$681,500	$1,022,250	Bend	far
Major	Collector	PURCELL BLVD.	NEFF	HWY 20	2400	40	36	$0	$0	Bend	far
Major	Collector	PURCELL BLVD.	HWY 20	TWIN KNOLLS	600	36	36	$12,000	$18,000	Bend	far
Major	Collector	PUTMAN	BUCK DR	MT. WASH. DR.	4000	36	36	$80,000	$120,000	Bend	far
Major	Collector	SCOTT AVE.	DIVISION ST.	SE 2ND.	1800	28	36	$144,000	$216,000	Bend	far
Major	Collector	SKYLINERS RD.	W.URB	W.UGB	5280	24	36	$739,200	$1,108,800	County	far
Major	Collector	STUDIO RD.	4TH ST., NE	BUTLER MARKET RD.	2700	40	36	$40,500	$60,750	Bend	far
Major	Collector	SUMMIT AVE.	MT. WASH. DR. (W)	MT. WASH. DR. (E)	11800	42	36	$0	$0	Bend	far
Major	Collector	WALL ST.	FRANKLIN AVE.	COLORADO AVE.	2300	30	36	$200,000	$300,000	Bend	near
Major	Collector	WELLS ACRE RD.	BUTLER MKT.	PURCELL	3000	40	36	$45,000	$67,500	Bend	far
Major	Collector	WELLS ACRE RD.	PURCELL	NE 27TH	2200	40	36	$33,000	$49,500	Bend	far
Major	Collector	WILSON AVE.	SE 3RD	SE 9TH ST.	2900	40	48	$675,000	$1,012,500	Bend	intermediate
Major	Collector	WILSON AVE.	SE 9TH ST.	SE 15TH. ST.	2400	41	48	$156,000	$234,000	Bend	far
Major	Collector	YEOMAN (N/S)	BUTLER MKT.	YEOMAN E/W	4000	24	36	$740,000	$1,110,000	Bend	far
Major	Collector	YEOMAN (E/W)	YEOMAN (N/S)	DESCH. MARKET RD.	3900	22	36	$877,500	$1,316,250	Bend	far

\# Under Construction 2000

187980

Note: If the existing street width is less than 5 feet of the Plan standard width, than no modernization was calculated

Priority unless otherwise changed by development activity or City Council action

BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

Appendix A.5

BEND URBAN AREA STREET INVENTORY

NEW LINKS ONLY* (full plan)

Arterial Streets

* planning level estimates

CLASSIFICATION		STREET NAME	FROM	TO	linear ft	W	Plan	Costs : Total	2000 $'s Total	Future x 1.5 Total	Jurisdiction	Priority##
Expressway		PARKWAY (NEW 97) #	COLORADO	HWY 97(S)	20232		100+	$77,399,261	$77,399,261	$3,150,000	ODOT	near
Major	Arterial	EMPIRE AVE.	ROAD TERMINUS	18TH ST.	2100		48	$2,100,000	$1,980,000	$1,980,000	Bend	far
Major	Arterial	EMPIRE AVE.	YEOMAN N/S	BUTLER MARKET RD.	3000		48	$1,320,000	$3,774,000	$3,774,000	Bend	near
Major	Arterial	REED MARKET RD	DIVISION	BLAKELY	3000		48	$2,516,000	$1,080,000	$1,080,000	Bend	near
Minor	Arterial	11TH ST., NE	FRANKLIN	ALDEN	1700		48	$720,000	$804,000	$804,000	Bend	near
Minor	Arterial	15TH ST., NE	BEAR CR.	HWY 20	2040		48	$536,000	$2,760,000	$2,760,000	Bend/ODOT	near
Minor	Arterial	ARIZONA (EB 1-way)	COLORADO	DIVISION	3000		30	$1,840,000	$5,220,000	$5,220,000	Bend	far
Minor	Arterial	BLAKELY RD.	WILSON EXT.	BLAKELY COURT	3000		74	$3,480,000	$3,114,000	$3,114,000	Bend	intermediate
Minor	Arterial	BROOKSWOOD	MC CLELLAN	POWERS	4000		36	$2,076,000	$7,722,000	$7,722,000	County	far
Minor	Arterial	COOLEY RD.	NE 18TH ST.	DESCHUTES MKT. RD.	6600		36	$5,148,000	$2,295,000	$2,295,000	Bend	far
Minor	Arterial	HUNNEL RD.	ROBAL RD.	COOLEY RD.	1700		48	$1,530,000	$1,296,000	$1,296,000	Bend/Co.	far
Minor	Arterial	HWY 20:FRONTAGE	COOLEY ROAD	ROBAL ROAD	1200		30	$864,000	$3,510,000	$3,510,000	Bend	far
Minor	Arterial	MT. WASHINGTON	SKYLINERS RD.	TROON	2600		48	$2,340,000	$486,000	$486,000	Bend	near
Minor	Arterial	REED MARKET RD	BLAKELY	BOND	300		48	$324,000	$5,340,000	$5,340,000	Bend	near
Minor	Arterial	REED MARKET RD	BOND	CENTURY DR.	5000		48	$3,560,000				
								59,472				

Under Construction 2000

Note: Parkway construction costs are from ODOT '93-98 6Yr TIP

Priority unless otherwise changed by development activity or City Council action

BEND URBAN AREA STREET INVENTORY

NEW LINKS ONLY* (full plan)

Collector Streets

* planning level estimates

CLASSIFICATION		STREET NAME	FROM	TO	linear ft	W	Plan	Costs : Total	2000 $'s Total	Future x 1.5 Total	Jurisdiction	Priority##
Major	Collector	AMERICAN LN. (NEW)	REED MKT. RD.	AMERICAN LN. (OLD)	360		36	$1,029,000	$1,029,000	$1,543,500	Bend	near
Major	Collector	BOND (OR ALT.)	COLORADO	INDUSTRIAL WAY	720		36	$316,800	$475,200	$475,200	Bend	near
Major	Collector	BUCK DR/TUM. CK RD	W. URBAN RESERVE	PUTNAM	3840		36	$2,265,600	$3,398,400	$3,398,400	Bend	far
Major	Collector	CHASE	MOWITCH	BROSTERHOUS	1500		36	$885,000	$1,327,500	$1,327,500	Bend	far
Major	Collector	HAWTHORNE	DIVISION	NE 1ST.	400		36	$6,236,000	$9,354,000	$9,354,000	Bend	far
Major	Collector	MURPHY RD.	BROSTERHOUS	SE 15TH ST.	2500		48	$4,700,000	$7,050,000	$7,050,000	Bend	far
Major	Collector	PURCELL BLVD.	OCKER	HOLIDAY AVE.	2200		36	$435,000	$652,500	$652,500	Bend	intermediate
Major	Collector	PURCELL BLVD.	TWIN KNOLLS	BEAR CR. RD.	600		36	$725,000	$1,087,500	$1,087,500	Bend	intermediate
Major	Collector	REED MKT. RD.	27TH ST., SE	E. UGB	1400		36	$826,000	$1,239,000	$1,239,000	Bend	far
Major	Collector	'B' [NE 15TH/18TH]	EMPIRE	BRINSON BLVD.	2640		36	$1,557,600	$2,336,400	$2,336,400	Bend	far
Major	Collector	'C' [BEAL]	NE 27TH.	E. URBAN RESERVE	4000		36	$2,360,000	$3,540,000	$3,540,000	Bend/Co	far
Major	Collector	'D' [AMERICAN LN]	REED MKT. RD.	AMERICAN LN	400		36	$436,000	$654,000	$654,000	Bend	far
Major	Collector	'E' [TRAP CT.]	BROSTERHOUS	AMERICAN LN	2400		36	$1,416,000	$2,124,000	$2,124,000	Bend	far
Major	Collector	'F' [SUMMIT]	'G' ROAD	MT. WASH. DR.	2600		36	$1,534,000	$2,301,000	$2,301,000	Bend	far
Major	Collector	'G' [SKYLINE RANCH]	SHEVLIN PARK RD.	BUCK/PUTNAM	8700		36	$5,133,000	$7,699,500	$7,699,500	County	far
Major	Collector	'H 1' [WESTSIDE N/S]	SHEVLIN PARK RD.	SKYLINER RD.	7900		36	$4,661,000	$6,991,500	$6,991,500	Bend	far
Major	Collector	'H 2' [WESTSIDE N/S]	SKYLINER RD.	CENTURY DRIVE	11300		36	$6,667,000	$10,000,500	$10,000,500	County	far
Major	Collector	'I 1' [WESTSIDE E/W]	'MT. WASH. DRIVE	'J' COLLECTOR	3600		36	$2,124,000	$3,186,000	$3,186,000	Bend	far
Major	Collector	'I 2' [WESTSIDE E/W]	'H' COLLECTOR	MT. WASH. DRIVE	1800		36	$1,062,000	$1,593,000	$1,593,000	Bend	far
Major	Collector	'J' [WESTSIDE N/S]	SHEVLIN PARK RD.	SKYLINER ROAD	1800		36	$1,062,000	$1,593,000	$1,593,000	Bend	far
Major	Collector	'K' [WESTSIDE E/W]	'H 2' COLLECTOR	MT. WASH. DRIVE	6800		36	$4,012,000	$6,018,000	$6,018,000	County	far
Major	Collector	'L' [NORTH LOOP]	O.B. RILEY	O.B. RILEY	8500		36	$5,015,000	$7,522,500	$7,522,500	County	far
Major	Collector	'M' [NORTH N/S]	ROBAL ROAD	EMPIRE BLVD.	3800		36	$2,242,000	$3,363,000	$3,363,000	Bend	far
Major	Collector	NINTH STREET	TRENTON	"N. TO FUTURE ST"	1200		32	$672,000	$1,008,000	$1,008,000	Bend	far
Major	Collector	WALL STREET	COLORADO	ARIZONA	300		30	$73,500	$110,250	$110,250	Bend	far
Major	Collector	YEOMAN E/W	18TH STREET	YEOMAN N/S	1300		36	$767,000	$1,150,500	$1,150,500	Bend	far
Major	Collector	YEOMAN E/W	DESCHUTES MKT.	E. URBAN RESERVE	1300		36	$767,000	$1,150,500	$1,150,500	County	far
								83860				

Under Construction 2000

Priority unless otherwise changed by development activity or City Council action

Appendix A.6

BTAC RECOMMENDATIONS FOR THE TRANSPORTATION CIP

Transportation System Five Year Capital Schedule

Transportation System Modernization

TYPE OF PROJECT	PRIORITY	Amounts by fiscal year (in thousands) 00-01	01-02	02-03	03-04	04-05	ODOT Funding	Urban Renewal Funding	OTHER Funding	Project Underway
Right of Way Acquisition (a)		538.0	455.0	125.0	100.0					
Intersection / Signalization/Roundabouts (a)		900.0	500.0	500.0	500.0	500.0			1460.0 (a)	
Paving Unpaved Streets (a)										
Trail Development		300.0	300.0	300.0	300.0	300.0				
Bicycle Lane Infill (b)		50.0	50.0	50.0	50.0	50.0				
Sidewalk Infill (b)		450.0	450.0	450.0	450.0	450.0				
Reed Market Division to Century Drive	1	400.0	150.0	1505.0	1505.0					
Portland / Hill Intersection improvements	2	92.5								
Wall / Bond Couplet (see Urban Renewal Funding $400,000)	3	400.0								
Arizona / Colorado Couplet (see Urban Renewal Funding $2,300,000) (c)	4	2300.0								
Franklin Bear Creek Connection	5	720.0								
8th Street & Penn Intersection Improvements	6	263.5								
Colorado / Simpson Intersection Improvements Signal/Roundabout (URF)	7	350.0								
Franklin Avenue, 2nd to 5th/Signal Improvements	8	368.0								
Olney / Penn Connection (project underway and funds on hand)	9	3181.0								
Bear Creek Signal	10		400.0							
Empire Avenue / Boyd Acres Signal	11	30.0	500.0							
Reed Market / 27th Signal	12	75.0	500.0							
Century Drive & Mt. Washington Intersection	13			40.0	700.0					
Reed Market / 9th Intersection	14		30.0	470.0						
American Lane Extension	15			975.0						
SE 15th Extension, Hwy. 20 to Bear Creek	16			536.0						
Mt. Washington Bridge / Hwy. 97	17				710.0					
Empire Avenue Extension (d)	18				870.0					
Wall Street, Newport to Hill	19		522.0							
Forum & 27th Signal	20					350.0				
8th Street & Greenwood Intersection	21					750.0				
Butler Market / 27th Street Intersection improvements	22					550.0				
27th Street Widening (Bear Creek to Neff Road) (e)	23					1537.0				
TOTAL		10418.0	3857.0	4951.0	5185.0	4487.0	0.0	0.0	1460.0	0.0

LEGEND

(a) These figures are from City staff and were not reviewed by BTAC
(b) BTAC recommends the City explore the use of SDCs for these multi-modal transportation elements that reduce reliance on the automobile and improve capacity
(c) BTAC recommends that the north-south link between Arizona and Bond/Blakely be completed as part of the Arizona/Colorado couplet
(d) Refer to BTAC TSP Recommendations, Section 6.9.6, Street System, Implementation Item 2, p. 33
(e) Refer to BTAC TSP Recommendations, Section 6.9.6, Street System, Policy 6 (c), p. 29; Policy 9, p. 30; and Implemenation item 2(e), p. 33
(f) BTAC did not make recommendations regarding prioritization of transportation projects 24-59

Appendix A.6 (continued)

Projects Not in Five Year Schedule

TYPE OF PROJECT	PRIORITY	Amounts (In thousands) Project Cost	ODOT an Renewal Funding	OTHER Funding	Project Underway
(f)					
E. Hwy. 20, NE 12th to Canal	24		1550.0		
Cooley Road Interchange (Design Participation)	25	110.0			
14th Street, Newport to Galveston	26	950.0			
Newport Bridge Replacement	27		1500.0	(Fed or ODOT)	
8th Street & Franklin Intersection	28	800.0			
NE Greenwood / Hill Street Intersection Improvements	29	450.0			
College Way / Newport Intersection Improvements	30	550.0			
Greenwood Avenue, 3rd to Hill	31	185.0			
Newport Avenue & 9th Street Intersection Improvements	32	235.0			
4th Street & Greenwood Intersection	33	220.0			
S. Hwy. 97 Underpass	34		4625.0	(Possible ODOT Funding)	
Franklin Avenue, 3rd to Hill	35	4650.0			
Revere, 4th to 8th	36	750.0			
Wilson/9th Intersection Improvements	37	350.0			
Franklin, Broadway to Harriman	38	800.0			
SE 9th, Wilson to Reed Market	39	1000.0			
Revere / 8th Intersection Improvements	40	450.0			
Mt. Washington Drive / Shevlin Park Intersection Improvements	41	350.0			
Butler Market / Yeoman Signal & Intersection Improvements	42	575.0			
8th & Butler Market Intersection	43	300.0			
Simpson / 14th Signal & Intersection Improvements	44	300.0			
27th Street, Neff to Butler Market	45	2360.0			
Wilson Avenue, 2nd to 5th	46	575.0			
Newport Avenue, 12th to 13th	47	110.0			
Reed Market / 15th Signal & Intersection Improvements	48	550.0			
Newport Avenue, 9th to Wall	49	1500.0			
Butler Market / Brinson Signal & Intersection Improvements	50	365.0			
Purcell Boulevard, Ocker to Holiday	51	435.0			
S. Hwy. 97 / Brosterhous Road Intersection Improvements	52	465.0		465.0 (Possible ODOT Funding)	
Purcell Boulevard, Twin Knolls to Bear Creek	53	725.0			
Brookswood Extension, end to Blakely	54	800.0			
Portland Avenue, Awbrey to Hill	55	940.0			
Boyd Acres / Brinson Signal & Intersection Improvements	56	362.0			
Halfway Road, Jamison to O.B. Riley Road	57	255.0			
Portland / 9th Signal & Intersection Improvements	58	220.0			
Purcell / Neff Signal & Intersection Improvements	59	650.0			
TOTAL		23,237.0	8,140.0	-	-

Appendix A.7

BTAC FUNDING RECOMMENDATIONS FOR THE FIVE-YEAR CIP

* DISCLAIMER: These are good faith estimates given the constraints of time. They are for general discussion purposes only.

	City Transportation SDC's	Property Tax Serial Levy	Franchise Fees	Transient Room Tax	Payroll Tax	Street Utility Fees	Local Gas Tax	State Gas Tax	Parks SDC's	County Street SDC's	General Fund	Other	Totals	
BICYCLE SYSTEM														
Lanes on existing streets	250,000	-	-	-	-	-	-	-	-	-	-	-	250,000	(g)
LAND USE														
Ordinance changes	75,000	-	-	-	-	-	-	-	-	-	-	-	75,000	
MAINTENANCE														
-	-	-	(a) (a1)	(a)	-	(a)	-	(a1) 29,720,504	-	(a)	-	(a2) 750,000	29,720,504	
Street Maintenance	-	1,000,000											1,750,000	
PARKING	-	-	-	-	-	-	-		-	-	(b)	-	-	
SIDEWALKS														
In-fill on arterials/collectors	250,000	2,000,000	-	-	-	-	-	-	-	-	-	-	2,250,000	(c)
Neighborhood in-fill	-	-	-	-	-	-	-	-	-	-	-	-	-	
STREETS														(c)
Completion of local streets	-	-	-	-	-	-	-	-	-	-	-	-	-	
Intersection improvements	6,905,000	-	-	-	-	-	-	-	-	-	-	-	6,905,000	
Street modernization and construction, including:	14,180,303	-	-	-	-	-	-	-	-	-	-	-	14,180,303	
Right of Way														
Street Paving														
Sidewalks														
Bicycle Lanes														
Intersections														
Signals														
Landscape Strip/Medians (h)														
TDM														(d)
Level A	-	-	-	-	-	-	-	-	-	-	55,000	-	55,000	(d)
Level B	-	-	-	-	-	-	-	-	-	-	75,000	-	75,000	(d)
Level C	-	-	-	-	-	-	-	-	-	-	300,000	-	300,000	
TRAILS														
Priority List	(f)	1,500,000	-	-	-	-	-	-	(f)	-	-	-	1,500,000	
TRANSIT														
Existing DAR	-	-	-	-	-	-	-	-	-	-	2,650,000	-	2,650,000	
Expansion of DAR	-	2,500,000	-	-	-	-	-	-	-	-	-	-	2,500,000	
TOTALS	21,660,303	7,000,000	-	-	-	-	-	-	-	-	3,080,000	750,000	62,210,807	
	(e)	(f)												

Recommendations:

(a) Deschutes County should enact a street SDC to fund County road improvements, allowing the County to shift State Gas Tax Revenue to the City for street maintenance. Additionally, Franchise fees, Transient Room taxes, and/or a Street Utility Fee should be considered by the City as a funding source for street maintenance.

(a1) City's current major two funding sources for this element are State Gas Tax Revenue and Franchise Fees.

(a2) City currently has $150,000 proposed in the street maintenance budget per year.

(b) City should develop a system of revenue collections from downtown tenants and owners to fund parking improvements.

(c) Local sidewalk and street improvements should be funded through Local Improvement Districts established by the local residents.

(d) City should fund TDM through the General Fund (explore allocation through various sources, such as franchise fees) and will also explore obtaining funds from other sources, i.e. - grants.

(e) City should update the current street SDC to include the full cost of improvements (excluding right-of-way, except for a provision for acquiring right-of-way on in-fill projects) and charge SDC's at 100% of the legal limit. Based on calculations provided by city staff an SDC of approximately $3,000 meets these standards and provides adequate funding for the improvements included in the current five-year CIP. (Funding subcommittee recommendation. No formal BTAC vote.)

(f) City should propose a five year serial levy, or serial levies, to fund in-fill sidewalk, trails, street/sidewalk/bike lane maintenance, and DAR expansion. Based on calculations provided by city staff the serial levy amounts would need to be $0.100 per $1,000 of taxable assessed value (TAV) for in-fill sidewalk construction, $0.075 per $1,000 of TAV for in-fill trail acquisition, construction, and maintenance, $0.05 for street/sidewalk/bike lane maintenance, and $0.125 per $1,000 of TAV for the expansion of DAR. Total levy would be $0.35 per $1,000 of TAV. For a residence with a TAV of $150,000 this would mean $52.50 annually in increased property taxes.

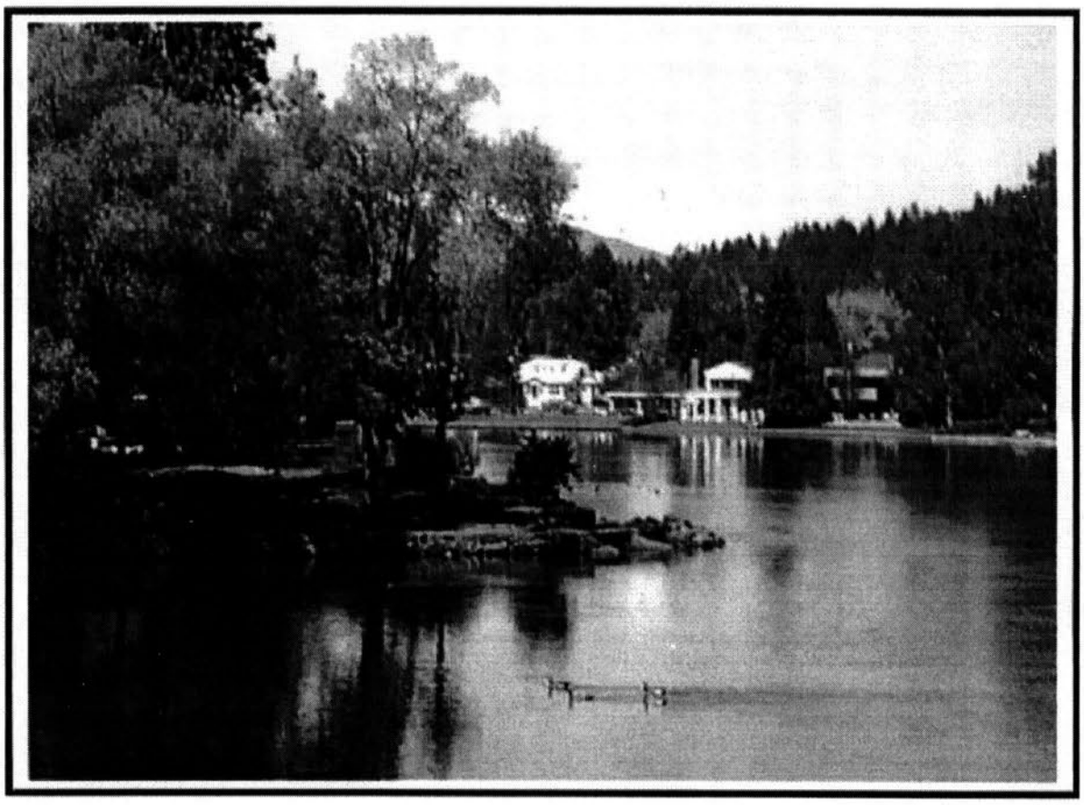
(g) Additional improvements for the upgrading or establishment of bicycle lanes on existing streets should be funded through the street maintenance budget (ie.- stripes, shoulder improvement).

(h) Costs of medians may be lower than currently estimated by the city based on recommended Street Policy 6(e).

(i) BTAC recommends the City explore the use of City Transportation SDCs for this transportation element, and coordinate with BMPRD re: parks SDCs.

APPENDIX B

Bend Urban Area
Transportation System Plan



Transportation Model Update
(EMME/2)

June, 2000

Final Report

Bend Transportation Model Update

City of Bend, Oregon

June 2000

Final Report

Bend Transportation Model Update

City of Bend, Oregon

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Project No. 3988.00

June 2000



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Section 1

Executive Summary

Executive Summary

During the past ten years, the City of Bend and Deschutes County have experienced a tremendous growth in population that has placed significant pressures on the transportation system. One of the tools that the city has used in the past to address the growing transportation needs in the community and to understand the implications of the changing mixture of land use patterns that are occurring around the city is the EMME/2 travel forecasting model. This model was originally developed by Kittelson & Associates, Inc. for Deschutes County in 1989 and was updated for the city in 1995/1996. Since 1996, a significant amount of population and employment growth and transportation network changes have occurred in the city. In January 2000, the city commenced a study to update the EMME/2 model. This updated model is one of the tools necessary to evaluate existing and future transportation needs citywide.

This report summarizes the assumptions, methodologies, and results of updating the EMME/2 model. It also represents a cumulative documentation of a series of technical memorandums reviewed by the Bend Transportation Technical Advisory Committee (T-TAC). This committee is comprised of city, county and state staff as well as representatives from local stakeholder groups, such as the Bend-La Pine School District, the Bend fire department, the local commute options group, etc.

The first step of the study was to update the 1995 existing conditions analysis to year 2000 conditions. This included the expansion and refinement of the Transportation Analysis Zone system (TAZ), the addition of collector and arterial roadways that have been constructed since 1995, the identification of year 2000 household and employment data by TAZ, and the preparation of year 2000 model "forecasts" that were calibrated to existing traffic counts at key locations throughout the city. The results of this analysis are summarized in Section 2. Section 2 also includes the methodology used to normalize model results to better replicate existing summertime conditions. Accounting for summertime travel in Bend results in a 24 percent increase in traffic that merely passes through Bend on the state highways and a 30 percent increase in trips generated by hotels and motels.

The calibrated model was used to develop year 2020 alternatives. The alternatives evaluated included:

- *No Build Alternative*: includes year 2020 land uses projected in accordance with the City's current comprehensive 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).
- *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 plan.
- *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, were assumed in the TDM alternative.
- *Combined Alternative*: includes a mixture of land use and transportation system strategies from both the Comprehensive Plan and the TDM Alternatives.

A second iteration of the Combined Alternative was also modeled. This alternative included the widening of Reed Market Road and 27th Street to five lanes.

Based on an evaluation of the advantages, feasibility, and implications of the strategies included in the alternatives, city staff forwarded the second iteration of the Combined Alternative as the Recommended

Alternative for the 20-year planning horizon. The development and evaluation of the alternatives is summarized in Section 3. The specific components of the Recommended Alternative are described in Section 4.

AREAS FOR FUTURE STUDY

Over the next five years, it is likely that the City of Bend will become part of a Metropolitan Planning Organization. The Transportation Planning and Analysis Unit (TPAU) of the Oregon Department of Transportation also has expressed the desire to modify the EMME/2 model structure for several communities around the state, including Bend, to one closer in nature to an activity-based model, rather than a gravity-based model. It is anticipated that this effort will commence in the next three to five years. To respond to these changes, there are a number of activities that could be completed to enhance the next update of the Bend EMME/2 model. Examples include:

- A new origin/destination study could be conducted at the major external stations (e.g., Highway 20 and 97) in Bend. The last study was completed in 1988. Updated information would be helpful in further discerning the amount of external-external travel vs. the external-internal and internal-external travel at these locations.
- Origin/destination studies could be conducted on a select number of major city corridors within the Bend area, such as the Deschutes River Bridges. This information could be helpful in further assessing the calibration of the existing conditions model.
- The city could establish a regular traffic count program to monitor traffic volumes on arterials and collectors, especially those crossing the identified screenline locations. At this time, the city has comprehensive data on the westside; traffic volumes in other areas of the city are limited.
- A comprehensive study of the effects of fixed-route transit could be conducted. This study should identify the potential ridership and mode shift due to the implementation of a transit system.
- The city could collect household data using a cross-classification scheme with car ownership and annual income. At the same time, the city could conduct a household survey that could be used to modify the trip production rates, by purpose, to reflect the cross-classification.

Regardless of MPO status or TPAU revisions to the model, the city should conduct location-specific studies of intersections and transportation corridors in areas of identified congestion to determine the appropriate infrastructure needs over the 20-year planning horizon. Specific connectivity improvements for pedestrians, bicycles, and vehicles should also be studied at a more microscopic level. The combination of all of these efforts will help the city to appropriately plan for and accommodate growth over the next twenty years.

Section 2

Existing Conditions and Calibration

Existing Conditions Analysis

This section of the report summarizes the refinement and calibration of the Bend Urban Area EMME/2 travel demand forecasting model to year 2000 existing conditions, including:

- EMME/2 network enhancement;
- year 2000 Bend Urban Area land use and demographic data;
- travel demand model trip generation;
- travel demand model trip distribution and assignment;
- travel demand model calibration; and
- estimation of year 2000 weekday summer p.m. peak hour travel.

EMME/2 NETWORK ENHANCEMENTS

The Bend Urban Area Travel Forecasting Model developed for the City in 1995/1996 (Kittelson and Associates, Inc., 1996) was used as the basis for the development of an updated model that accurately reflects year 2000 existing weekday p.m. peak hour conditions. As part of the development of the updated year 2000 model, revisions and enhancements were made to both the TAZ and roadway elements of the model network.

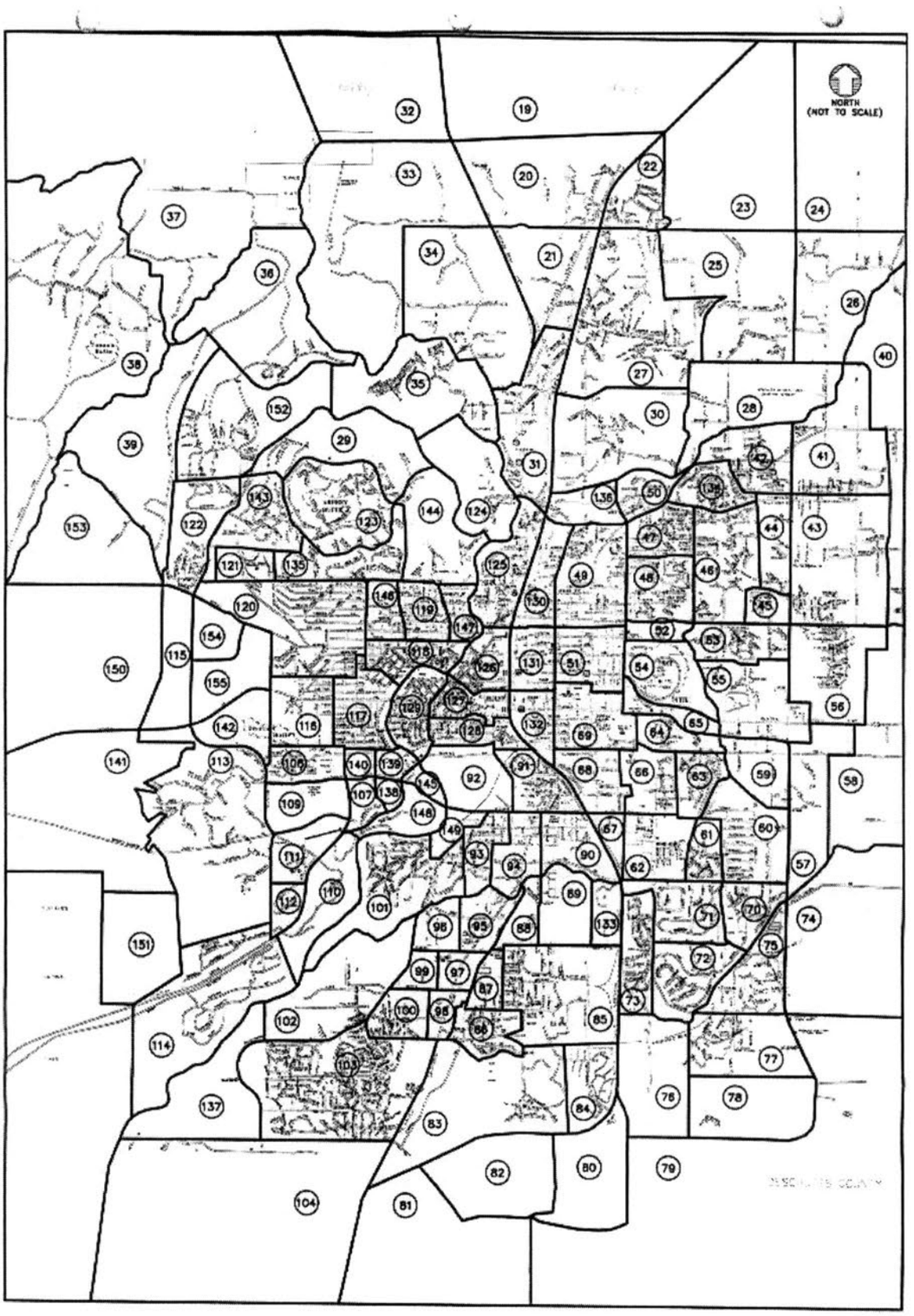
Refinement of the Transportation Analysis Zone System

To facilitate the development of a more refined travel forecast within the urban area, the Transportation Analysis Zone (TAZ) system was refined. The TAZ refinements included the following changes:

- The disaggregation of TAZ 39, near Shevlin Park Road and Skyline Ranch Road in northwest Bend, into three new zones: a redefined TAZ 39 and TAZs 152 and 153; and
- The disaggregation of TAZ 115, Northwest Crossing, into three new zones: a redefined TAZ 115 and TAZs 154 and 155.

The enhanced TAZ system is illustrated in Figure 1. To the extent possible, boundaries for the TAZs were established in accordance to the following criteria:

- areas of homogenous land use (both current and projected future land use);
- conformance with major boundaries (e.g., major transportation corridors, physical boundaries which prevent continuous development); and,
- homogeneous access of land use to the transportation system (collector/arterial street system).



TRANSPORTATION ANALYSIS ZONES

TRANSPORTATION MODEL UPDATE BEND, OREGON JUNE 2000	FIGURE 1

The external stations utilized in the existing Bend Urban Area model were retained for the development of the updated model. These include:

1. US 20 (North)
2. US 97 (North)
3. Butler Market Road/Yeoman Road
4. Neff Road
5. US 20 (East)
6. Bear Creek Road
7. Rickard Road
8. China Hat Road
9. US 97 (South)
10. Century Drive
11. Skyliners Road
12. Bend – Deschutes Market Road
13. Stevens Road
14. Johnson Road
15. Bend Redmond Road
16. Bowery Road
17. Hamehock Road
18. Ward Road

Refinement of the Roadway Network

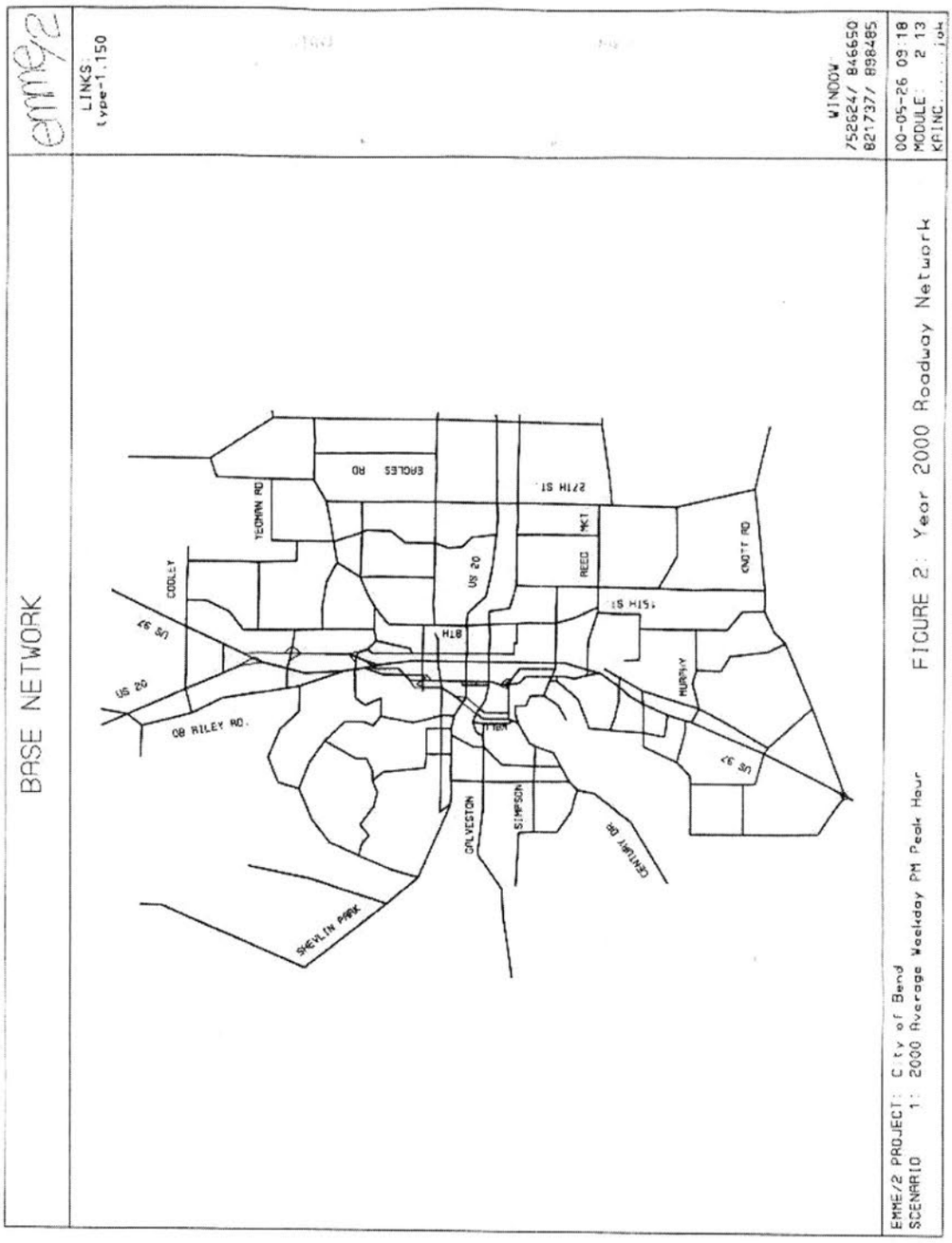
In addition to the refinements made to the TAZ system, the roadway network was examined to ensure that all of the existing collector and arterial streets were included in the model. The following roadway projects have been constructed since the creation of the 1995 model and were therefore added to the updated model:

- the construction of segments of the Bend Parkway from US 97 to Colorado Avenue;
- the Wilson Avenue overcrossing of the Parkway;
- the completion of Mount Washington Drive between US 97 and Shevlin Park Road;
- the extension of Bond Street-Blakely Road to Wilson Avenue;
- the extension of Awbrey Road to Mount Washington Drive;
- the extension of Purcell Boulevard between Wells Acres Road and Neff Road; and,
- the extension of Olney Avenue from Division to 3rd Street.

Other important local circulation routes were also added to the year 2000 model, such as Broadway Avenue and Tumalo Road.

The resultant year 2000 EMME/2 model roadway network is illustrated in Figure 2. The model network shown in Figure 2 includes 155 zones (TAZs), 521 regular nodes, and 1,568 links (roadway segments). In the existing conditions model, all links in the model were assigned the following characteristics based upon existing function:

- distance (in hundredths of a mile);
- travel speed (average free-flow, off-peak travel speed which include potential delays at terminal intersections);
- link type (all links were assigned into one of 40 categories based on geographic location and facility type); and
- link capacity (peak hour roadway capacities were defined based on functional classification, roadway cross-section, corridor access control, and adjacent land use).


emme/2
LINKS
type-1.150
WINDOW
752624/ 846650
821737/ 898485
00-05-26 09:18
MODULE 2 13
KRING
BASE NETWORK
ENGLES RD
27TH ST
YEOMAN RD
3RD
REED
MKT
US 20
COOLEY
US 97
8TH
15TH ST
CHOTT RD
US 20
OB RILEY RD.
MURPHY
US 97
CALVESTON
SIMPSON
CENTURY DR
SHERLIN PARK
EMME/2 PROJECT: City of Bend
SCENARIO 1: 2000 Average Weekday PM Peak Hour
FIGURE 2: Year 2000 Roadway Network

YEAR 2000 LAND USE DATA

City of Bend staff disaggregated year 2000 land use information into number of households, number of employees, number of students, and number of hotel/motel rooms for each TAZ. For trip generation purposes the 2000 household data were classified into single-family dwelling units, multi-family dwelling units, and manufactured homes; the 2000 employment data were classified as retail, service, school and other employees. Appendix "A" includes the year 2000 household and employment data that was used for the existing conditions trip generation. It should be noted that within the urban area, recreational homes (or secondary residences) exist in a limited number of locations throughout the City (for example, at Broken Top and Awbrey Glen). These secondary residences exhibit different weekday p.m. peak hour trip generation characteristics than a typical primary residence and, as such, the total number of households was reduced to account for this phenomenon.

The Bend Urban Area was divided into five districts (northwest, southwest, northeast, southeast, and downtown), as shown in Figure 3, in order to summarize the year 2000 land use data. Citywide, the 2000 land use data represented a 22 percent increase in employment and a 37 percent increase in number of households over the 1995 model.

TRAVEL DEMAND MODEL TRIP GENERATION

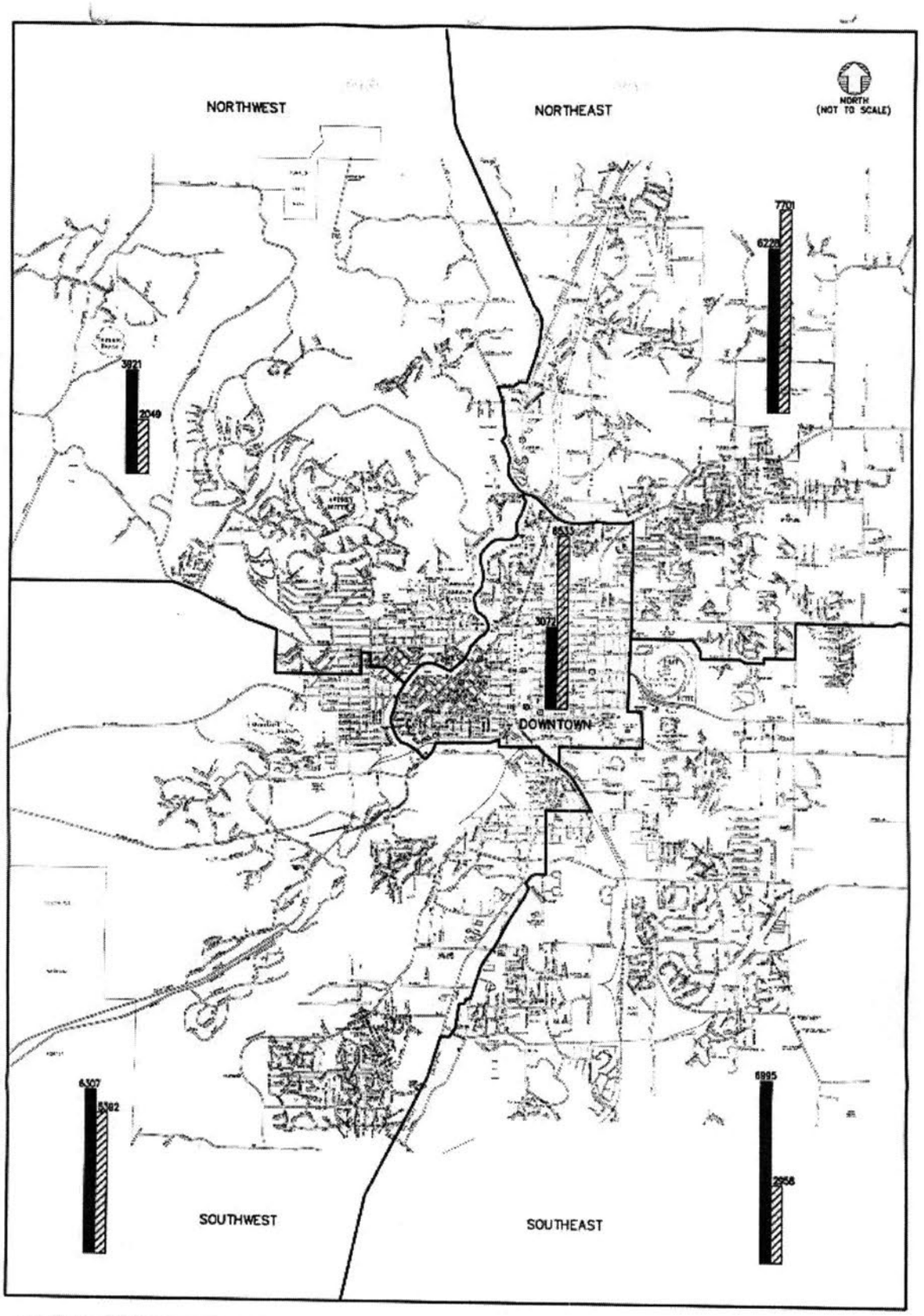
The first stage of modeling existing transportation conditions is the calibration of the trip generation estimate based on the year 2000 land use inputs. The Bend travel forecasting model was calibrated to accurately reflect existing vehicular traffic volumes, as measured on key roadways throughout the City. The number of trips that are carried by alternative modes, while not explicitly modeled in the existing conditions, is reflected in the trip generation rates as those volumes are not forecasted as vehicular volumes. Therefore, while the number of person-trips made using alternative modes may not be explicitly known, the total number of vehicular trips reflected on the system accounts for multi-modal travel.

Three basic *internal* trip tables were developed to reflect the existing travel patterns in the urban area. Typical modeling practice categorizes travel into the following trip purposes:

- Home-Based Work (HBW) travel (e.g., a commuting trip from work to home);
- Home-Based Other (HBO) travel (e.g., a shopping trip from home to the grocery store); and,
- Non Home-Based travel (NHB) (e.g., a trip from work to a meeting).

These basic trip purposes were supplemented with special *external* trip purposes including:

- External-External travel (trips both beginning and ending outside of the urban area); and,
- Internal-External/External-Internal travel (trips with only one trip end inside the urban area, such as a trip from a business in Bend to a home in Redmond).



2000 POPULATION AND EMPLOYMENT DATA BY DISTRICT

TRANSPORTATION MODEL UPDATE
BEND, OREGON
JUNE 2000

FIGURE 3

Internal Trip Generation

Representative daily trip generation rates and equations derived from national averages and other resources were used as a basis for calculating the year 2000 daily trip productions and attractions by trip purpose for each TAZ (these rates are based on rates documented in NCHRP Reports 187 and 365). The daily trip production equations used for each trip purpose were:

- $HBW_{PROD} = (SF_{HH} \times 1.793) + (MF_{HH} \times 0.863)$
- $HBO_{PROD} = (SF_{HH} \times 5.021) + (MF_{HH} \times 2.900)$
- $NHB_{PROD} = (SF_{HH} \times 2.889) + (MF_{HH} \times 1.667)$

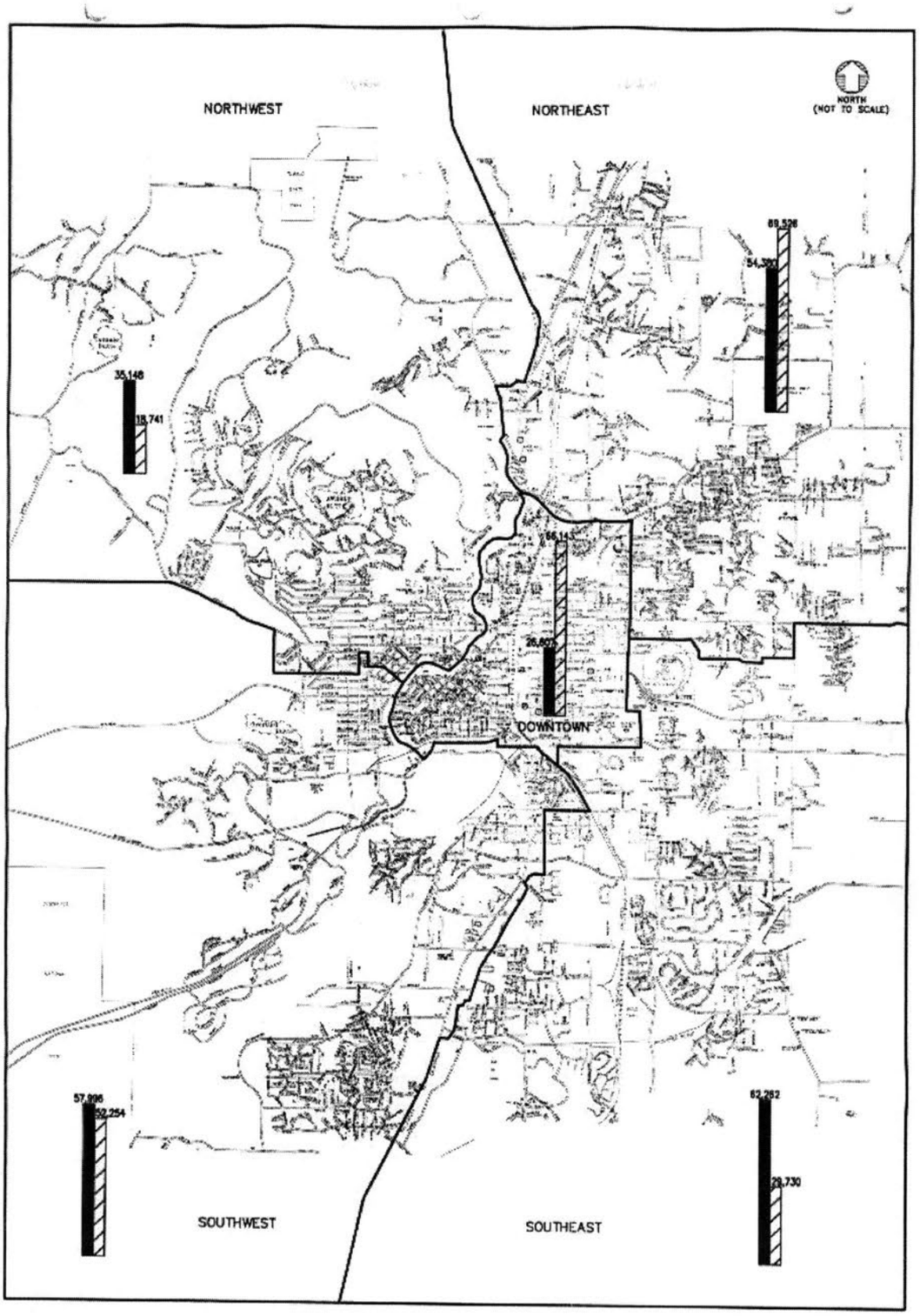
The daily trip attraction equations used for each trip purpose were:

- $HBW_{ATT} = (TOTAL_{EMP} \times 1.4)$
- $HBO_{ATT} = (RETAIL_{EMP} \times 9.0) + (SERVICE_{EMP} \times 3.0) + (STUDENTS \times 1.5) + (TOTAL_{HH} \times 0.5)$
- $NHB_{ATT} = [(RETAIL_{EMP}+SERVICE_{EMP}) \times 3.6] + [(SCHOOL_{EMP} + OTHER_{EMP}) \times 1.6]$

Where:

HBW, HBO, NHB	= Trip Purpose
$_{PROD}$	= Daily Vehicle Trip Productions
$_{ATT}$	= Daily Vehicle Trip Attractions
SF_{HH}	= Single-Family Households
MF_{HH}	= Multi-Family Households
$TOTAL_{HH}$	= Total Households (Single- and Multi-Family)
$RETAIL_{EMP}$	= Retail Employees
$SERVICE_{EMP}$	= Service Employees
$SCHOOL_{EMP}$	= School Employees
$OTHER_{EMP}$	= Other Employees
$TOTAL_{EMP}$	= Total Employees (Retail, Service, School, and Other)

These trip generation rates were applied to the year 2000 household and employment estimates by TAZ. Table 1 summarizes the resulting year 2000 daily trip generation estimates by trip purpose. Consistent with state-of-the-art modeling techniques, the daily attractions were balanced to equal the daily productions to calculate daily origins and destinations. Attractions are typically balanced to equal the productions because data about households can typically more accurately obtained than employment data in an urban area. Information about households is available via the census, home-based activity surveys, etc. Table 1 also identifies the balanced trip purposes. The daily productions and attractions by major district are shown in Figure 4.



2000 DAILY PRODUCTIONS AND ATTRACTIONS BY DISTRICT

TRANSPORTATION MODEL UPDATE
BEND, OREGON
JUNE 2000

FIGURE 4

Table 1
2000 Daily Internal Trip Generation by Trip Purpose

Trip Purpose	Unbalanced Productions	Unbalanced Attractions	Balanced Productions And Attractions	Percent Of Total Daily Trips
Home-Based Work	42,994	32,035	42,994	18%
Home-Based Other	122,768	112,385	122,768	52%
Non Home-Based	70,631	63,565	70,631	30%
TOTAL	236,393	207,985	236,393	100%

External Trip Generation

Recent (1998-2000) weekday p.m. peak hour traffic volumes were used to develop trip generation estimates at each of the external stations. Survey information collected by ODOT in 1988 was used to estimate and differentiate the number of external-external and the internal-external/external-internal trips at each of the external stations. Table 2 summarizes the estimated year 2000 p.m. peak hour trip generation for the external stations.

Table 2
2000 P.M. Peak Hour Trip External Trips

Origin/Destination	Internal	External	Total
Internal	n/a	3,989	3,989
External	3,358	503	3,861
Total	3,358	4,492	7,850

TRAVEL DEMAND MODEL TRIP DISTRIBUTION

A traditional Gravity Model was employed to distribute the estimated daily trips generated by the year 2000 household and employment base. The methodology and guidelines outlined in *NCHRP Report 365 Travel Estimation Techniques for Urban Planning* were used as the basis for the trip distribution modeling process. The fundamental principle upon which the gravity model is based assumes that the amount of travel between two places is directly related to the size of each of the places (amount and type of land development), and inversely related to the distance between the two places. Therefore, zones with relatively large amounts of development exchange more trips and zones that are relatively far apart from each other exchange fewer trips. The basic formula used to determine the trip distribution patterns for the gravity model is shown below.

$$T_{ij} = P_i \frac{A_j F_{ij} K_{ij}}{\sum A_j F_{ij} K_{ij}}$$

Where:
- T_{ij} = trips produced in zone i and attracted to zone j
- P_i = trips produced in zone i
- A_j = trips attracted to zone j
- F_{ij} = impedance (friction factor) relating to the spatial separation between zone i and zone j
- K_{ij} = optional adjustment factor for zonal interchange

The optional adjustment factor was not applied in the Bend model.

Use of the gravity model requires the determination of appropriate travel time factors, or impedances, that adequately reflect the effect of spatial separation between unique locations (TAZs). The friction factor attempts to represent the behavior of the traveler in terms of the perception of time and distance, or the willingness of a traveler to spend time and distance for a trip (based on the trip purpose). As stated in NCHRP Report 365, the gamma function is used to determine the trip distribution friction factors. To adequately estimate zonal impedance (F_{ij}), the exponential function shown below was used.

$$F_{ij} = a \times t_{ij}^{b} \times e^{c \times t_{ij}}$$

Where: F_{ij} = Impedance (friction factor) between zone i and zone j

a, b, and c = model coefficients (a is a scaling factor that can be varied or omitted without changing the distribution)

t_{ij} = travel time between zone i and zone j

The friction factor model coefficients (a, b, and c) documented in the NCHRP Report 365 for small urban areas were used in the model update (see NCHRP Report 365 pages 39-41 and Table 14).

The first step of the trip distribution process is the calculation of the "free flow" travel time, based on uncongested travel speeds and distances, between each zone pair. Once these travel times have been estimated, the gamma function shown above is applied in a three iteration process to calculate zonal impedance for each trip purpose. In each iteration, a new set of "skim costs" (i.e., zonal travel times saved from the previous EMME/2 assignment of total trips) was applied to redistribute trip productions and attractions by trip purpose.

Once the internal trip productions and attractions were calculated, adjustments to the internal trips were made to reflect the level of external-internal and internal-external travel occurring at each of the study area external stations. This is done to ensure that there is no double counting of trips that have one trip end at a household or a business inside and one trip end outside the urban area.

P.M. Peak Hour vs. Daily Trip Characteristics by Trip Purpose

The weekday p.m. peak hour is typically the critical time period for analyzing the transportation system given that areawide traffic volumes and congestion are generally highest during this time of the day. In order to convert the daily internal trips to average weekday p.m. peak hour trips, diurnal (or time-of-day) factors were applied. NCHRP Report 365 provides recommended diurnal factors to convert daily trips, by trip purpose, to a weekday p.m. peak hour trip table (see NCHRP Report 365 page 83, Table 41). The report presents diurnal factors for each hour of the day. Because the analysis time period used for this evaluation is 4:30 to 5:30 p.m., the diurnal factors provided for 4:00 to 5:00 p.m. and for 5:00 to 6:00 p.m. were averaged to obtain a representative peak hour adjustment to use for Bend. The adjustment factors that were applied to the existing daily trip productions and attractions are summarized in Table 3.

Table 3
Weekday P.M. Peak Hour Directionality Factors by Trip Purpose

Trip Purpose	Daily Trips	Percent of Daily Trips in the PM Peak Hour	Number of Internal PM Peak Hour Trips	Directionality	
				Outbound	Inbound
Home-Based Work	42,994	10.49%	4,510	9%	91%
Home-Based Other	122,768	7.29%	8,950	45%	55%
Non-Home Based	70,631	17.84%*	12,600	50%	50%
Total	236,393	11.02%	26,060	n/a	n/a

*This value has been modified from the NCHRP report and calibrated to local conditions.

As discussed previously, the internal trips were adjusted to reflect the level of internal-external/external-internal travel occurring in Bend to ensure that there is no double counting for trips that have one trip end at a household or a business inside the urban area and one trip end outside the urban area. The adjusted internal trips are shown in Table 4.

Table 4
Adjusted Internal Trips for External-Internal/Internal-External Trips

	Unadjusted Internal Trips	Internal-External/ External-Internal Trips (I-X, X-I)	Adjusted Internals (I-I)	Total Adjusted Trips (I-I, I-X, X-I)
Internal Trips	26,060	7,347	18,713	26,060

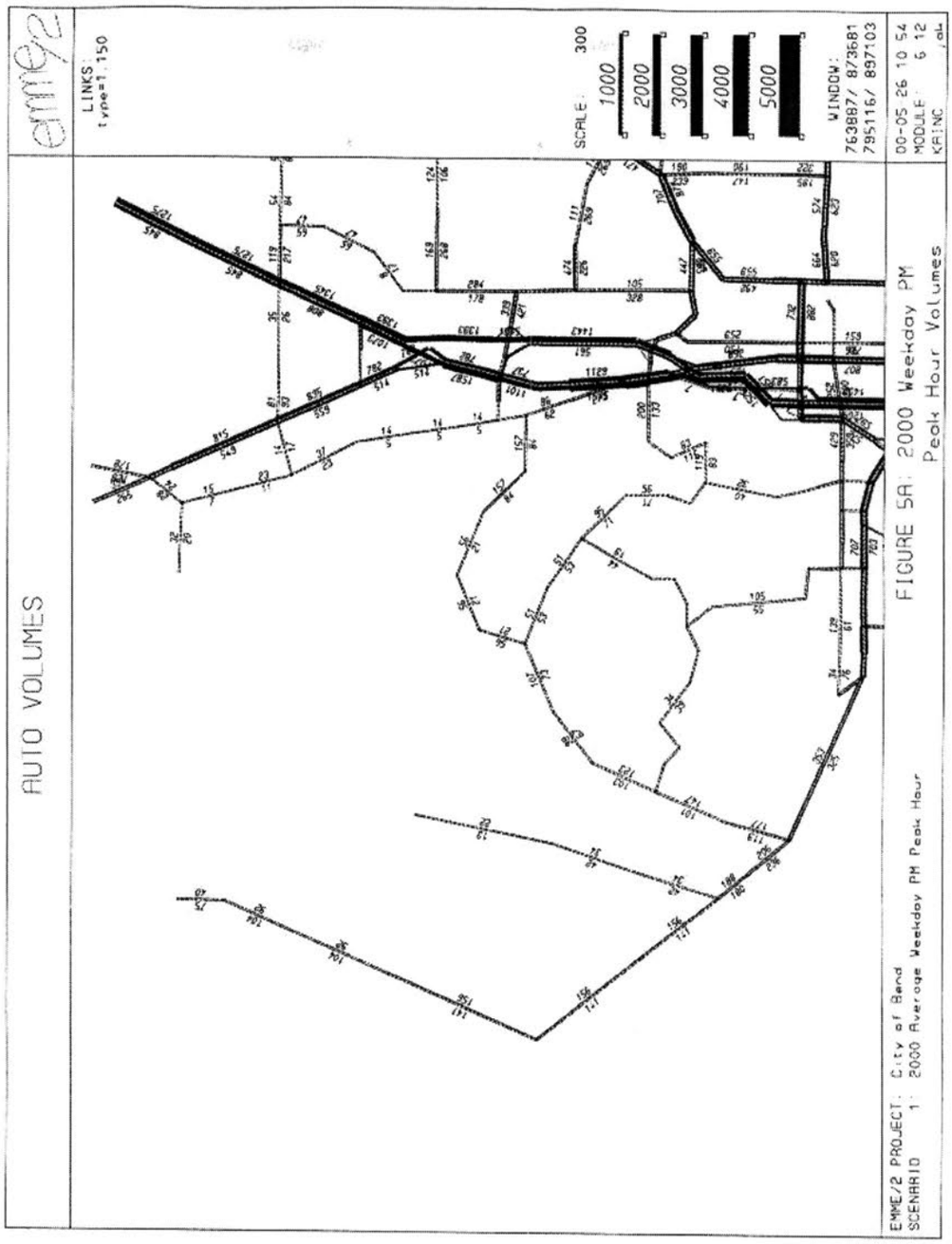
The adjusted weekday p.m. peak hour internal trip tables were added to the external trip tables to determine the total travel generated in the study area during the average weekday p.m. peak hour. The total year 2000 weekday p.m. peak hour trip table is summarized in Table 5.

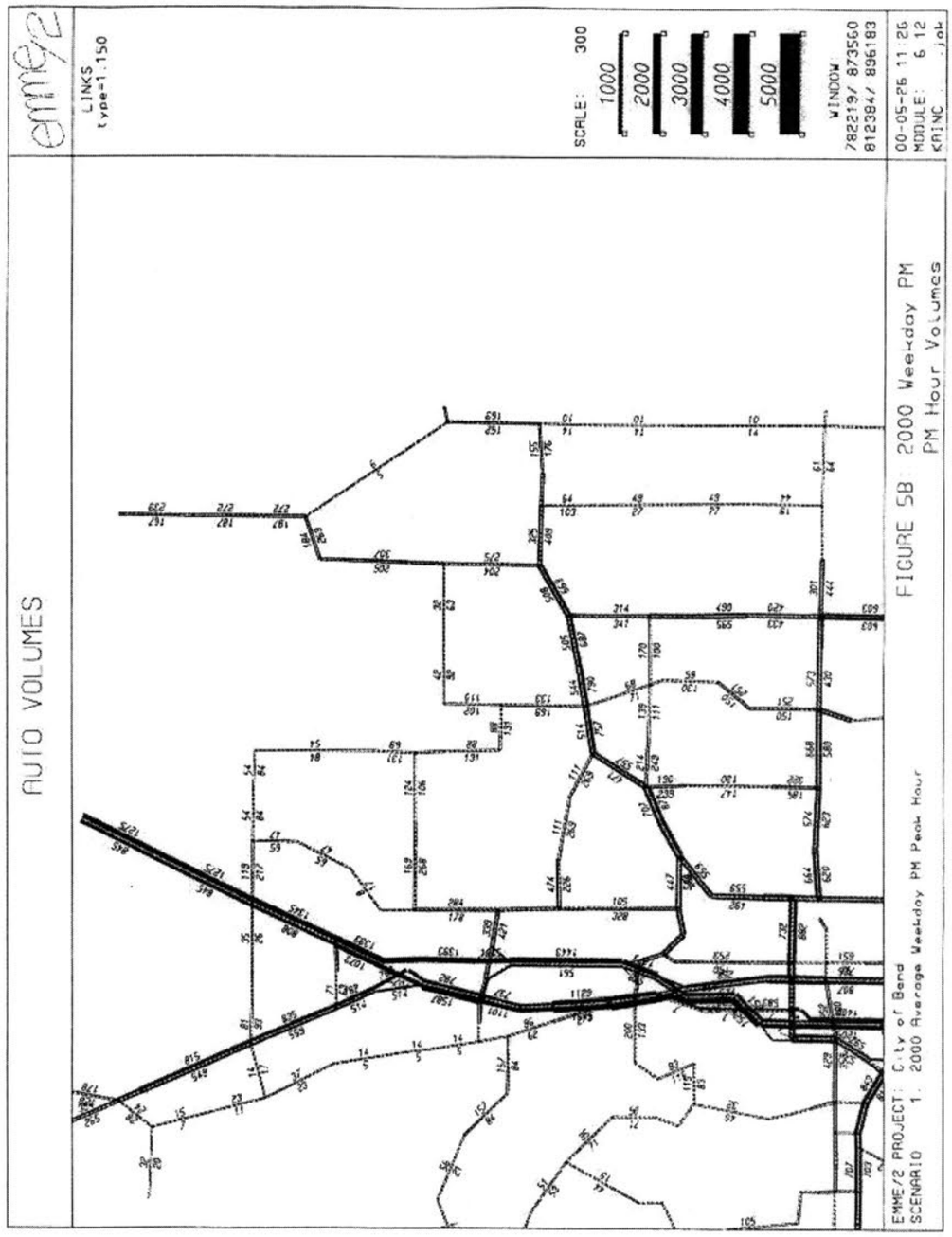
Table 5
2000 Weekday P.M. Peak Hour Trips

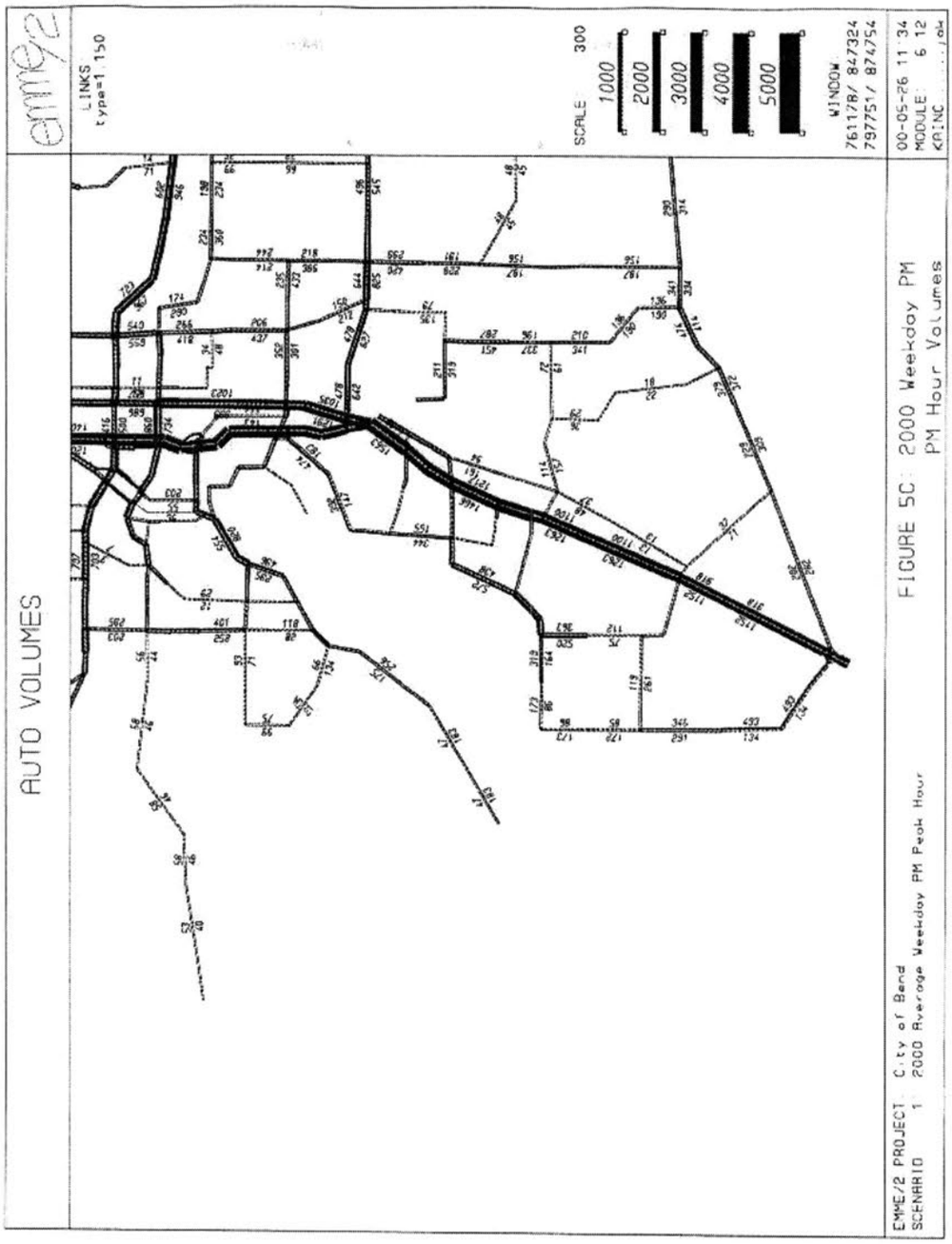
Origin/Destination	Internal	External	Total
Internal	18,713	3,989	22,702
External	3,358	503	3,861
Total	22,071	4,492	26,563

TRAVEL DEMAND MODEL TRAFFIC ASSIGNMENT

The total 2000 weekday p.m. peak hour trip table was assigned to the model network using an equilibrium assignment algorithm. The resulting 2000 weekday p.m. peak hour synthetic (i.e., model produced) traffic volumes are shown in Figures 5A through 5D.


emme/2
LINKS
type=1,150
AUTO VOLUMES
SCALE: 300
1000
2000
3000
4000
5000
WINDOW:
763887/ 873681
795116/ 897103
00-05 26 10 54
MODULE: 5 12
KRINC
FIGURE 5A: 2000 Weekday PM
Peak Hour Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 1: 2000 Average Weekday PM Peak Hour


AUTO VOLUMES
emme/2
LINKS
type=1,150
SCALE: 300
1000
2000
3000
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WINDOW
782219/ 873560
812384/ 896183
00-05-26 11:26
MODULE: 6.12
KRINC .ini
FIGURE 5B 2000 Weekday PM
PM Hour Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 1. 2000 Average Weekday PM Peak Hour


AUTO VOLUMES
emme/2
LINKS
type=1 150
SCALE 300
1000
2000
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WINDOW
761178/ 847324
797751/ 874754
00-05-26 11:34
MODULE 6 12
KAINC ...104
FIGURE 5C: 2000 Weekday PM
PM Hour Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 1: 2000 Average Weekday PM Peak Hour

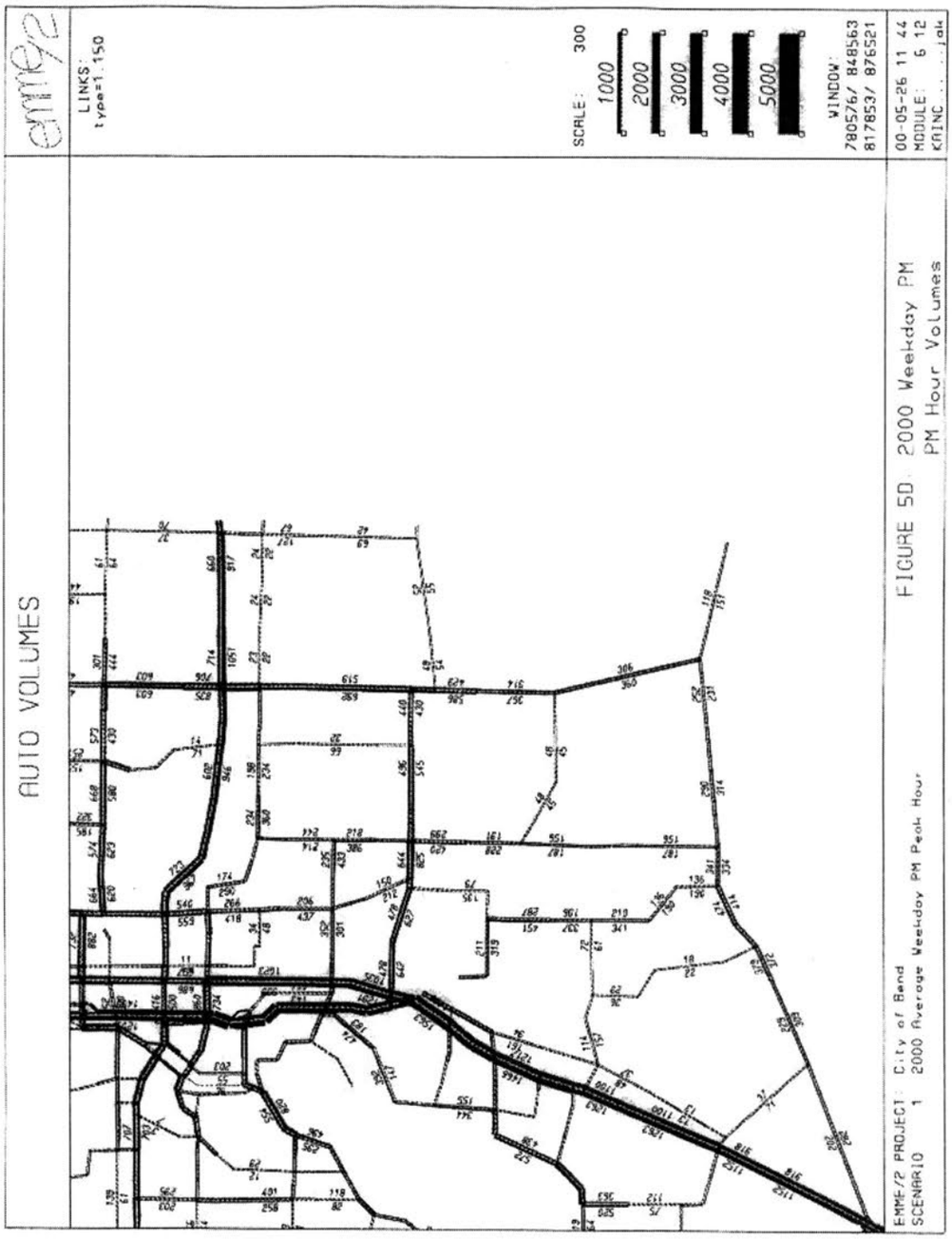

emme/2
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SCALE: 300
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WINDOW:
780576/ 848563
817853/ 876521
00-05-26 11 44
MODULE: 6 12
KAINC . . . .pk
AUTO VOLUMES
FIGURE 5D 2000 Weekday PM
PM Hour Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 1 2000 Average Weekday PM Peak Hour

Figure 6 illustrates a volume-to-capacity plot for the year 2000 weekday p.m. peak hour traffic assignment. For city facilities, roadway links that are illustrated in green are operating at 80 percent of capacity or less, links shown in blue are operating between 80 percent and 90 percent of capacity, and links shown in red are operating above 90 percent of capacity. For state facilities, links are shown as either meeting or exceeding the 1999 Oregon Highway Plan (OHP) mobility standards by facility type. According to the OHP, acceptable volume-to-capacity ratios for Highway 97 and Highway 20 are either 0.70 or 0.75, depending on the location and posted speed; acceptable volume-to-capacity ratios for Colorado Avenue/Century Drive are 0.80 or 0.85 depending on location and posted speed. Figure 6 shows only a limited number of city roadway links operating above 90 percent of capacity. Several of these roadway links are isolated segments (for example, southbound 27th Street between US 20 and Bear Creek Road) that are likely related to intersection deficiencies and are consistent with areas of existing weekday p.m. peak hour congestion; other areas can be attributed to a concentrated zone loading (such as Brookswood). As shown in Figure 6, many segments of Highway 97 do not currently meet the OHP standards.

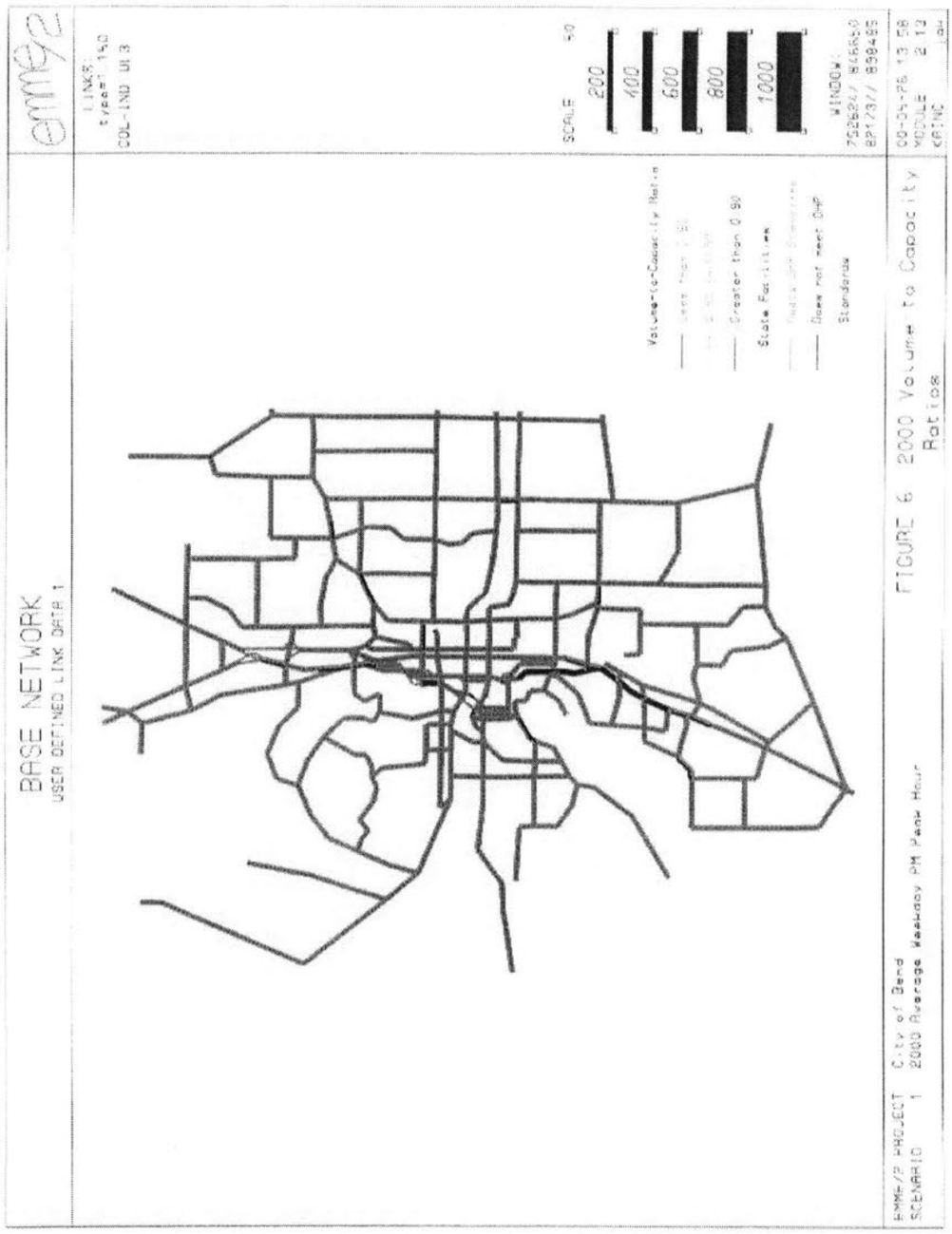
TRAVEL DEMAND MODEL CALIBRATION

A series of tests and comparisons were performed to determine the accuracy and validity of the existing conditions assignment. Assigned link volumes were compared to the existing traffic count data for a variety of roadway segments and screenlines in the EMME/2 model network. Figures 7 and 8 present a regression plot comparison of the synthetic assigned model volumes to the actual traffic count volumes for the east-west and north-south screenlines, respectively. As shown in Figures 7 and 8, a strong correlation exists between the calibrated model estimates and the field data ($R^2 = 0.95$ for the East-West screenlines and $R^2 = 0.79$ for the North-South screenlines). Appendix "B" presents a comparison of the resulting EMME/2 travel assignment volumes to the field traffic counts on each of the collector/arterial facilities across a series of north-south and east-west screenlines through the study area. As shown in Appendix B, the model estimate volumes are generally within 10-15 percent of the observed traffic counts. This, combined with the high R^2 value for the regression plot, indicates that the model accurately replicates the existing traffic conditions and meets statewide modeling standards, and therefore it can be concluded that calibration is achieved.

EXISTING CONDITIONS SUMMERTIME MODEL

As part of the development of the City of Bend travel demand forecasting model, summer weekday p.m. peak hour volumes were approximated after the calibrated model was reviewed.

To estimate the incremental increase in vehicle trips during the summertime, the seasonal fluctuations along US 20 and US 97 were examined using data from the ODOT permanent recorder stations located south of Bend (on US 97) and east of Bend (on US 20). The data obtained from these stations suggested that travel into and out of Bend is approximately 24 percent higher during the months of July and August than that of the average weekday. For the purposes of modeling existing summertime conditions, the estimates for the year 2000 external-external travel were increased by 24 percent and reassigned to the roadway network.


emme2
LINKS:
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WINDOW
752624// 866650
891737// 890495
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MODULE 2.10
KEYNO
Volume-to-Capacity Ratio
Greater than 0.90
State Facilities
Does not meet DMP
Standards
BASE NETWORK
USER DEFINED LINK DATA 1
FIGURE 6 2000 Volume to Capacity Ratios
EMME/2 PROJECT City of Bend
SCENARIO 1 2000 Average Weekday PM Peak Hour

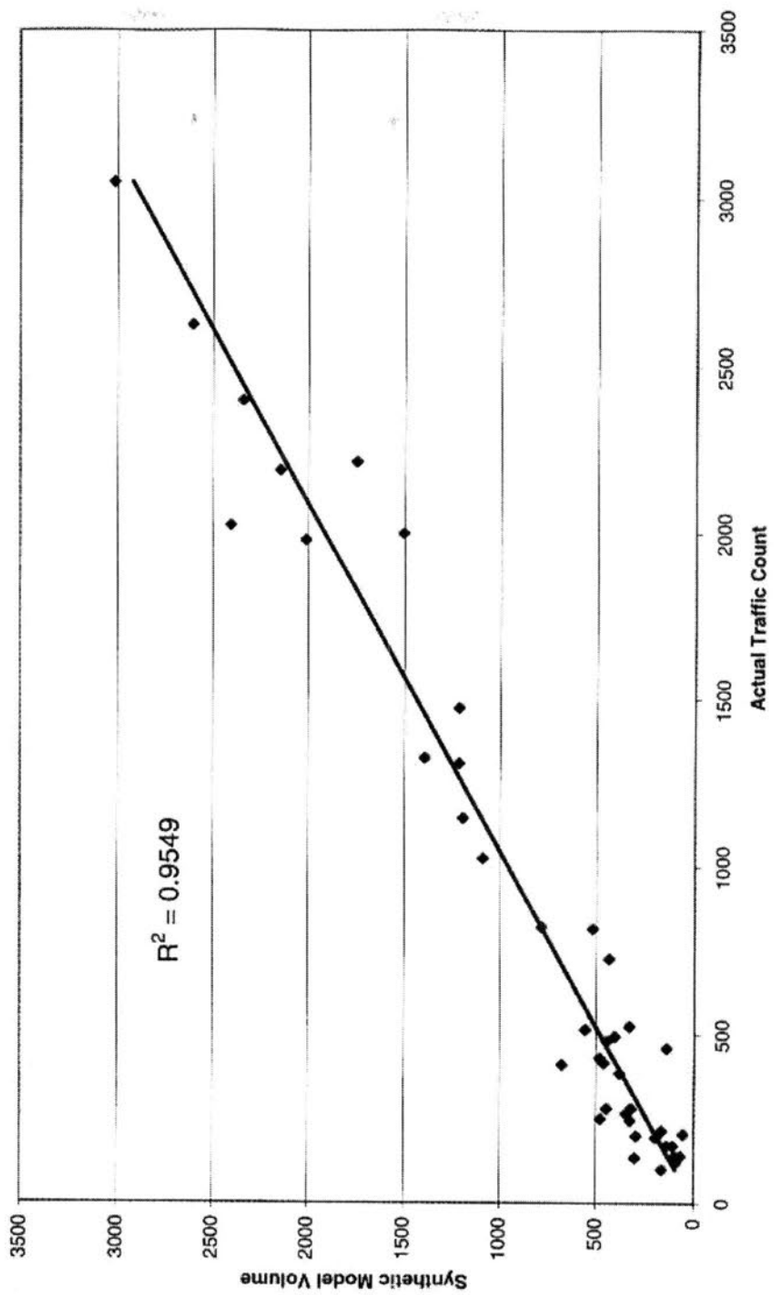


FIGURE 7
Model Validation - East/West Screenlines

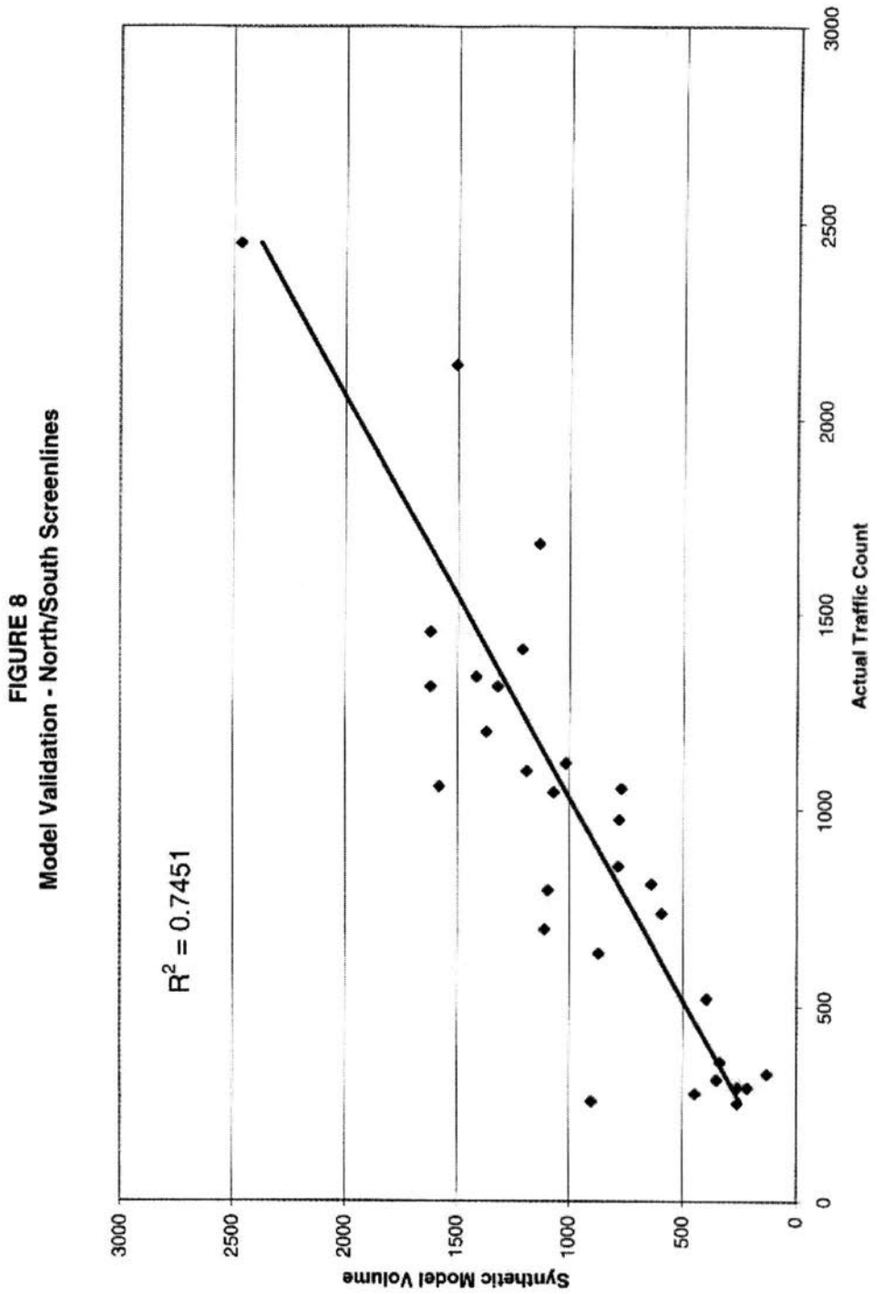


FIGURE 8
Model Validation - North/South Screenlines

In addition to an increase in external travel, an increase in traffic due to recreational and tourist travel in the summertime within the city was also included. Data obtained from a local motel indicated that on a typical weekday during the summertime, the average occupancy rate is approximately 30 percent higher than the average weekday during for the other months of the year. During the off-peak months, typical hotel/motel occupancies are in the range of 50 to 60 percent, while during the peak summer season the occupancy rate increases to approximately 85 to 90 percent. City Staff confirmed that this data obtained from the motel was representative of other hotels and motels in Bend. The Bend Chamber of Commerce also confirmed the reasonableness of this assumption.

Based on these observations, a separate trip table was created to account for trips occurring during the summertime weekday p.m. peak hour that are generated by hotels and motels. This trip table was created using the standard trip generation assumptions for motels and hotels documented in the ITE Trip Generation Manual, 6th Edition. The vehicles generated by the increased occupancy rates were distributed between the hotels/motels and the commercial areas in the central business district (it should be noted that rental units in recreational developments such as Mount Bachelor Village were also included in the hotel/motel category).

The total year 2000 summertime weekday p.m. peak hour travel demand was obtained by adding the additional external-external and hotel/motel trips to the average weekday p.m. peak hour trip table. The resulting total summertime weekday p.m. peak hour trip table is summarized in Table 6.

Table 6
2000 Summer Weekday PM Peak Hour Trips

	Internal	External	Total
Internal	19,172*	3,989	23,161
External	3,358	624	3,982
Total	22,530	4,613	27,143

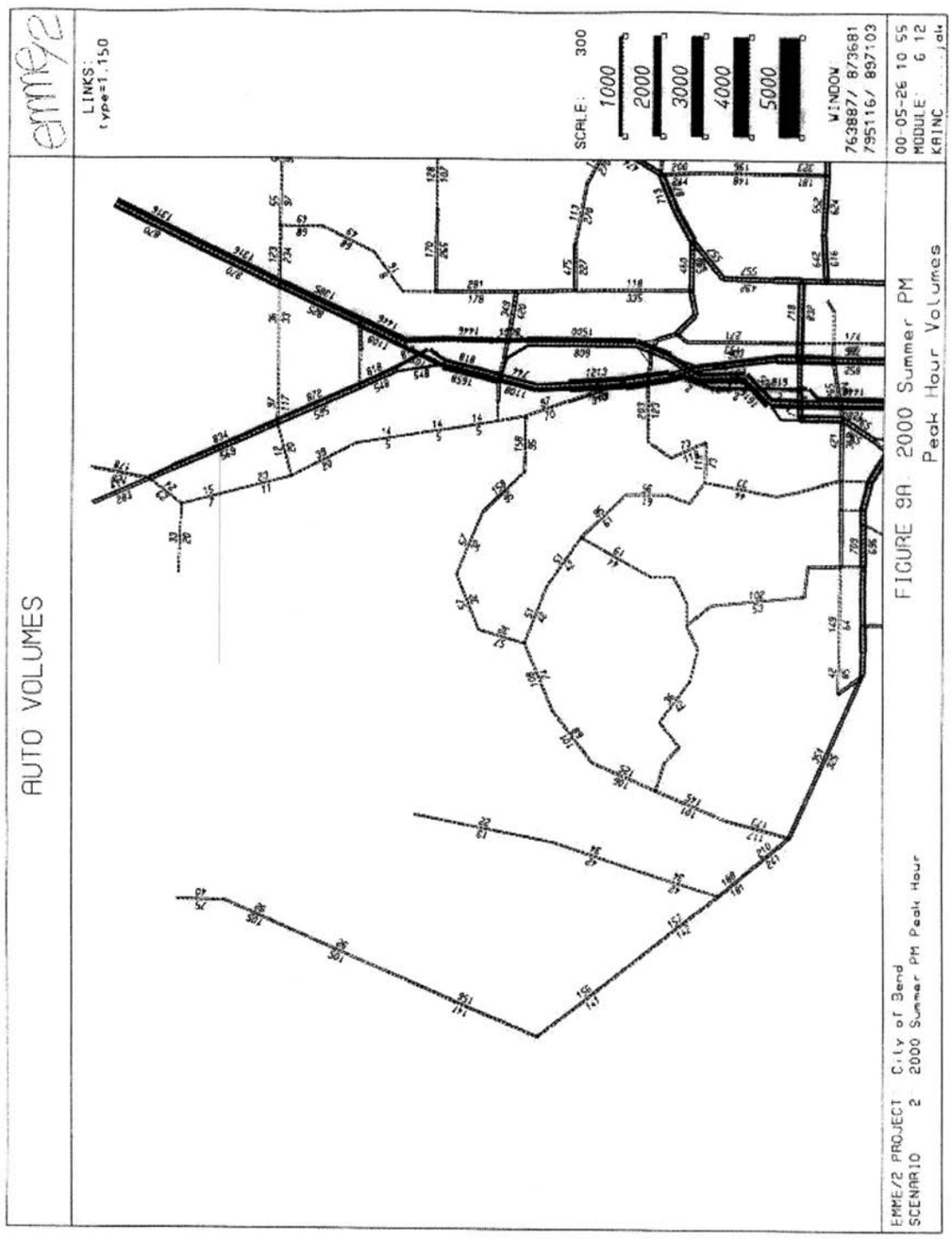
*Note: Internal-Internal trips include additional summertime hotel travel.

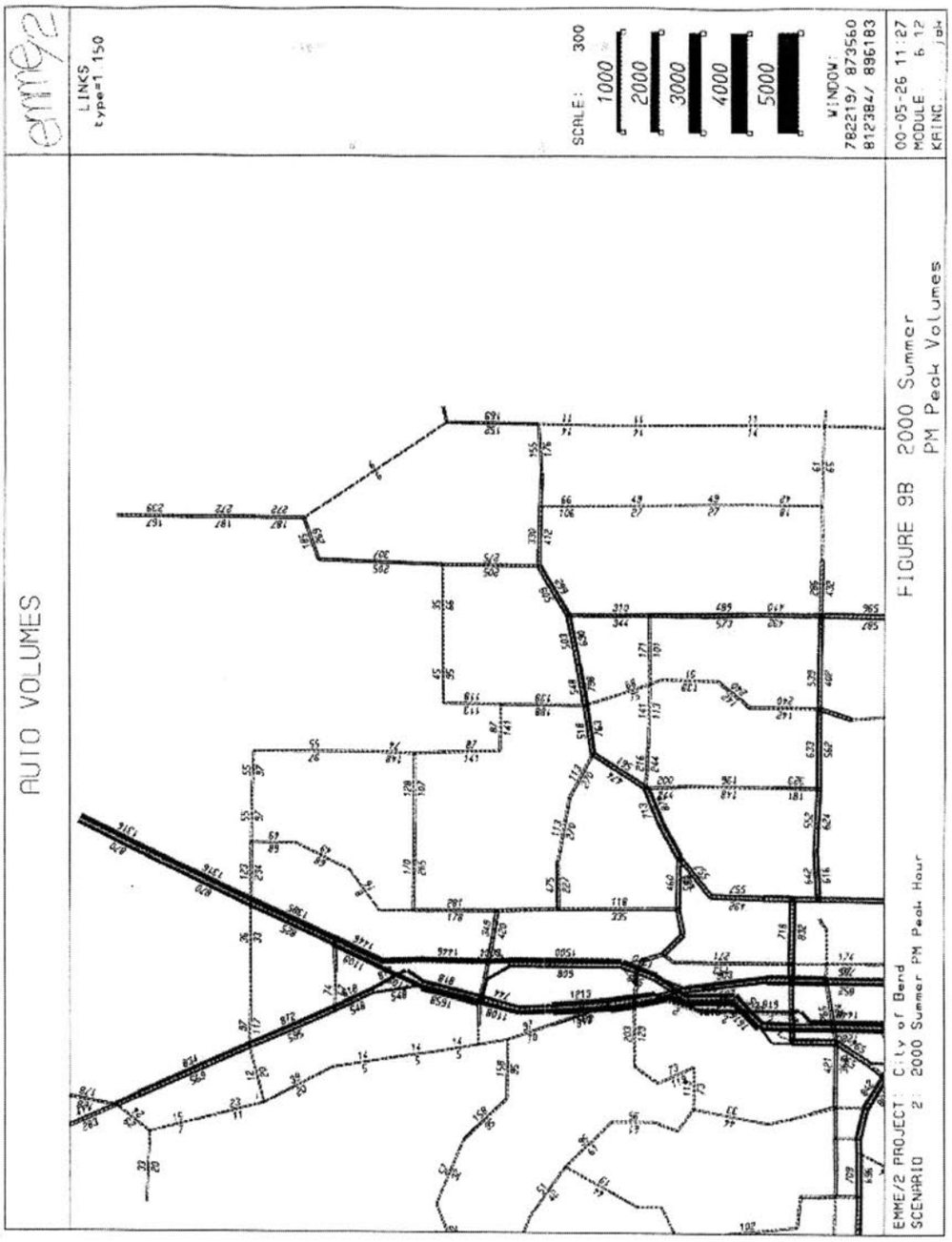
Table 6 shows the increase in summertime travel results in a 2.2 percent systemwide increase over the average weekday conditions (shown in Table 5). The traffic volumes resulting from the assignment of the 2000 summer weekday p.m. peak hour trip table are illustrated in Figures 9A through 9D.

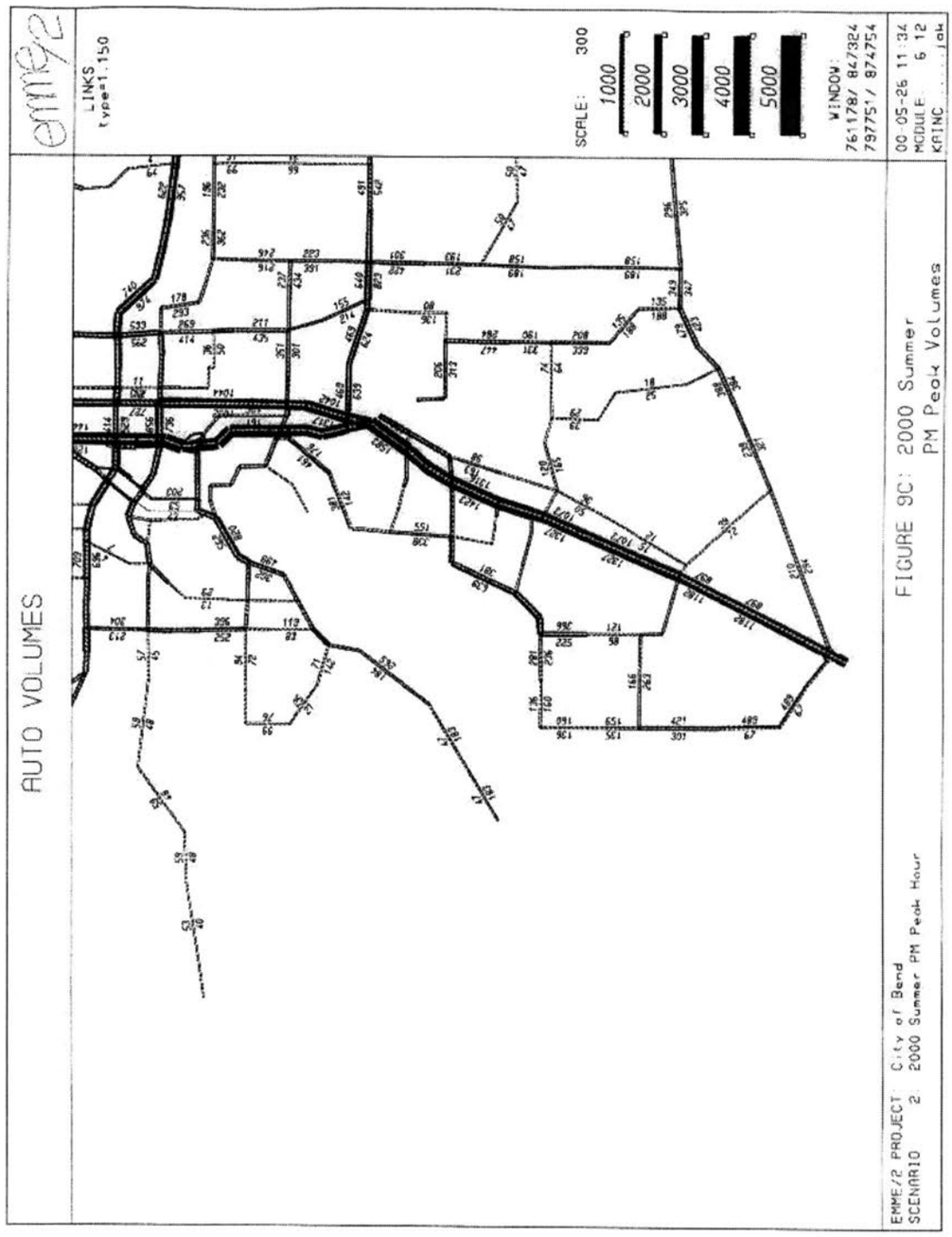
Year 2000 Findings

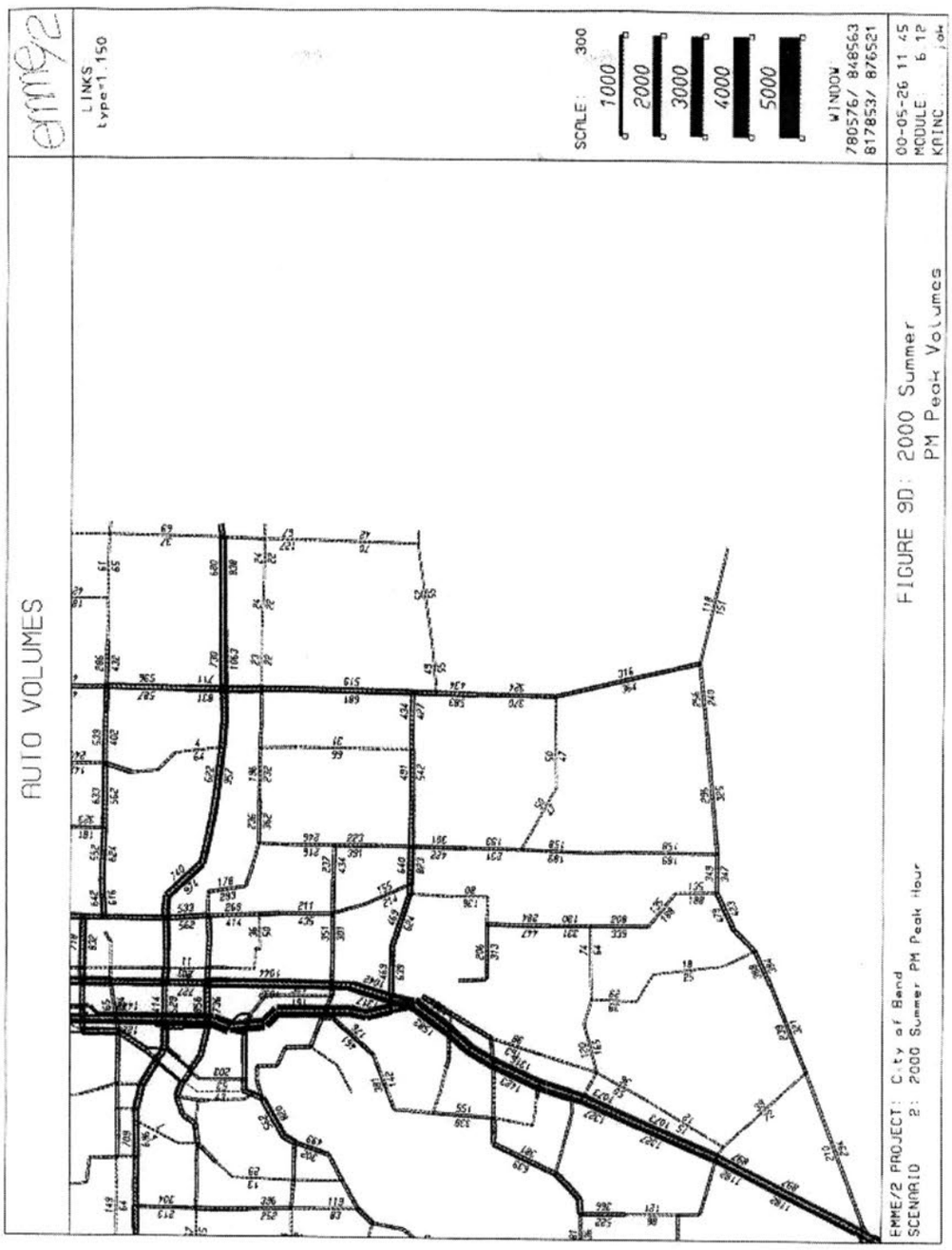
The primary findings of the existing conditions are summarized below.

- The updated Bend EMME/2 model includes 155 transportation analysis zones, 18 of which are "external" stations.
- The year 2000 land use data represents a 22 percent increase in households and a 37 percent increase in employment in the urban area as compared to the 1995 data.
- The updated model has been calibrated to meet or exceed statewide modeling guidelines.
- Accounting for increases in summertime travel results in a 24 percent increase in external-external travel and a 30 percent increase in trips generated by hotels. This results in a systemwide increase of weekday p.m. peak hour trips by 2.2 percent over average weekday conditions.


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LINKS:
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MODULE: G 12
KAINC
AUTO VOLUMES
FIGURE 9A 2000 Summer PM
Peak Hour Volumes
EMME/2 PROJECT City of Bend
SCENARIO 2 2000 Summer PM Peak Hour


emme/2
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type=1 150
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MODULE 6.12
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AUTO VOLUMES
FIGURE 9B 2000 Summer
PM Peak Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 2: 2000 Summer PM Peak Hour


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AUTO VOLUMES
SCALE: 300
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WINDOW:
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797751/ 874754
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MODULE 6 12
KAINC jah
FIGURE 9C: 2000 Summer
PM Peak Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 2: 2000 Summer PM Peak Hour


emme/2
LINKS
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SCALE: 300
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817853/ 876521
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MODULE 6.12
KAINC
AUTO VOLUMES
FIGURE 9D: 2000 Summer
PM Peak Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 2: 2000 Summer PM Peak Hour

Section 3

Alternatives Analysis

Alternatives Analysis

This section outlines the development and evaluation of the future land use and transportation system alternatives formulated to plan for the 20-year growth and development within Bend. Using the calibrated year 2000 model as a base, future travel demand was projected with 20-year population and employment estimates. The 2020 travel demand forecast was used to evaluate a series of land use and transportation system alternatives. The four alternatives evaluated are summarized below.

- *No Build Alternative*: includes year 2020 land uses projected in accordance with the City's current comprehensive 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).
- *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 plan.
- *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, are assumed in the TDM alternative.
- *Combined Alternative*: includes a mixture of land use and transportation system strategies from both the Comprehensive Plan and the TDM Alternatives.

The remainder of this section outlines the methodology and evaluation results associated with the development of the 2020 alternatives. Included in this section are the year 2020 land use forecasts, the roadway network enhancements, and the future trip generation, mode split, and travel assignment projections for each alternative.

YEAR 2020 NO BUILD ALTERNATIVE

Based on the calibrated model for the average weekday p.m. peak hour, year 2020 No Build conditions were forecast assuming a 20-year buildout of the comprehensive plan land uses, the same mode split as is occurring today, and the construction of only those facilities that are currently funded.

Land Use

Based on the City's current comprehensive plan, City of Bend staff developed year 2020 household and employment forecasts for the TAZ system. Table 7 presents the 2020 land use data used to generate the No Build Alternative travel forecasts. Table 7 also provides a comparison of the 2020 forecast to the year 2000 estimates.

Table 7
Bend Urban Area Land Use and Demographic Data

Year	Number of Employees					Number of 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 (2020-2000)	5,233	5,775	587	5,353	16,948	9,439	5,100	14,539
Percent Growth	96%	72%	34%	70%	74%	44%	104%	55%

Appendix C provides the year 2020 household and employment estimates by TAZ. Table 8 and Figure 10 summarize the 2020 households and employment by major district within the study area.

Table 8
Bend Urban Area Demographic Data by District

Year	District									
	Northwest		Southwest		Northeast		Southeast		Downtown	
	HH	EMP	HH	EMP	HH	EMP	HH	EMP	HH	EMP
2020	5,785	2,517	11,268	11,993	9,330	14,058	11,265	4,358	3,414	6,904
2000	3,921	1,621	6,307	5,039	6,228	7,136	6,995	2,745	3,072	6,341
Growth	1,864	896	4,961	6,954	3,102	6,922	4,270	1,613	342	563
Percent Growth	48%	55%	79%	138%	50%	97%	61%	59%	11%	9%

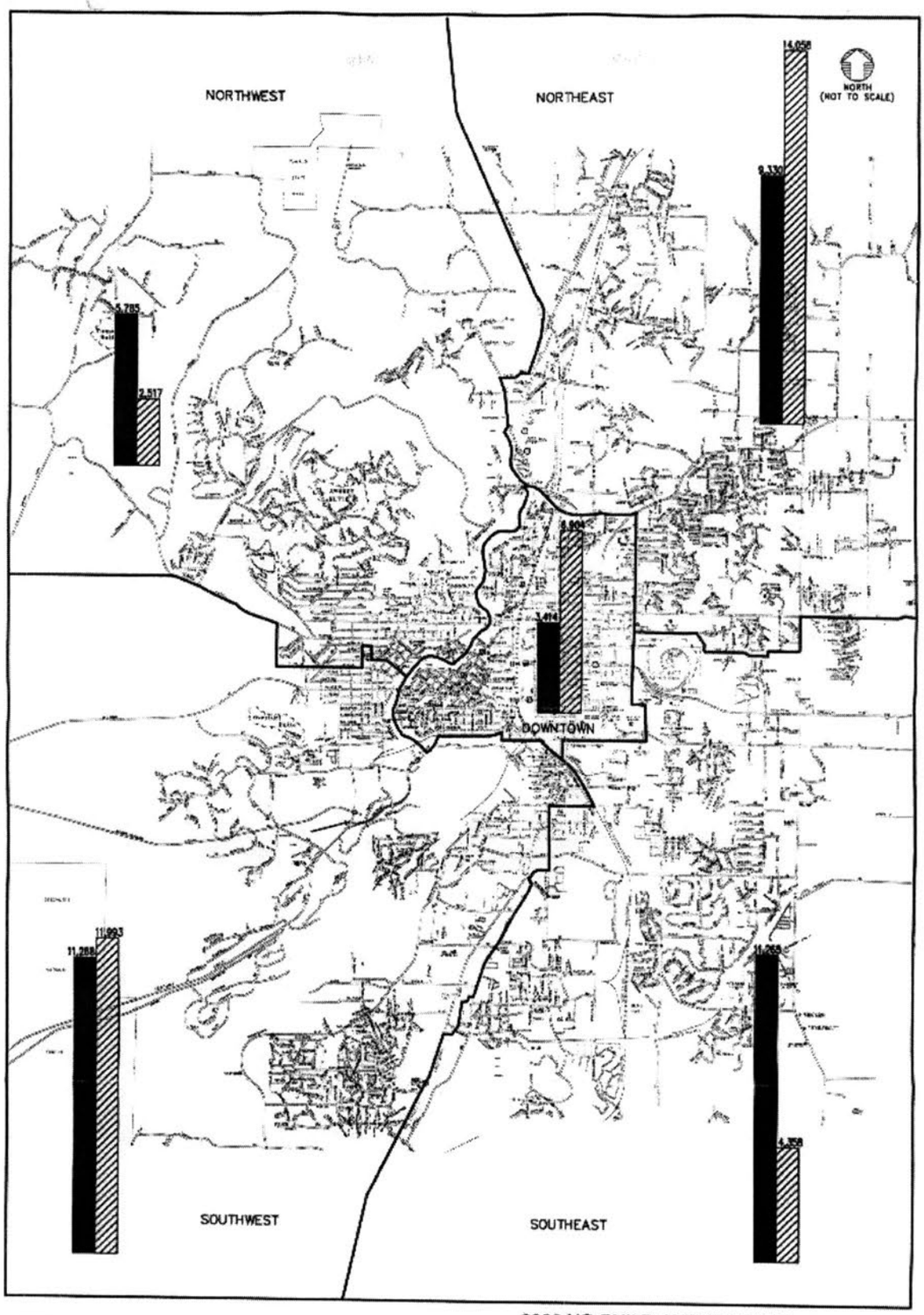
HH: households, EMP: employees

A comparison of the year 2020 land use forecasts and the existing land use data revealed that a 74 percent increase in total employment and a 55 percent increase in total households was projected. The largest employment increase occurred in the retail sector (96 percent increase in employees) and the largest household increase occurred in multi-family households (104 percent increase). Geographically, the southwest district within the Bend Urban Area is forecast to accommodate the largest increase in both households and employees (79 percent and 138 percent increases, respectively).

Roadway Improvements

The model roadway network used for the evaluation of the year 2020 No Build Alternative consisted of the same roadway system used for the existing conditions evaluation, plus the addition of funded roadway improvement projects. The following transportation improvement projects were added to the model network for the year 2020 No Build Alternative evaluation:

- the completion of the Bend Parkway;
- the completion of Mount Washington Drive between Shevlin Park Road and Skyliners Road;
- the completion of Olney Avenue-Neff Road between 3rd Street and 8th Street;
- the extension of Empire Avenue between Boyd Acres Road and 18th Street;



2020 NO-BUILD ALTERNATIVE
POPULATION AND EMPLOYMENT
DATA BY DISTRICT

TRANSPORTATION MODEL UPDATE
BEND, OREGON
JUNE 2000

FIGURE 10

- the connection of Purcell Boulevard and Pettigrew Road between Neff Road and Bear Creek Road;
- the completion of the Bond Street-Blakely Road connection south of Wilson Avenue;
- the construction of the local bridge across the Deschutes River in the Old Mill District; and,
- the construction of the collector streets on the Northwest Crossing Property (between Shevlin Park Road and Skyliners, adjacent to Mt. Washington Drive).

The 2020 No Build Alternative roadway network is illustrated in Figure 11.

Trip Generation

Year 2020 productions and attractions, by TAZ, were estimated based on the 2020 No Build land use forecast. As discussed in Section 2, three basic *internal* trip tables were used to reflect the travel patterns for employees and residents: Home-Based Work (HBW), Home-Based Other (HBO), and Non Home-Based (NHB). These basic internal trip purposes were supplemented with the two types of external travel: external-external travel (trips both beginning and ending outside of the urban area), and internal-external/external-internal travel (trips with one trip end inside the urban area and one trip end outside the urban area, for example, a commute trip between Bend and Redmond).

As discussed in Section 2, the number of person-trips carried by non-auto modes was not explicitly forecast in the No Build EMME/2 model; however, alternative mode travel was reflected in the trip generation rates applied to the land use data as those trips are not forecast as vehicular volumes. While the number of person-trips made using alternatives modes may not be explicitly known, the total number of vehicular trips reflected on the roadway system in the base case accounted for all modes of travel.

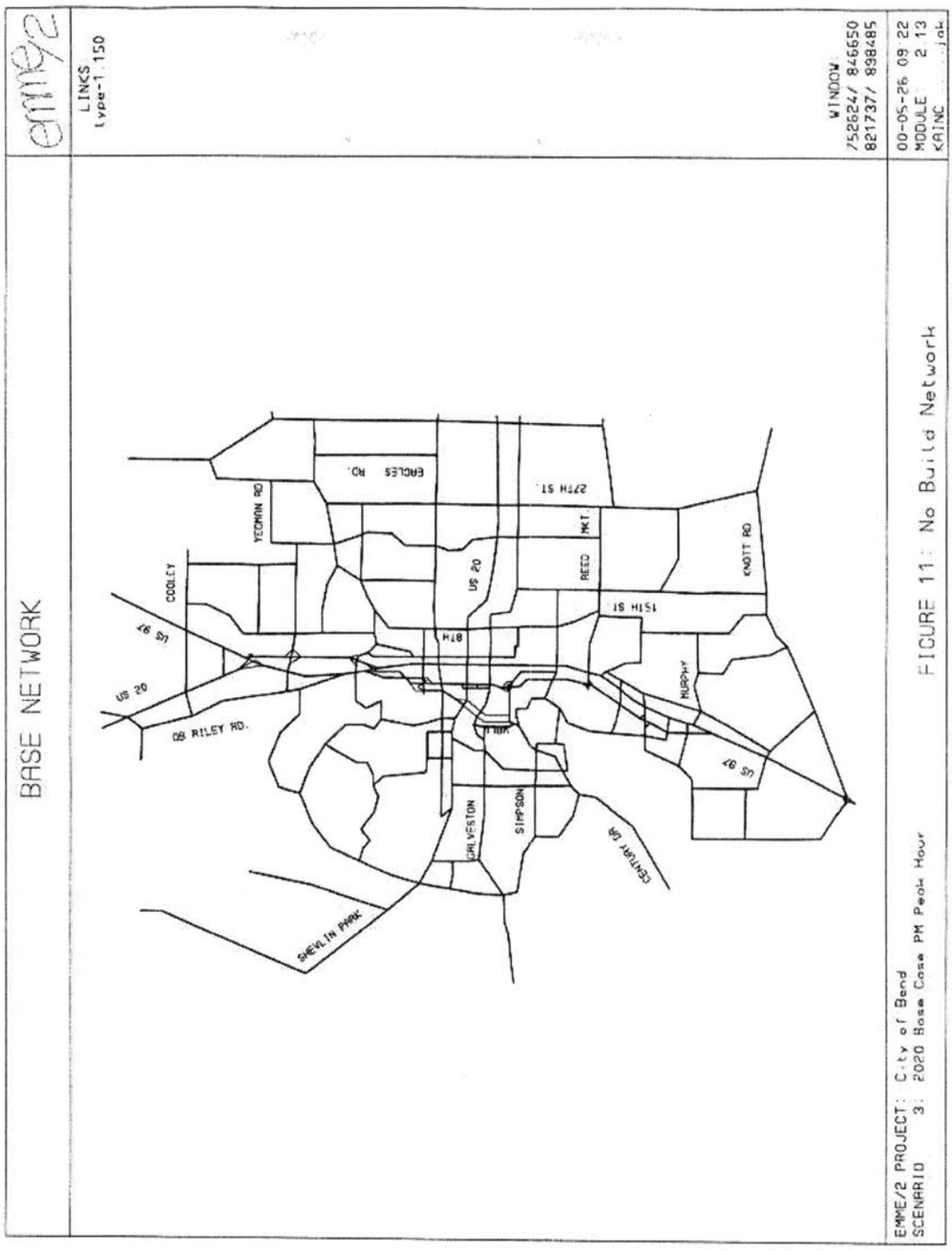
Internal Trip Generation

The daily trip generation rates summarized in Section 2 were applied to the year 2020 No Build Alternative household and employment estimates to generate the future year daily productions and attractions by TAZ. In addition, the attractions were balanced to the productions to generate daily trip origins and destinations. Table 9 presents a summary of the 2020 No Build Alternative balanced internal productions/attractions by trip purpose, as well as a comparison of the 2020 and 2000 estimates.

Table 9
2020 Daily Internal Trip Generation by Trip Purpose

Trip Purpose	2020 Daily Unbalanced Productions	2020 Unbalanced Daily Attractions	2020 Daily Balanced Productions/ Attractions	2000 Daily Balanced Productions/ Attractions	Growth (2000-2020)	Percent Growth
Home-Based Work	64,320	55,762	64,320	42,994	21326	50%
Home-Based Other	184,952	191,452	184,952	122,768	62184	51%
Non Home-Based	106,402	112,698	106,402	70,631	35771	51%
Total	355,674	359,912	355,674	236,393	119281	50%

As shown in Table 9, the total 2020 No Build Alternative internal trip generation estimates represented a 50 percent increase in internal travel.


BASE NETWORK
emme/2
LINKS
type=1 150
WINDOW
752624/ 846650
821737/ 898485
00-05-26 09:22
MODULE 2.13
KAINC .ja
EMME/2 PROJECT: City of Bend
SCENARIO 3: 2020 Base Case PM Peak Hour
FIGURE 11: No Build Network
ENGLES RD.
27TH ST
YEOMAN RD
MKT.
REED
US 20
KNOTT RD
COOLEY
15TH ST
8TH
US 97
US 20
OB RILEY RD.
MURPHY
CARVESTON
SIMPSON
CENTURY DR
SHEVLIN PARK

External Trip Generation

An analysis of traffic volumes on US 97 and US 20 between 1980 and 1998 was used to estimate the growth in external travel between the year 2000 and 2020. External station survey information collected by ODOT in 1988 was used to estimate and differentiate the number of external-external and internal-external/external-internal trips at each of the external stations. The growth applied to the external stations was equivalent to a straight-line growth rate of three percent per year (which resulted in a 60 percent increase in external travel).

In addition to a yearly growth factor, the incremental increase of additional trips due to summertime peak conditions, as applied to the year 2000 external trip table, was also applied to the 2020 external trip table. As such, the 2020 No Build Alternative travel demand forecast is representative of summertime weekday p.m. peak hour conditions.

Table 10 summarizes the forecast 2020 No Build Alternative summer p.m. peak hour trip generation for the external stations. Table 10 also provides a comparison to the year 2000 estimates of external travel.

Table 10
2020 Summer P.M. Peak External Trip Generation

Trip Type	Year 2020 Conditions	Year 2000 Conditions	Percent Growth
Internal-External/ External-Internal	11,822	7,347	61%
External-External (summer)	1,000	624	60%
Total	12,822	7,971	61%

Trip Distribution and Assignment

As summarized in Section 2, a traditional Gravity Model was used to distribute the year 2020 weekday p.m. peak hour travel generated by the households and employees. The resulting p.m. peak hour forecasts are summarized below.

PM Peak Hour vs. Daily Trip Generation and Directionality by Trip Purpose

The same adjustment factors applied to the calibrated existing conditions model productions/attractions were used to estimate year 2020 No Build Alternative travel forecasts, by trip purpose. The development of the 2020 No Build Alternative weekday p.m. peak hour trip table is summarized in Tables 11 - 13.

Table 11
Unadjusted Internal Weekday P.M. Peak Hour Trips

Trip Purpose	Daily Trips	Percent of Daily Trips in the PM Peak Hour	Number of Internal PM Peak Hour Trips
Home-Based Work	64,320	10.49%	6,747
Home-Based Other	184,952	7.29%	13,483
Non-Home Based	106,402	17.84%*	18,982
Total	355,674	11.02%	39,212

*This value has been modified from the NCHRP report and calibrated to local conditions.

The internal trips were adjusted to reflect the level of internal-external/external-internal travel occurring in Bend to ensure that there is no double counting of trips that have one trip end at a household or a business

inside the UGB and one trip end outside the UGB. In addition, the summer forecasts represent additional trips generated by the hotels during the summer months. The hotel trips were added to the adjusted internal trips and the external-internal/internal-external trips to calculate total internal trips. The adjusted internal trips are shown in Table 12. The total 2020 weekday p.m. peak hour trips are summarized in Table 13.

Table 12
Adjusted Internal Trips for External-Internal/Internal-External Trips

	Unadjusted Internal Trips	Internal-External/ External-Internal Trips (I-X, X-I)	Adjusted Internals (I-I)	Summer Hotel Trips (I-I)	Total Adjusted Internals (I-I, I-X, X-I)
Internal Trips	39,212	11,822	27,390	560	39,772

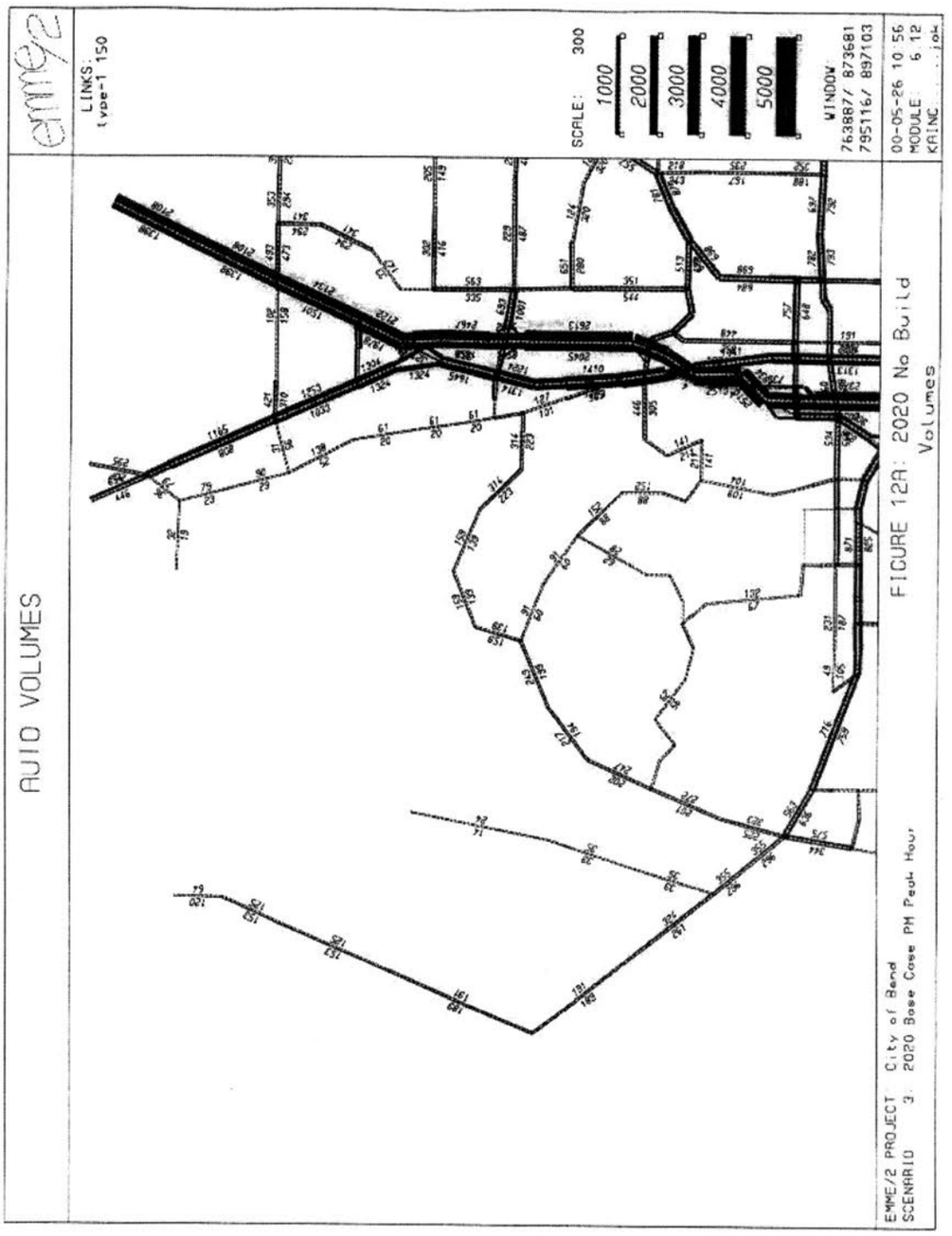
Table 13
2020 Weekday PM Peak Hour No Build Alternative Trip Table

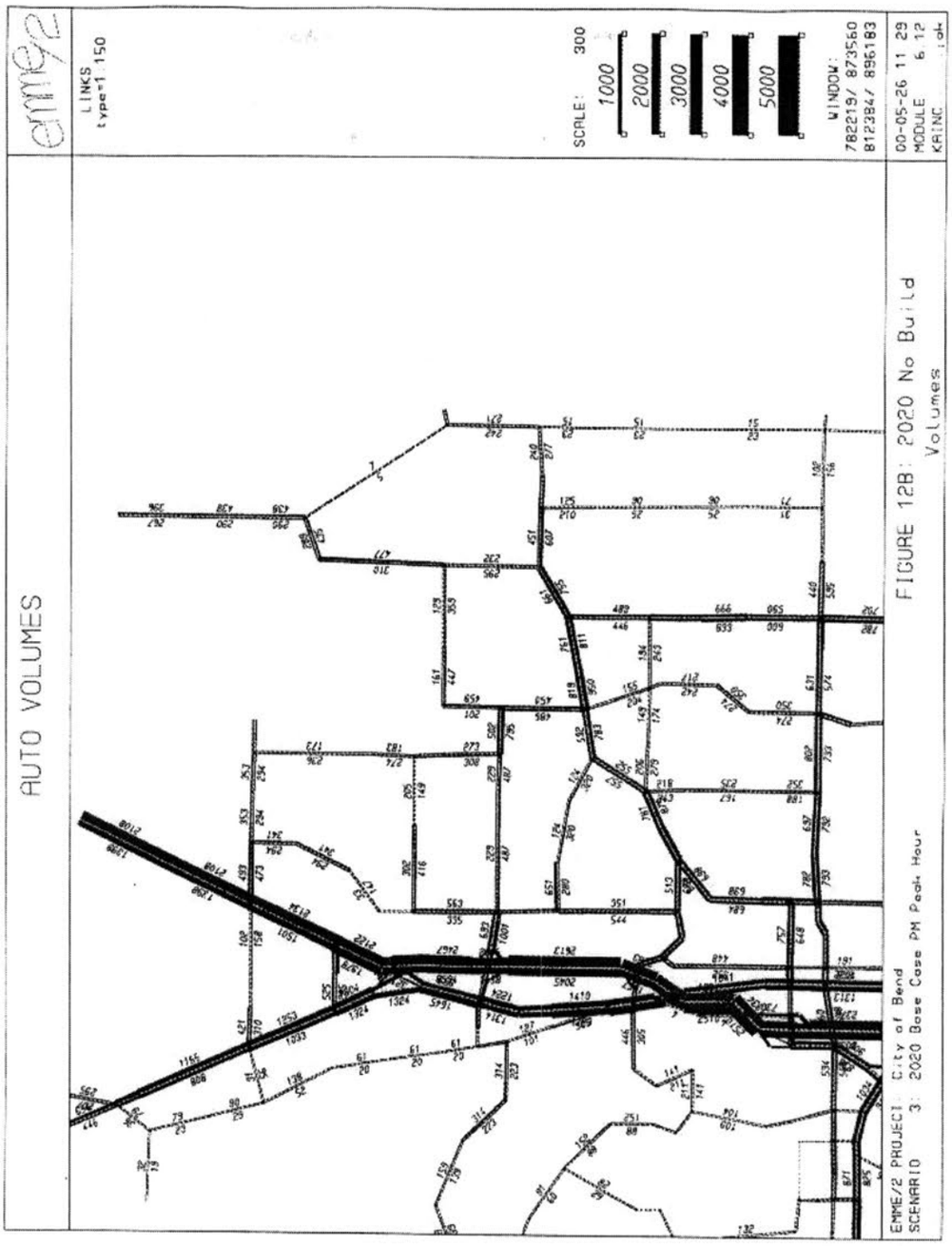
Origin/Destination	Internal	External	Total
Internal	27,950	6,455	34,405
External	5,367	1,000	6,367
Total	33,317	7,455	40,772

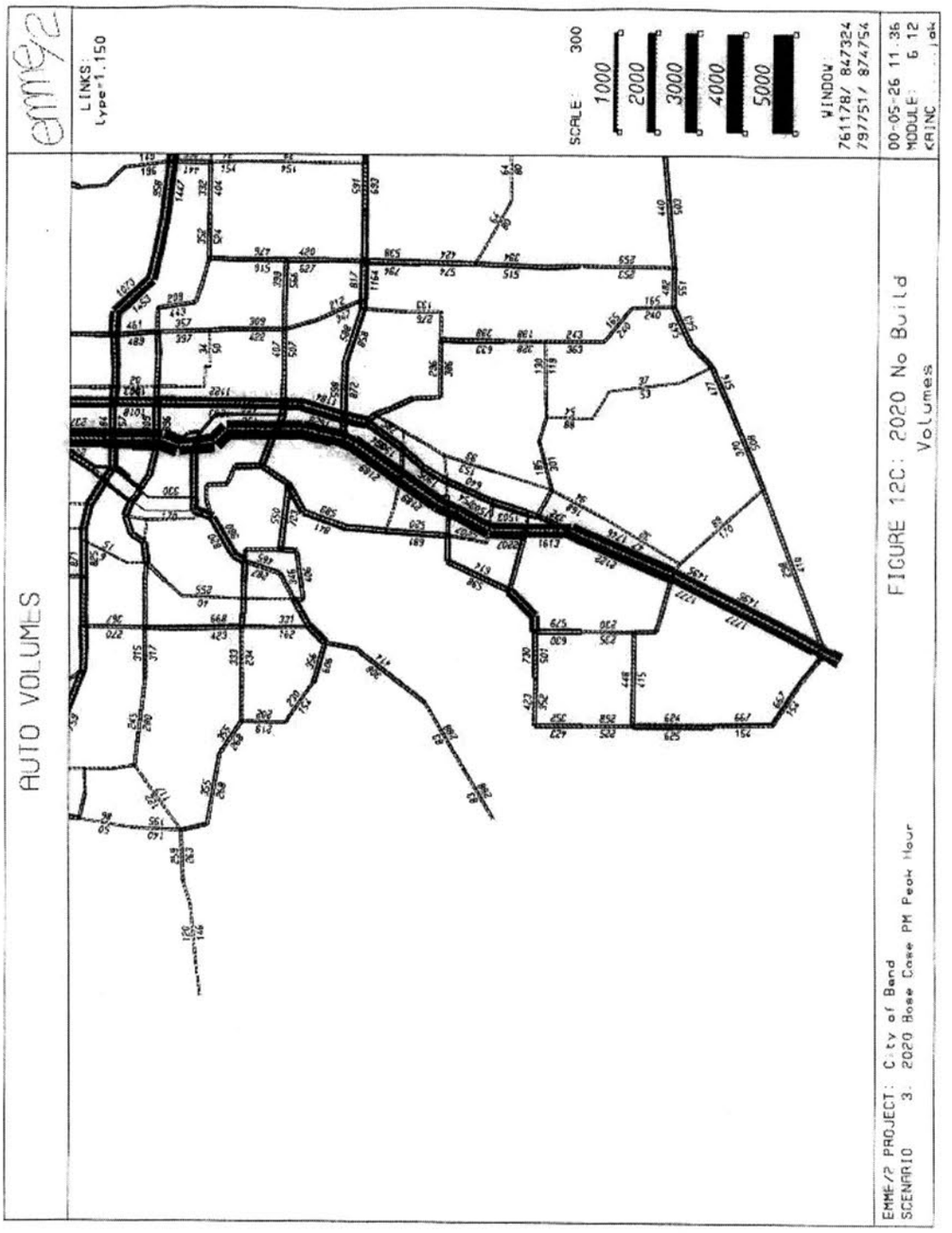
The 2020 summer p.m. peak hour trip table was assigned to the 2020 No Build Alternative roadway network using an equilibrium assignment algorithm. The resulting projected year 2020 No Build Alternative summer p.m. peak hour traffic volumes are shown in Figures 12A through 12D.

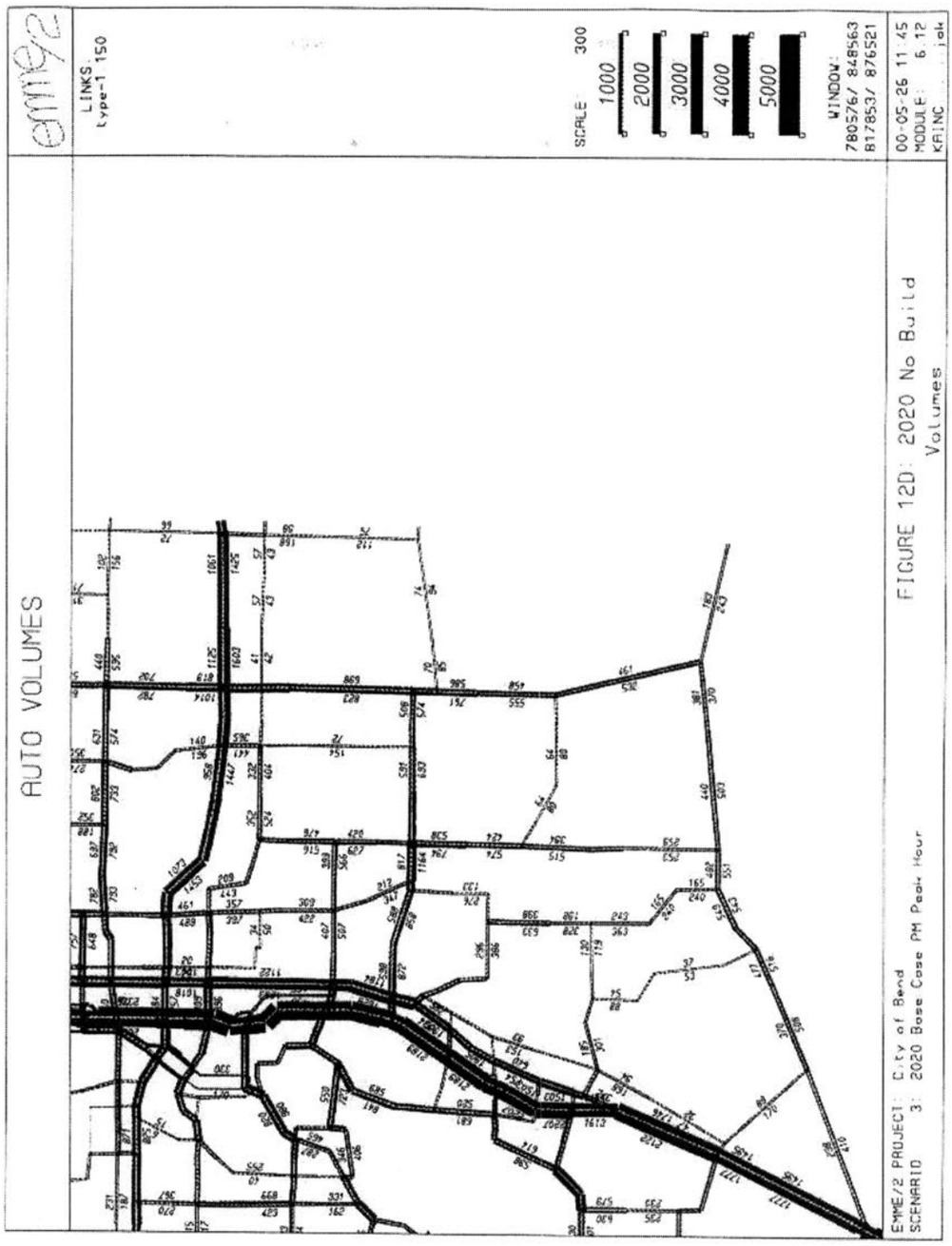
Figure 13 presents the volume-to-capacity ratios for the 2020 No Build roadway network. As shown in the figure, there are several roadway segments within study region that were forecast to operate near or at capacity during the p.m. peak hour under the 2020 No Build Alternative conditions. These segments include:

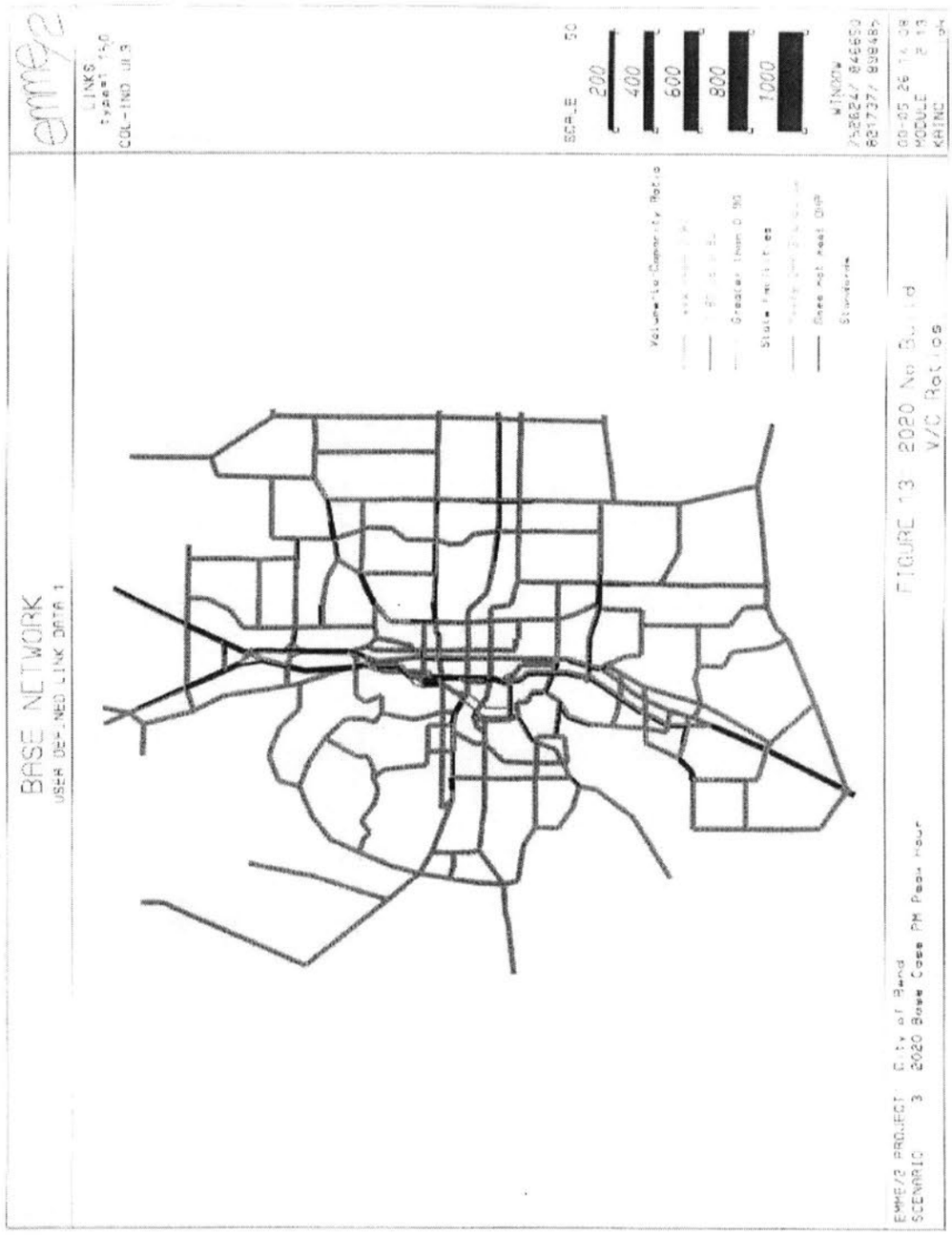
- US 97 throughout the city;
- Northbound US 20 north of the Parkway;
- US 20 in the vicinity of 27th Street;
- Newport Avenue;
- Neff Road between 8th and 27th;
- 27th Street between Neff and Reed Market;
- Colorado Avenue;
- the local bridge in the Old Mill District;
- the Bond Street-Blakely Road extension;
- the Wilson Avenue overcrossing of the Bend Parkway;
- Butler Market Road; and,
- Reed Market Road.


AUTO VOLUMES
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LINKS:
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MODULE 6.12
KAINC ...jpa
FIGURE 12A: 2020 No Build
Volumes
EMME/2 PROJECT City of Bend
SCENARIO 3: 2020 Base Case PM Peak Hour


emme/2
LINKS
type=1 150
SCALE: 300
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WINDOW:
782219/ 873560
812384/ 896183
00-05-26 11 29
MODULE 6.12
KRINC
AUTO VOLUMES
FIGURE 12B: 2020 No Build
Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 3: 2020 Base Case PM Peak Hour


emme/2
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WINDOW
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797751/ 874754
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MODULE: 6.12
AUTO VOLUMES
FIGURE 12C: 2020 No Build
Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 3: 2020 Base Case PM Peak Hour


emme/2
LINKS
type-1 150
SCALE 300
1000
2000
3000
4000
5000
WINDOW:
7805767 848563
8178537 876521
00-05-26 11:45
MODULE: 6.12
KAINC jak
AUTO VOLUMES
FIGURE 12D: 2020 No Build
Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 3: 2020 Base Case PM Peak Hour


BASE NETWORK
SCALE
200
400
600
800
1000
FIGURE 13 2020 No Build
V/C Ratios
2020 Base Case PM Peak Hour

Other roadway sections, such as Brookswood Boulevard, were shown as approaching or over capacity although this is primarily attributable to concentrated zonal loading of large TAZs onto the roadway network.

The results of the 2020 No Build Alternative analysis indicate the need to reduce the forecast travel demand through increased transportation demand management (TDM) measures and/or to increase roadway capacity in several major corridors, such as along the state highways and Deschutes River bridges.

2020 COMPREHENSIVE PLAN ALTERNATIVE

The 2020 Comprehensive Plan Alternative included specific strategies aimed at continued development of the land use and transportation system in accordance with the comprehensive plan. The specific components of the 2020 Comprehensive Plan Alternative are summarized below.

Land Use Strategies

Like the No Build Alternative, the land use strategy for the Comprehensive Plan Alternative assumed growth in households and employment as outlined in the current Comprehensive Plan. This includes the continued development of a higher-density, mixed use center in Downtown Bend, the development of the Old Mill District as a mixed use center south of Colorado Avenue, the development of Northwest Crossing (a mixed use retail, residential, and employment center in northwest Bend), mixed employment zoning, and the development of commercial nodes in all quadrants of the city.

Transit Strategies & Trip Making

The Comprehensive Plan Alternative included the same level of transit service (demand responsive system) that is available today. It did not include the addition of any fixed-route transit provisions. For this reason, the same mode split assumptions used for the existing conditions and the 2020 No Build Alternative were used.

Pedestrian and Bicycle Strategies & Trip Making

This alternative included additional cycling and walking opportunities for commuting, shopping, and recreational trips by assuming the development of the bicycle lanes, trails, and sidewalks included in the City of Bend Transportation System Plan over the next 20 years. It also assumed the same mode split between vehicular, pedestrian, and bicycle trip making as occurs in Bend today.

Roadway Improvements

The roadway network for the Comprehensive Plan Alternative included the same network links as the 2020 No Build alternative, plus the complete construction of the roadway system identified in the City's current Comprehensive Plan. The arterial and collector improvements included, in addition to those incorporated in the 2020 No Build Alternative, are summarized below.

New Arterial Roadways

- The addition of a new north-south arterial from Cooley Road to Robal Lane, between Highway 20 and Highway 97.
- The extension of Cooley Road east from 18th Street to Deschutes Market Road.
- The extension of Empire Avenue east from Yeoman Road to Butler Market Road-27th Street.

- The connection of Mount Washington Drive and Reed Market Road between Century Drive and the Bend Parkway.
- The extension of 15th Street from Bear Creek Road to US 20.

New Collector Roadways

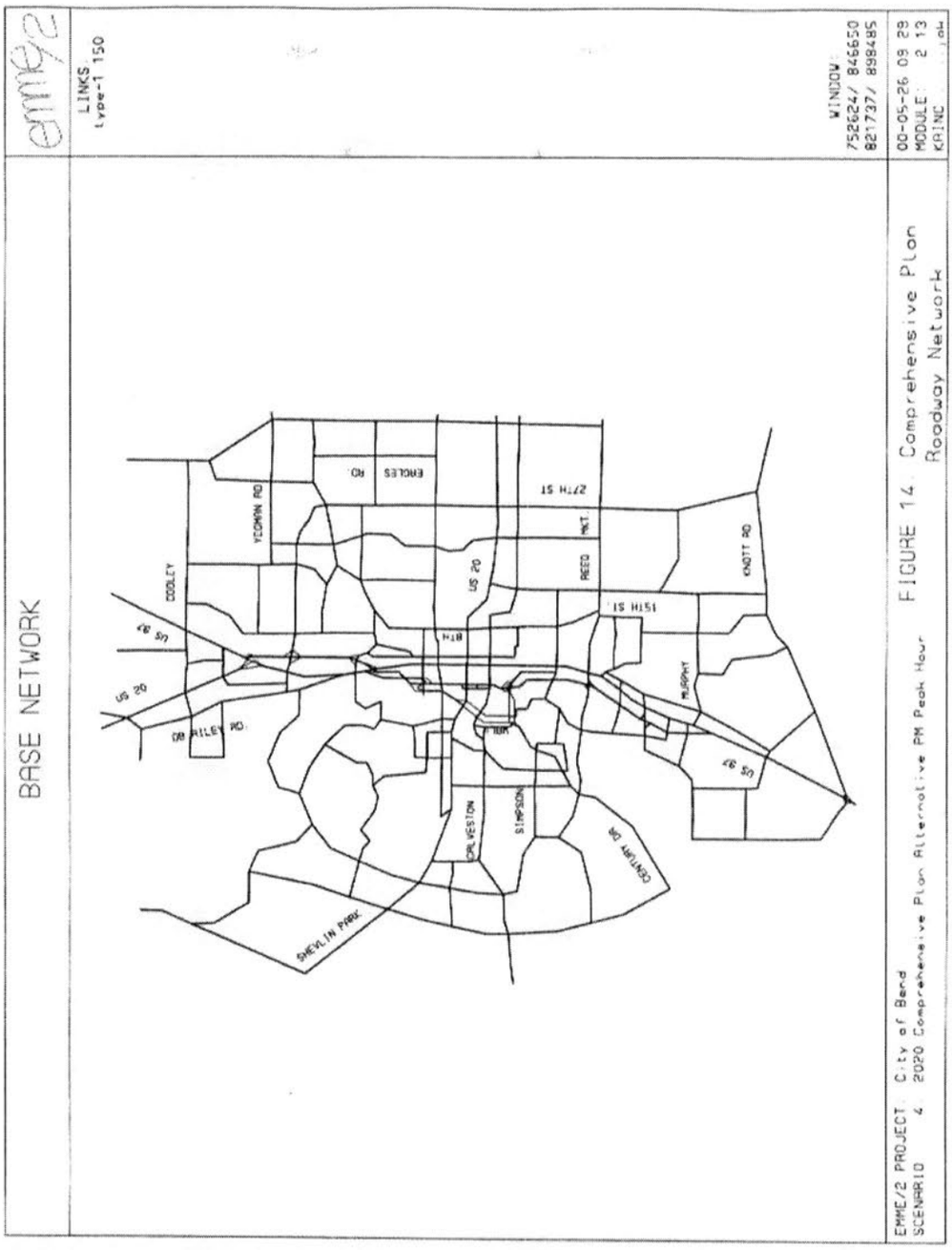
- The extension of Putnam Road-Tumalo Creek Road north to Johnson Market Road.
- The extension of Summit Drive west from Mount Washington Drive to Skyline Ranch Road.
- The extension of Skyline Ranch Road south from Shevlin Park Road to Century Drive.
- The addition of a new east-west collector between the Skyline Ranch Road extension and Mount Washington Drive.
- The addition of a new north-south collector between Robal Lane and Empire Avenue, west of Highway 20.
- The addition of a new north-south collector north of Cooley Road, between Highway 20 and Highway 97.
- The extension of Yeoman Road west to 18th Street and east to Butler Market Road.
- The extension of 18th Street south from Empire Avenue to Brinson Boulevard.
- The addition of a new east-west collector between 27th Street and Hamby Road near Mountain View Senior High School.
- The addition of a new east-west collector between Brosterhous Road and American Lane, south of Reed Market Road.
- The extension of Murphy Road east from Brosterhous Road to 15th Street.
- The realignment of Reed Market Road at 27th Street.
- The extension of 9th Street to Awbrey Road.
- The completion of the Cooley loop road west of OB Riley Road.

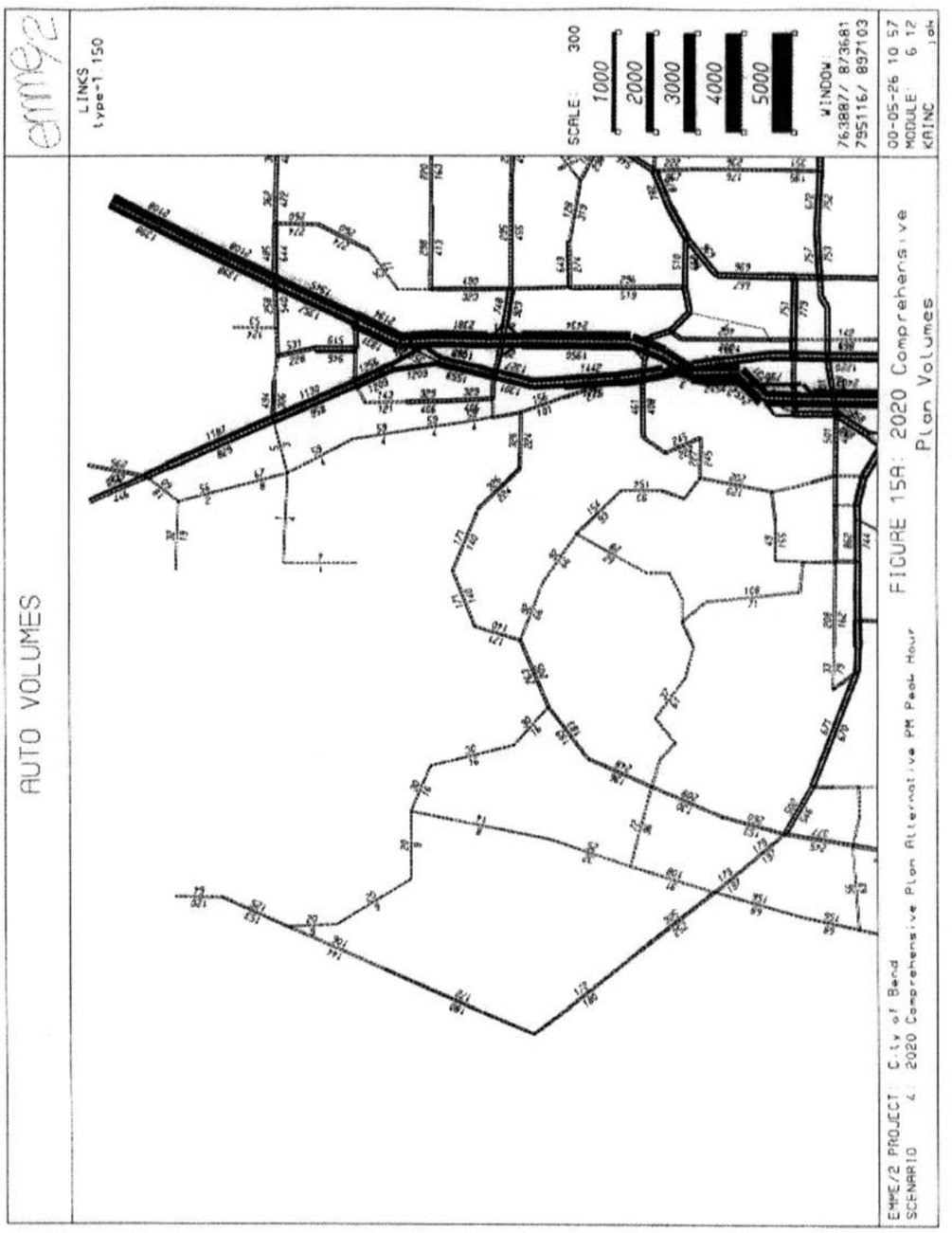
The model roadway network for the 2020 Comprehensive Plan Alternative is illustrated in Figure 14.

Trip Generation

Year 2020 p.m. peak hour travel forecasts were calculated for the Comprehensive Plan alternative in a manner similar to that outlined for the No Build Alternative. Because this alternative focused primarily on improvement to the roadway system with improvements to other modes that would accommodate future growth at the same level of non-SOV travel that is occurring today, the same mode-split assumptions applied in the 2020 No Build alternative were applied in the Comprehensive Plan Alternative.

The 2020 travel demand forecasts for the Comprehensive Plan Alternative are shown in Figures 15A through 15D. Based on the forecast volumes shown in the figures, a level of service analysis was performed to identify system deficiencies under this alternative. The results of this analysis are illustrated in Figure 16.


emme/2
LINKS
type-1 150
WINDOW
752624/ 846650
821737/ 898485
00-05-26 09:28
MODULE: 2.13
KRINC
BASE NETWORK
YEOMAN RD
ERCLES RD
27TH ST
NET
REED
KNOTT RD
US 20
COOLEY
15TH ST
8TH
US 97
US 20
OB RILEY RD
MURPHY
7TH
CRESTON
SIMPSON
CENTURY DR
SHEVLIN PARK
US 97
FIGURE 14 Comprehensive Plan Roadway Network
EMME/2 PROJECT: City of Bend
SCENARIO 4: 2020 Comprehensive Plan Alternative PM Peak Hour


emme/2
LINKS
type=1 150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW
763887/ 873681
795116/ 897103
00-05-26 10 57
MODULE 6 12
KAINC
AUTO VOLUMES
FIGURE 15A: 2020 Comprehensive Plan Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 4: 2020 Comprehensive Plan Alternative PM Peak Hour

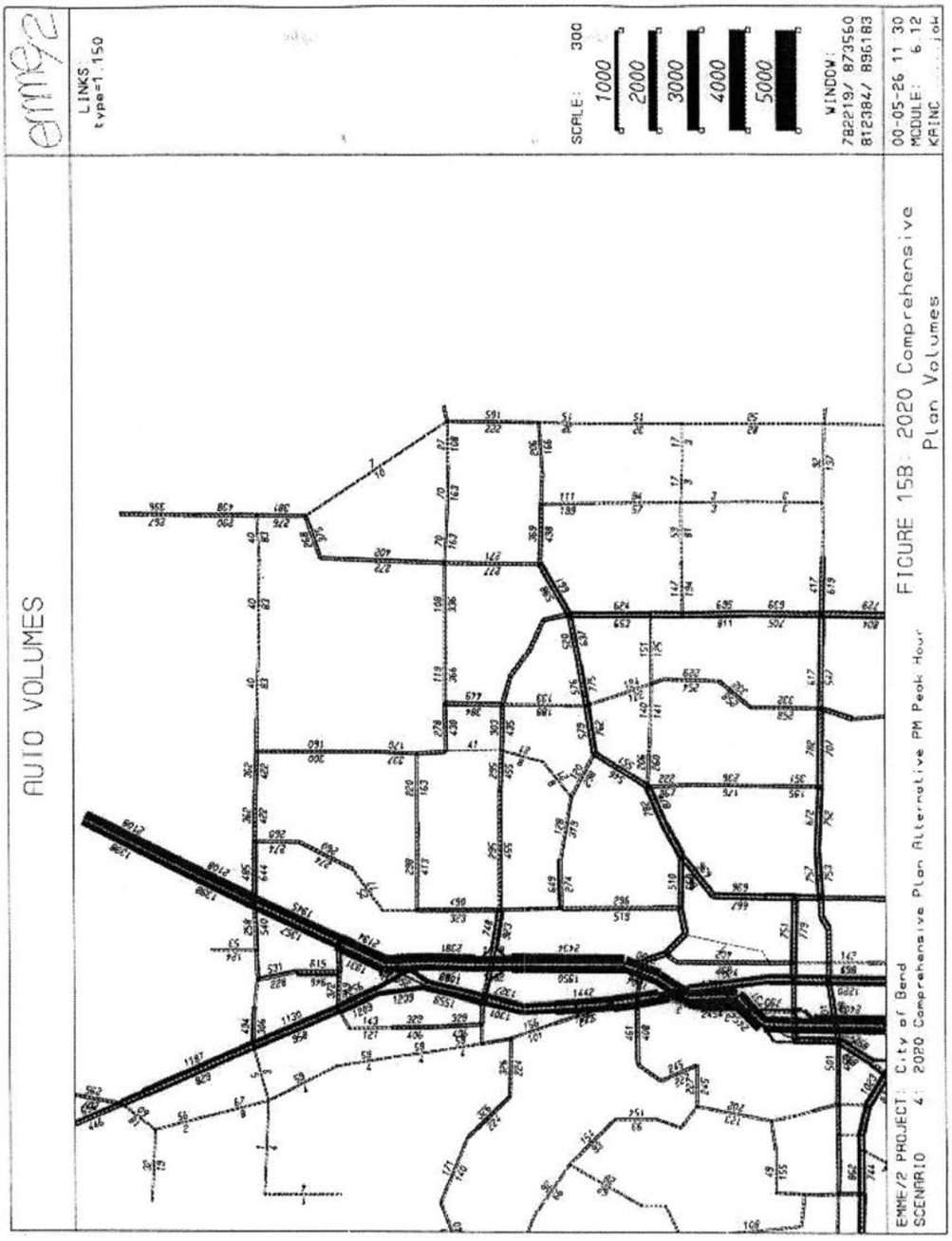
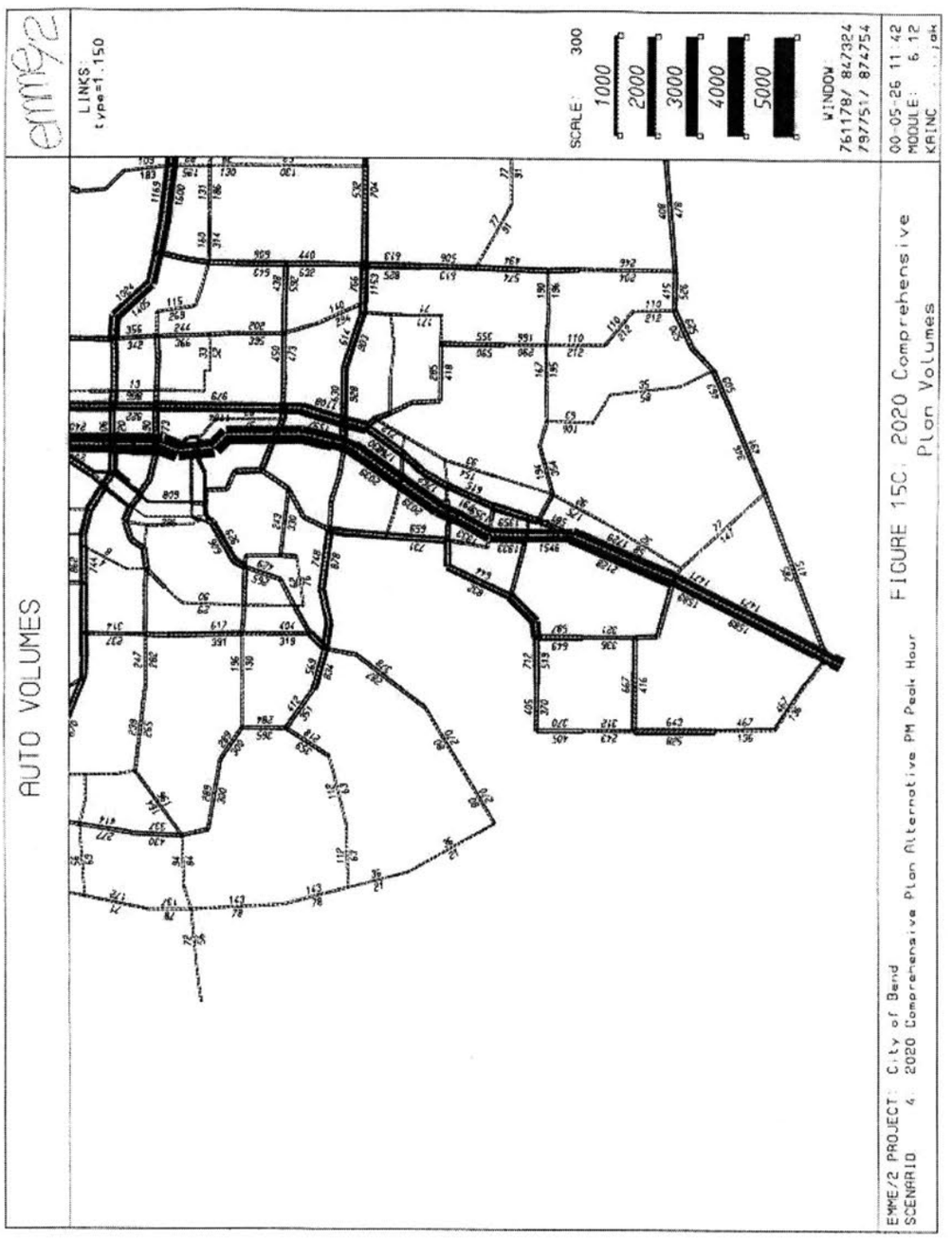
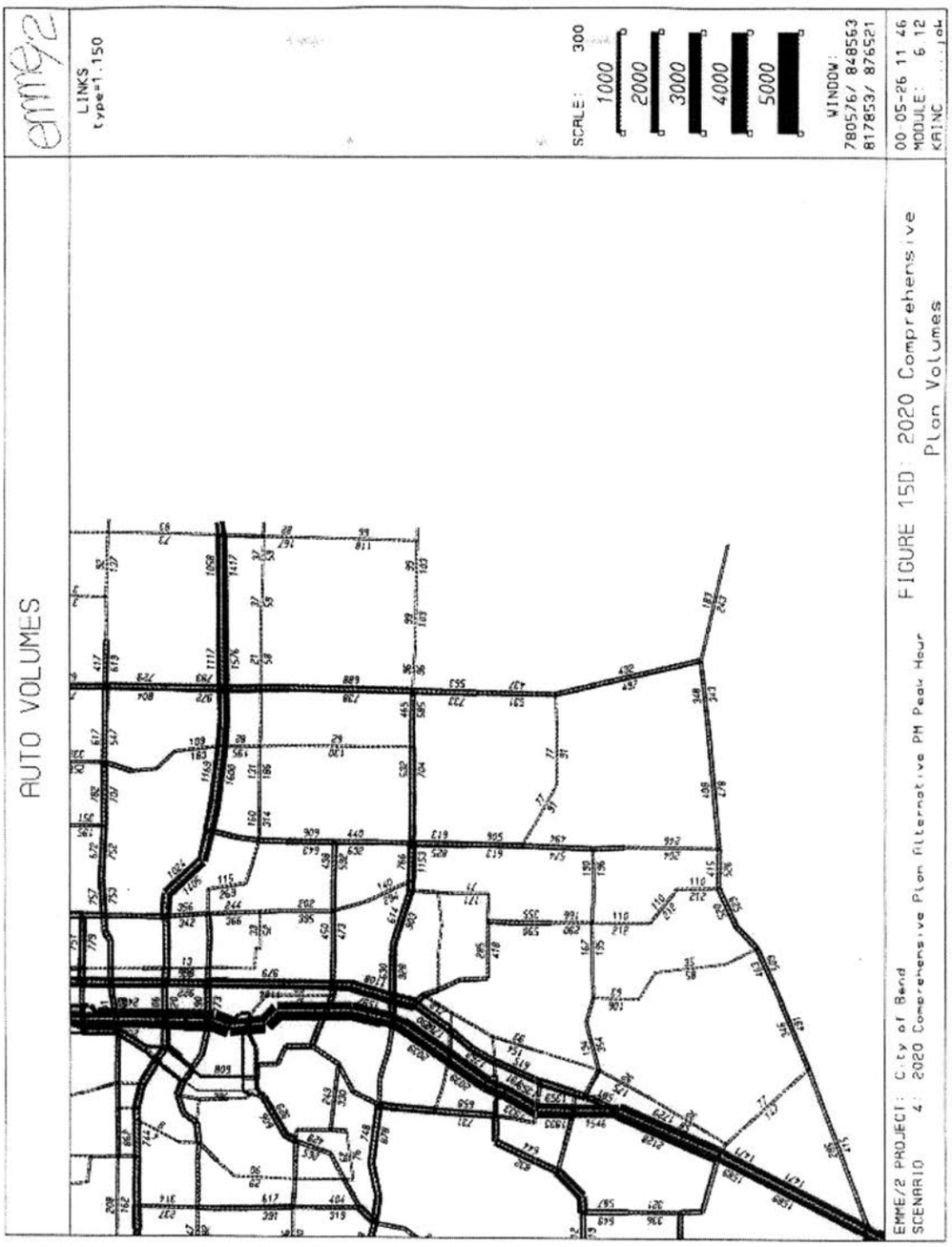
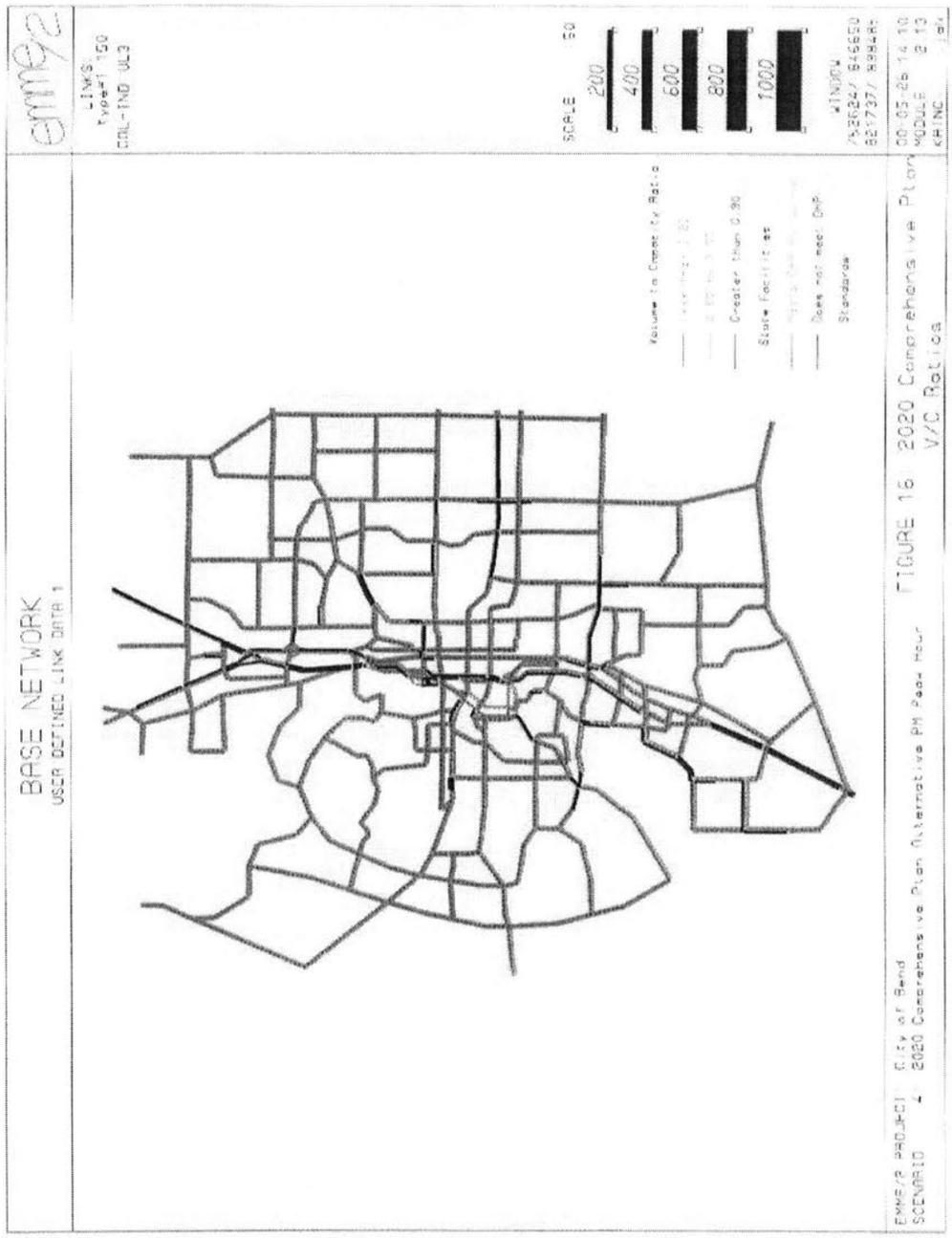


FIGURE 15B: 2020 Comprehensive Plan Volumes


emme/2
LINKS
type=1.150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW
761178/ 847324
797751/ 874754
00-05-25 11:42
MODULE: 6.12
KRINC
AUTO VOLUMES
FIGURE 15C: 2020 Comprehensive Plan Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 4: 2020 Comprehensive Plan Alternative PM Peak Hour


emme/2
LINKS
type=1.150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW:
7805767 8485637
8178537 8765217
00-05-26 11:46
MODULE: 6.12
KAINC
AUTO VOLUMES
EMME/2 PROJECT: City of Bend
SCENARIO 4: 2020 Comprehensive Plan Alternative PM Peak Hour
FIGURE 15D: 2020 Comprehensive Plan Volumes


emme/2
BASE NETWORK
USER DEFINED LINK DATA 1
SCALE
200
400
600
800
1000
Volume to Capacity Ratio
Greater than 0.90
Does not meet OHP Standards
FIGURE 16 2020 Comprehensive Plan
V/C Ratios

As shown in Figure 16, even with the construction of the collector and arterials identified in the current comprehensive plan, several roadways were forecast to operate unacceptably with regard to operational standards in the future. The major corridors projected to operate near or overcapacity include the Deschutes River crossings, the 27th Street corridor, the Reed Market Road corridor, Butler Market Road, and the state highway system. These findings suggest that a combination of strategies that reduce future travel demand and the construction of new roadways will be necessary to accommodate the future growth anticipated.

2020 TRAVEL DEMAND MANAGEMENT ALTERNATIVE

The 2020 Travel Demand Management (TDM) Alternative included land use and travel demand management strategies aimed at reducing reliance on single occupancy vehicle travel. The specific components of the TDM Alternative are described below.

Land Use Strategies

The fundamental approach to the TDM Alternative land use concept was to build on the land use pattern in the comprehensive plan that enhances community orientation and provides the greatest potential for residents and employees to meet their travel needs with local non-auto activity. This land use strategy was accomplished by evaluating and modifying several development patterns including density, land use mix, job/housing balance, and activity concentration.

The City of Bend recently conducted an extensive effort to revise the Comprehensive Plan to incorporate strategies that create or encourage mixed use and commercial centers throughout the city. A review of the location of these centers related to existing and future residential neighborhoods revealed that one additional center in southeast Bend could potentially be created as part of the TDM Alternative. In addition, some of the low-density housing in the City could be converted to higher density residential centers along transit corridors.

A comparison of the number of households and employees for the TDM and No Build Alternatives, by summary district, is provided in Figure 17 and Tables 14 and 15.

Table 14
2020 TDM Alternative Bend Urban Area Demographic Data by District

	2020 Demographics					
	Households			Employees		
District	TDM	No Build	Change	TDM	No Build	Change
Northwest	5602	5785	-183	2517	2517	0
Southwest	11106	11268	-162	11848	11993	-145
Northeast	8974	9330	-356	14058	14058	0
Southeast	11888	11265	623	4588	4358	230
Downtown	3492	3414	78	6819	6904	-85
Total	41062	41062	0	39830	39830	0

Table 15
2020 Bend Urban Area Land Use and Demographic Data Comparison

Year	Number of Employees					Number of Households		
	Retail	Service	School	Other	Total	Single-Family	Multi-Family	Total
TDM Alternative	10,673	13,812	2,328	13,017	39,830	29,640	11,422	41,062
No Build Alternative	10,673	13,812	2,328	13,017	39,830	31,057	10,005	41,062
Change (TDM-No Build)	0	0	0	0	0	-1417	1417	0
Percent Change	0%	0%	0%	0%	0%	-5%	14%	0%

As shown in the figure and tables, the TDM land use strategy maintained a consistent number of total households and employees in the urban area as the No Build. However, the TDM land use strategy included the relocation of future employees and households to more concentrated activity centers than is designated in the comprehensive plan. Table 14 shows that the number of future households in the northwest, southwest, and northeast districts of the city were reduced in the TDM Alternative and these households were reallocated to more concentrated mixed use centers in the southeast and downtown districts. Similarly the number of employees in southwest district were also reduced in the TDM Alternative and reallocated to the southeast region.

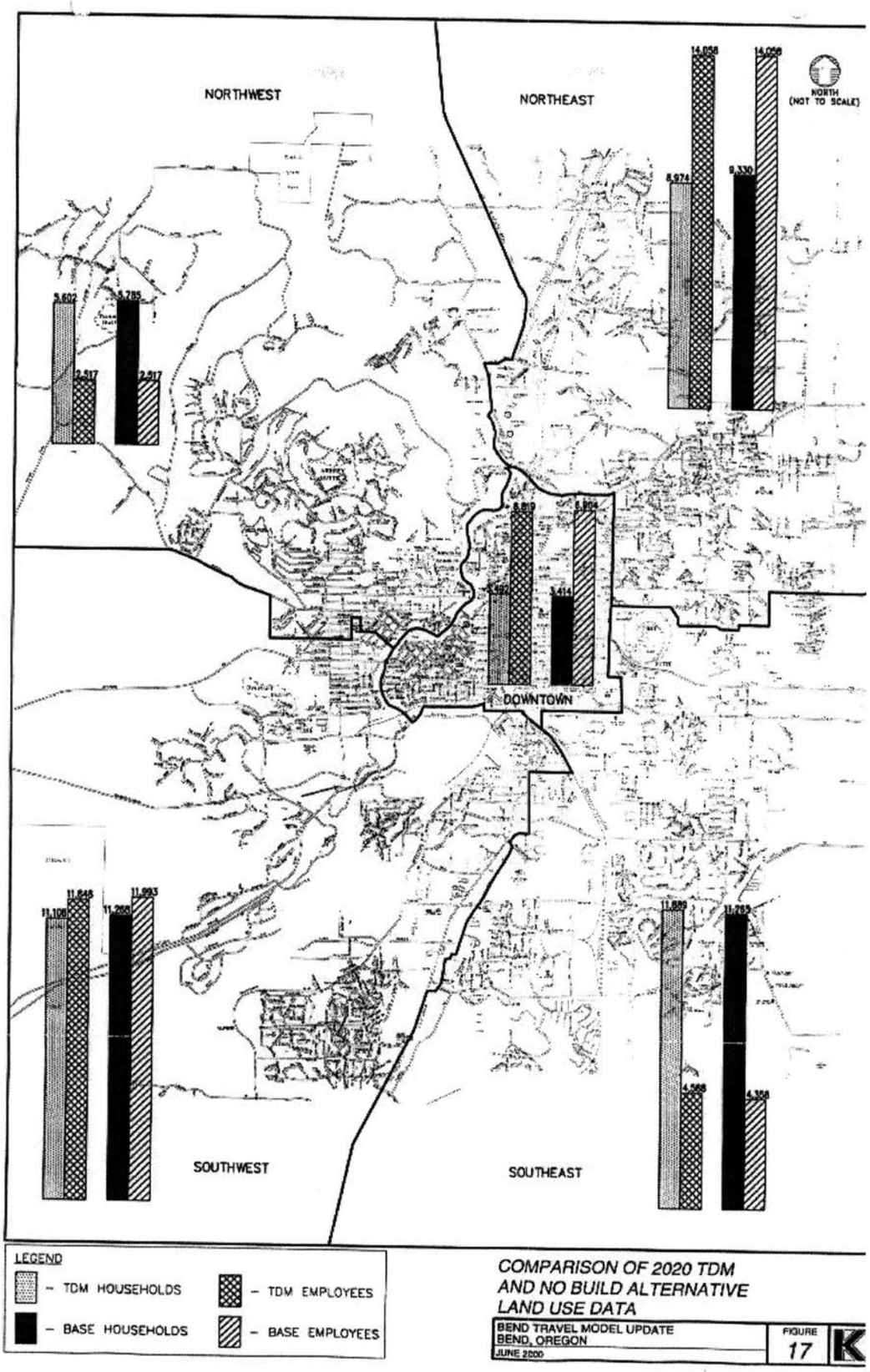
Transit Strategies & Trip Making

The TDM Alternative included the provision of fixed-route transit service along key arterial and collectors within the City of Bend, and the provision of an intercity transit shuttle to Redmond. Both measures could increase mobility, provide Bend with additional transportation alternatives, and reduce the reliance on single-occupancy vehicle travel. It is likely that these effects would primarily be realized on trips occurring between major employment areas (such as the downtown core, the Old Mill District, Central Oregon Community College, and the St. Charles Medical Center) and the residential centers along potential transit routes.

Intracity Transit

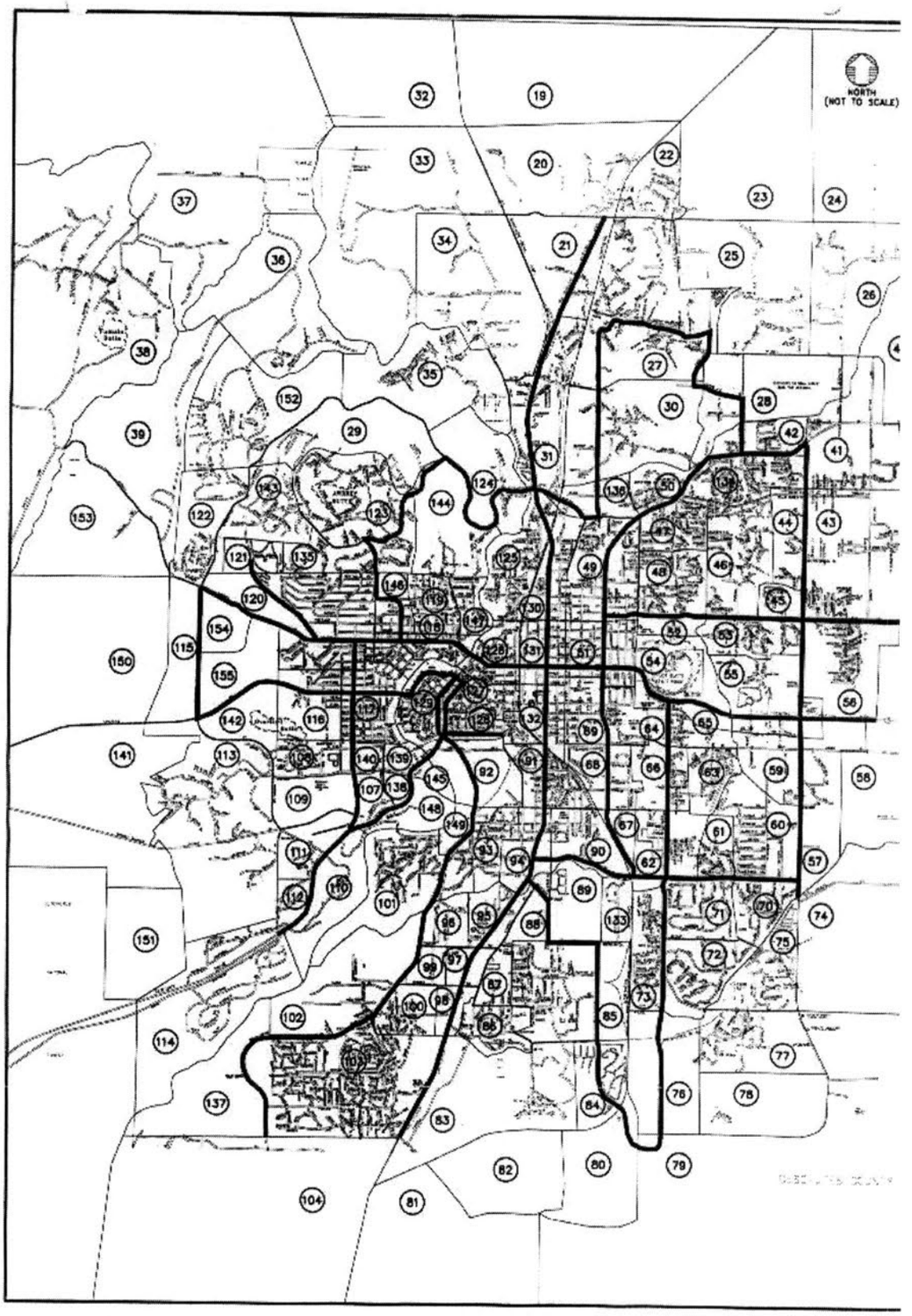
The potential reduction in vehicle trips due to the implementation of fixed-route transit and the enhancement of the existing demand-responsive services was approximated by reducing the number of trips made between TAZs along the potential transit routes by 7 percent. Figure 18 illustrates the TAZs within the model to which the transit trip reduction was applied. As shown in Figure 18, 88 of the TAZs were assumed to be served by some form of transit service. These adjustments resulted in an overall reduction of 3.5 percent in vehicle trips during the weekday p.m. peak hour.

The transit share anticipated in this alternative is similar to the existing percentage of trips made by transit in the City of Eugene. It is significantly higher than the current transit usage in the City of Medford. In Eugene, transit captures approximately five to six percent of the total trips during the weekday p.m. peak hour in major transit corridors. This equates to an overall capture rate of between three and four percent systemwide. On a daily basis, approximately two percent of the trips are made by transit in Eugene. In Medford, the total p.m. peak hour capture rate for transit is less than one percent. Based on the experiences of other Oregon cities of comparable size, the assumption of seven percent represented an aggressive capture rate for non-SOV travel, which is consistent with the intent of the TDM Alternative.



COMPARISON OF 2020 TDM AND NO BUILD ALTERNATIVE LAND USE DATA

BEND TRAVEL MODEL UPDATE BEND, OREGON JUNE 2000	FIGURE 17



TRANSIT REDUCTION ZONES

TRANSPORTATION MODEL UPDATE BEND, OREGON MAY 2000	FIGURE 18

Intercity Transit

The provision of an intercity transit route between Bend and Redmond was also included as part of the TDM Alternative. It was assumed that the intercity transit service would serve two primary purposes: service for commuters who work in Bend and live in Redmond or other outlying communities, and service to the Bend-Redmond Airport.

According to the 1990 Census (Bureau of Census Journey-to-Work), approximately 460 people live in Redmond and work in Bend; of those, approximately 80 percent drive alone. For the purposes of modeling the TDM Alternative, a five percent reduction in vehicle travel originating at a Bend employment center (i.e., any TAZ with 500 or more employees) and destined for Redmond was assumed during the p.m. peak hour.

Pedestrian and Bicycle Strategies & Trip Making

In addition to the bicycle lanes, trails, and sidewalks that exist within today, the City is currently planning to create a comprehensive bicycle, sidewalk, and trail system over the next twenty years. This will provide Bend residents with additional non-auto opportunities for commuting, shopping, and recreational trips. The development of higher-density mixed use centers throughout the city will also provide additional opportunities for pedestrian and bicycle trip making.

To account for the additional opportunities for pedestrian and bicycle trip making, the following adjustments were applied to the TDM Alternative trip tables:

- all trips less than ½ mile were reduced by ten percent;
- all trips between ½ mile and 2 miles were reduced by five percent; and,
- all trips between 2 miles and 5 miles were reduced by two percent.

No pedestrian or bicycle travel reduction factors were applied to trips greater than five miles in length.

The application of the pedestrian and bicycle factors resulted in an additional four percent decrease in the total number of *internal* trips beyond those reductions made for transit. The combination of the transit and pedestrian/bicycle mode split increases resulted in a 6.4 percent overall trip reduction and an 8.6 percent reduction in internal trips.

Roadway Improvements

The roadway network for the TDM Alternative incorporated the same network links as the 2020 No Build Alternative. These include the existing roadway system plus any funded projects. As part of the TDM Alternative it was assumed that aggressive TDM measures would limit the amount of new roadway construction that would be needed to accommodate future growth.

Other Strategies

Parking management strategies could also be implemented to further reduce single-occupancy vehicle travel within Bend. These strategies could involve instituting or raising parking fees, limiting parking supply, and providing parking incentives for reduced parking in the downtown area and at major employment centers (i.e., those TAZs with 500 or more employees). These strategies could be implemented in combination with the provision of park-and-ride lots, a reduction in the amount of employer-provided parking, and by working with major employers to establish ride-share programs and incentives.

Parking Fees and Incentives

According to the 1990 Census (Bureau of Census, Journey-to-Work), of the people who live and work in Bend, approximately 80 percent drive alone to work, 12 percent carpool, and 8 percent bicycle or walk. The implementation of parking strategies and other measures may result in a shift of more commuter travel to pedestrian, bicycle, and transit modes. To model the effect of parking strategies, commuter vehicle tips originating in major employment centers were examined to evaluate the combined effects of reductions for fixed-route transit and bicycle and pedestrian system improvements, as described above. A reduction in SOV trips in these TAZs was also applied to account for carpooling. The overall effect was a reduction in commuter vehicle trips to and from these zones of 10 percent (the incremental reduction for carpooling alone was 1.5 – 2 percent, the pedestrian, bicycle, and transit reductions described previously comprised the remaining reduction).

The combination of all of the TDM reduction factors resulted in a system-wide decrease in vehicular trip-making of 6.6 percent and a 9.5 percent decrease in internal vehicular travel.

Travel Assignment

Based on the trip table modifications outlined above, weekday p.m. peak hour travel forecasts were developed and a level of service analysis was conducted. The resulting 2020 travel forecasts are shown in Figures 19A through 19D. The resulting volume-to-capacity ratios are shown in Figure 20.

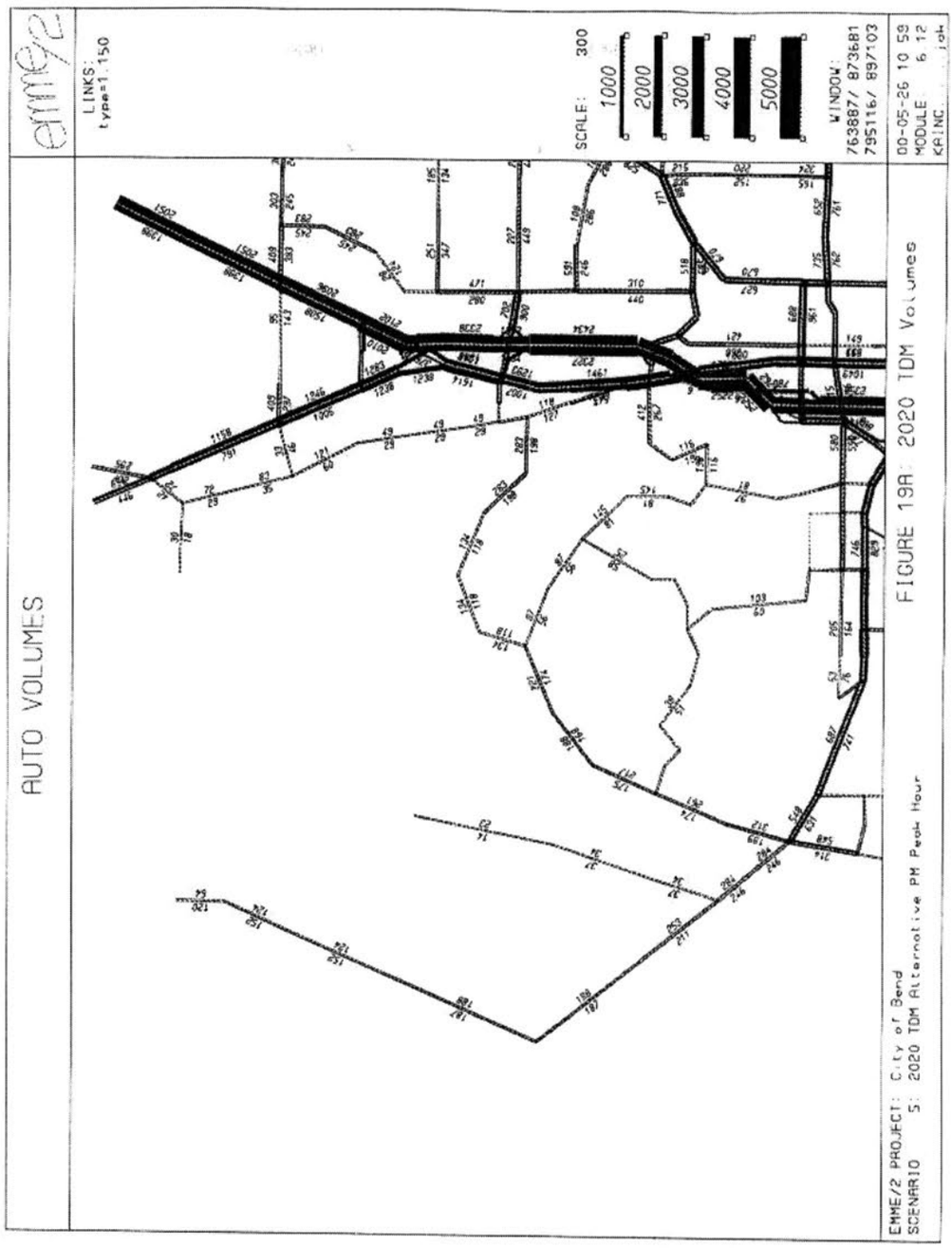
As shown in Figure 20, the implementation of alternative land use and TDM strategies could provide a certain degree of relief to the capacity deficiencies identified in the No Build Alternative. The river crossings, the Colorado and Newport Avenue corridors, Butler Market, the 27th Street corridor, Reed Market Road, and the state highway system were still projected to operate near or over capacity, suggesting that, even if the City successfully implements very aggressive TDM measures in the future, new roadways and improvements to existing roadways will still be needed to mitigate future capacity deficiencies. Other roadways and associated bicycle and pedestrian facilities may be warranted for local vehicular, pedestrian, and bicycle system connectivity.

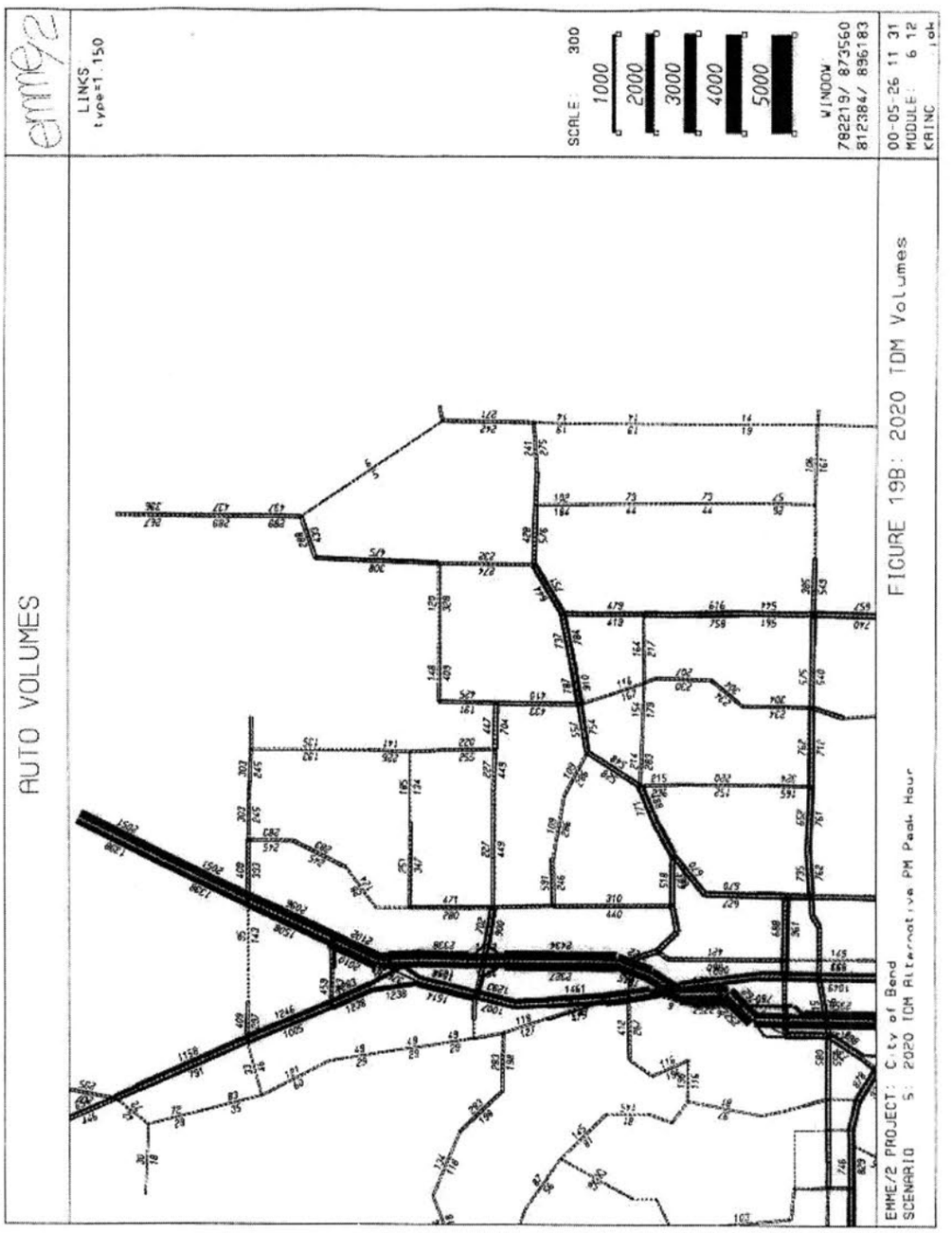
2020 COMBINED ALTERNATIVE

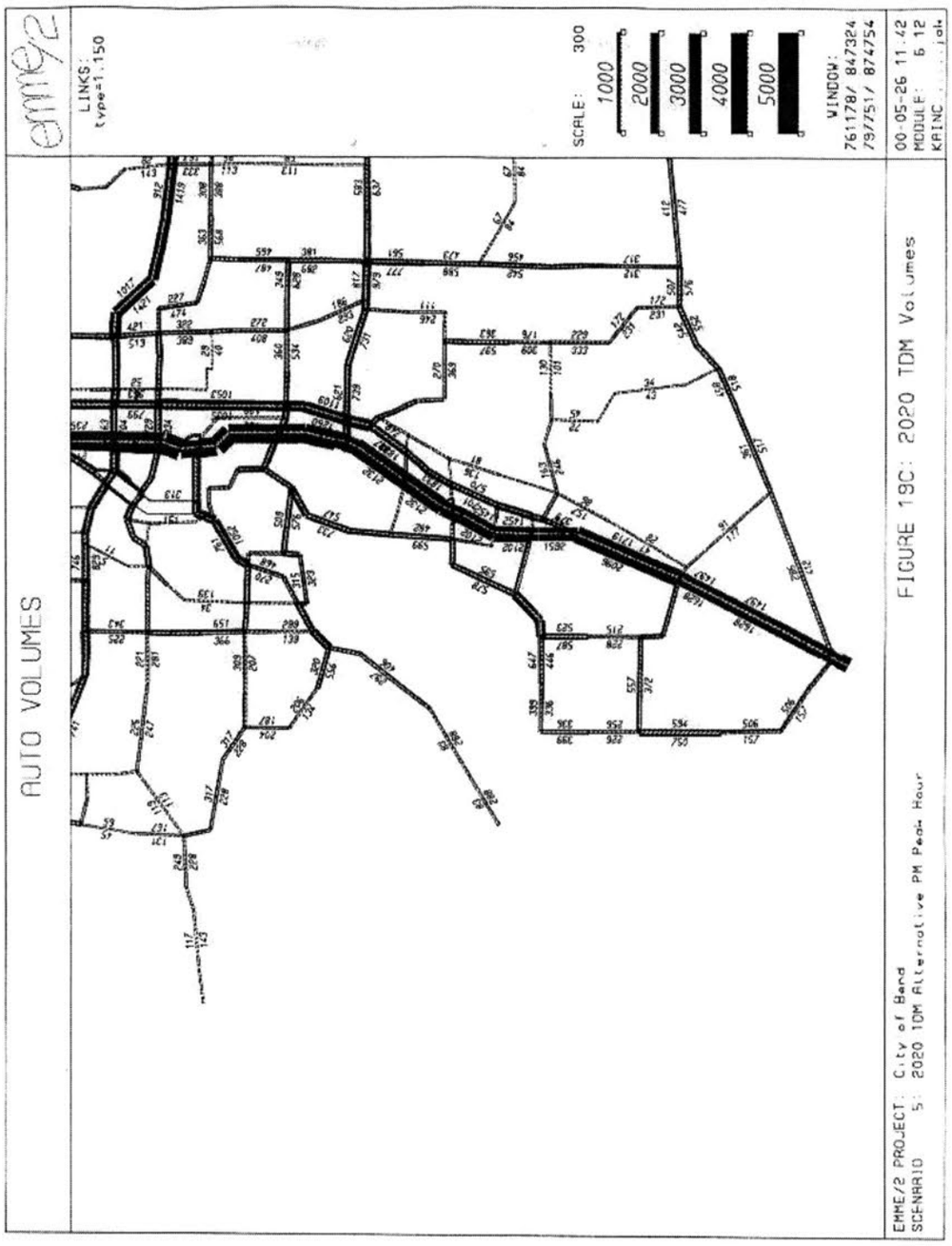
The 2020 Combined Land Use and Transportation System Alternative was developed to incorporate aspects of both the Comprehensive Plan and the TDM Alternatives. It included the implementation of a fixed-route transit system and increased reliance on pedestrian, bicycle, carpooling, and ridesharing to reduce reliance on single-occupancy vehicle travel. The 2020 Combined Alternative also included the construction of new roadways to provide increased network connectivity and additional roadway capacity. The specific components of the 2020 Combined Alternative are described below.

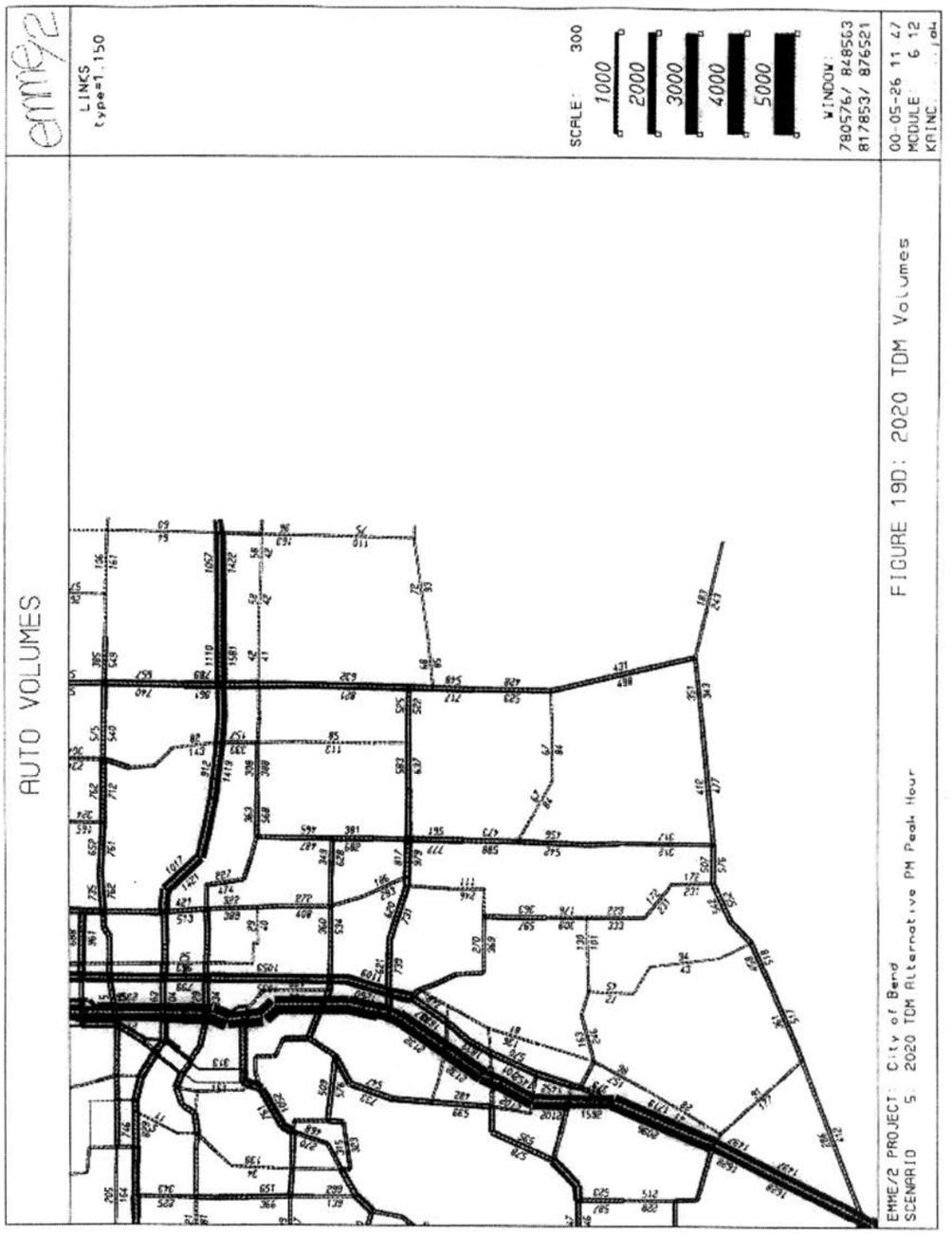
Land Use Strategies

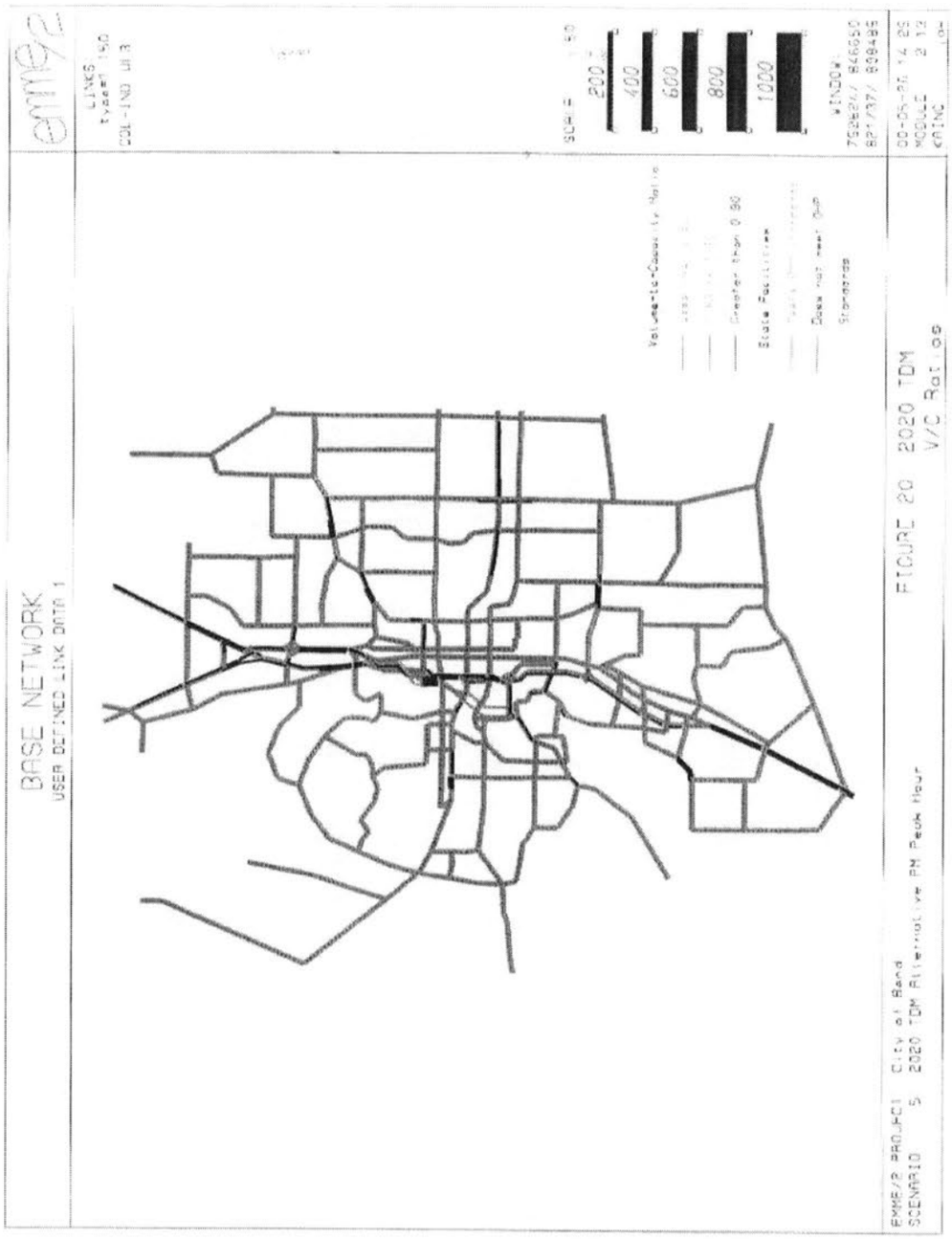
Like the No Build Alternative, the land use strategy for the Combined Alternative assumed growth in households and employment as outlined in the current Comprehensive Plan. This included the continued development of a higher-density, mixed use center in Downtown Bend, the development of the Old Mill District as a mixed use center south of Colorado Avenue, the development of Northwest Crossing (a mixed use retail, residential, and employment center in northwest Bend), mixed employment zoning, and the development of commercial nodes in all quadrants of the city.


emme/2
LINKS:
type=1:150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW:
763887/ 873681
795116/ 897103
00-05-26 10 59
MODULE 6.12
KAING jah
AUTO VOLUMES
FIGURE 19A: 2020 TDM Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 5: 2020 TDM Alternative PM Peak Hour


emme2
AUTO VOLUMES
LINKS
type=1 150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW
782219/ 873560
812384/ 896183
00-05-26 11 31
MODULE: 6 12
KAING
FIGURE 19B: 2020 TDM Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 5: 2020 TDM Alternative PM Peak Hour


emme/2
LINKS:
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SCALE: 300
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3000
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5000
WINDOW:
761178/ 847324
797751/ 874754
00-05-26 11:42
MODULE: 6.12
KAINC
AUTO VOLUMES
FIGURE 19C: 2020 TDM Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 5: 2020 TDM Alternative PM Peak Hour


emme/2
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3000
4000
5000
WINDOW:
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817853./ 876521
00-05-26 11:47
MODULE 6.12
KAINC .104
AUTO VOLUMES
FIGURE 19D: 2020 TDM Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 5: 2020 TDM Alternative PM Peak Hour


BASE NETWORK
USER DEFINED LINK DATA 1
FIGURE 20 2020 TDM
V/C Ratios
Volume-to-Capacity Ratio
Greater than 0.90
State Facilities
Streets
200
400
600
800
1000

Transit Strategies & Trip Making

Similar to the TDM alternative, the Combined Alternative included provision of fixed-route transit service along key arterials and collectors within the City of Bend. It also included the intercity transit service between Bend and Redmond. More conservative estimates of potential ridership were assumed for the fixed route service for the Combined Alternative than the TDM Alternative.

Intracity Transit

The potential reduction in vehicle trips attributable to future implementation of fixed-route transit and enhancement of demand-responsive services was quantified by reducing the number of trips made between TAZs along the potential transit routes by 3.5 percent. These adjustments resulted in an overall reduction of 2.2 percent in vehicle trips during the weekday p.m. peak hour (for comparison purposes, the overall TDM Alternative reduction for transit was 3.5 percent). Based on the experiences in other Oregon communities of comparable size, the transit assumptions for the Combined Alternative were determined to be reasonable.

Intercity Transit

The provision of intercity transit between Redmond and Bend was also included in the Combined Alternative. A five percent reduction was assumed for p.m. peak hour vehicular travel originating at a Bend employment center and destined for Redmond.

Pedestrian and Bicycle Strategies & Trip-Making

The 2020 Combined Alternative included additional cycling and walking opportunities for commuting, shopping, and recreational trips created by the continued development of bicycle lanes, sidewalks, and trails and the development of mixed use centers throughout the city during the next twenty years.

To account for the additional opportunities for pedestrian and bicycle trip-making, the following adjustments were applied to the Combined Alternative trip tables:

- all trips less than ½ mile were reduced by ten percent;
- all trips between ½ mile and 2 miles were reduced by five percent; and
- all trips between 2 miles and 5 miles were reduced by two percent.

No pedestrian or bicycle travel reduction factors were applied to trips greater than five miles in length.

The pedestrian and bicycle factors resulted in a 3.8 percent reduction in internal vehicular trip-making under the 2020 Combined Alternative beyond those reductions made for transit. The combination of transit and pedestrian and bicycle factors resulted in a 4.9 percent reduction in systemwide SOV trips. As discussed previously, the combination of the transit and pedestrian/bicycle factors in the TDM Alternative resulted in a 6.4 percent overall reduction.

Roadway Improvements

The roadway network for the 2020 Combined Alternative included the construction of the new roadways identified in the comprehensive plan to provide for vehicular, pedestrian, and bicycle network connectivity as well as capacity improvements. The new roadways included in the Combined Alternative were listed in the Comprehensive Plan Alternative.

Other Strategies

The parking strategies identified as part of the TDM Alternative (i.e., parking fees and carpooling/ridesharing incentives) were also assumed in this alternative. More conservative estimates of potential single-occupancy vehicle reduction resulting from the implementation of these strategies were assumed.

Parking Fees and Incentives

A combined five percent reduction was made to trips to/from major employment centers (i.e., the downtown core, Central Oregon Community College, St. Charles Medical Center) to account for fixed-route transit service, pedestrian and bicycle trip making, and carpooling and ridesharing. A review of the effects of pedestrian, bicycle, and transit reductions revealed that the SOV travel to/from the employment centers was reduced by 6.6 – 7 percent; therefore, no additional reductions were made for parking incentives and/or additional carpooling.

The overall effect of increased transit, pedestrian, cycling, and carpool trip-making in Bend under this alternative was a 4.9 percent systemwide reduction in vehicular travel and a 6.9 percent reduction in internal vehicular trips.

Travel Assignment

Based on the trip table modifications outlined above, weekday p.m. peak hour travel forecasts were developed for the year 2020 Combined Alternative and a level of service analysis was conducted. The resulting travel forecasts are shown in Figures 21A through 21D. The roadway volume-to-capacity ratios are shown in Figure 22.

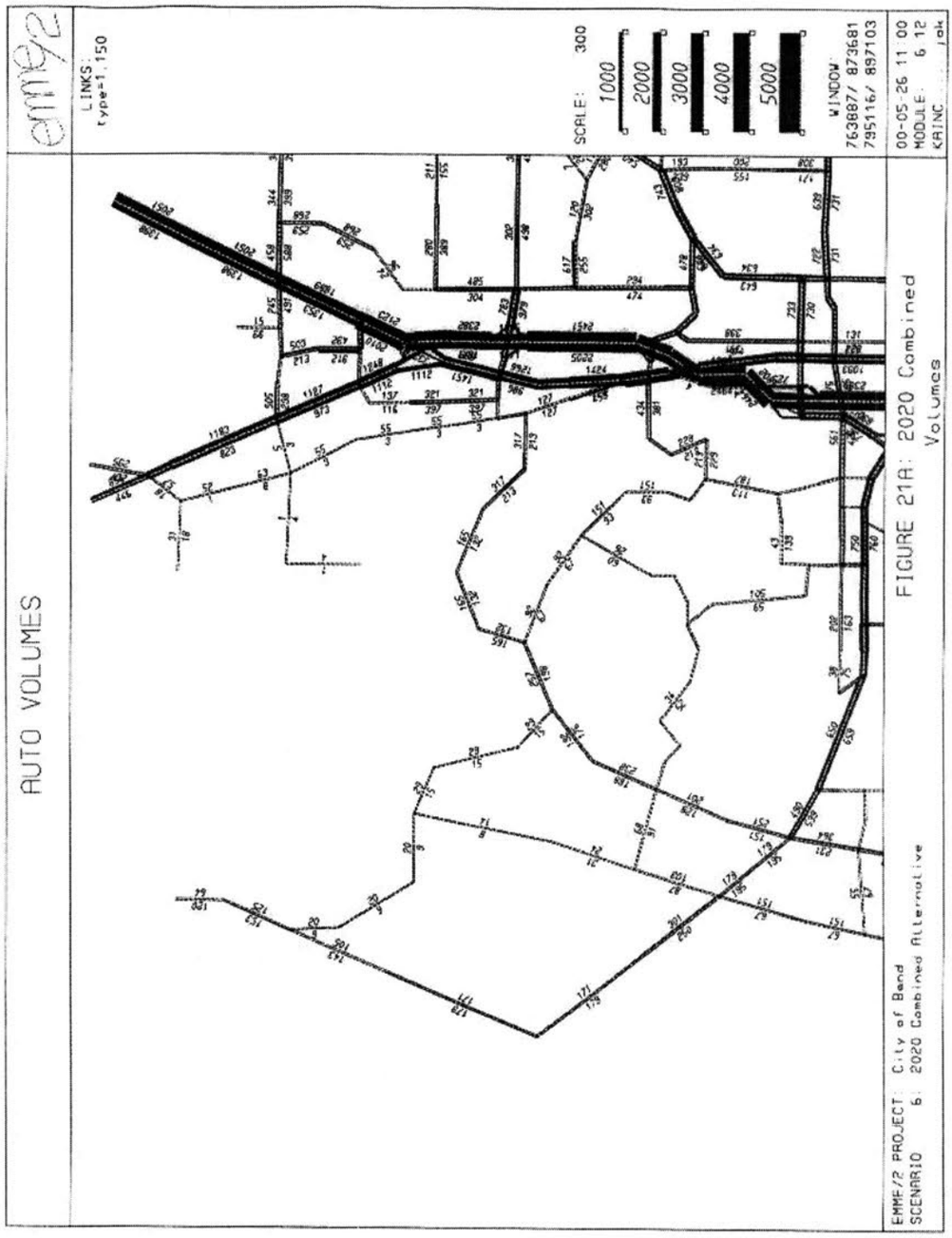
A comparison of the No Build and Combined Alternatives revealed that several of the roadway segments forecast to operate over-capacity under the No Build alternative could be improved to operate either near or under-capacity in the Combined Alternative (excluding the state facilities). As shown in Figure 22, increased capacity would still be necessary along the 27th Street, Reed Market Road, and state highway corridors to meet the operational criteria. Other capacity deficiencies in this alternative could likely be mitigated through intersection improvements or improvements on short sections of the corridor.

2020 Combined with Five-Lane Facilities

A second iteration of the Combined Alternative was evaluated to examine the impacts of creating five-lane facilities on some of the major corridors. These corridors included:

- Reed Market Road between 27th Street and the Parkway; and,
- 27th Street between Neff Road and Reed Market Road.

The 2020 forecasts are shown in Figures 23A through 23D. The resulting volume-to-capacity ratios are shown in Figure 24. As shown in Figure 24, the roadway segments projected to operate over capacity are primarily limited to the state facilities. Other projected capacity deficiencies could likely be mitigated through intersection improvements or improvements on short sections of the corridor. It is recommended that the city and/or state conduct additional sub-area studies to identify improvements at individual intersections, as appropriate.


emme/2
LINKS:
type=1,150
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1000
2000
3000
4000
5000
WINDOW:
763887/ 873681
795116/ 897103
00-05-26 11:00
MODULE: 6.12
KAINC: jak
AUTO VOLUMES
FIGURE 21A: 2020 Combined Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 6: 2020 Combined Alternative

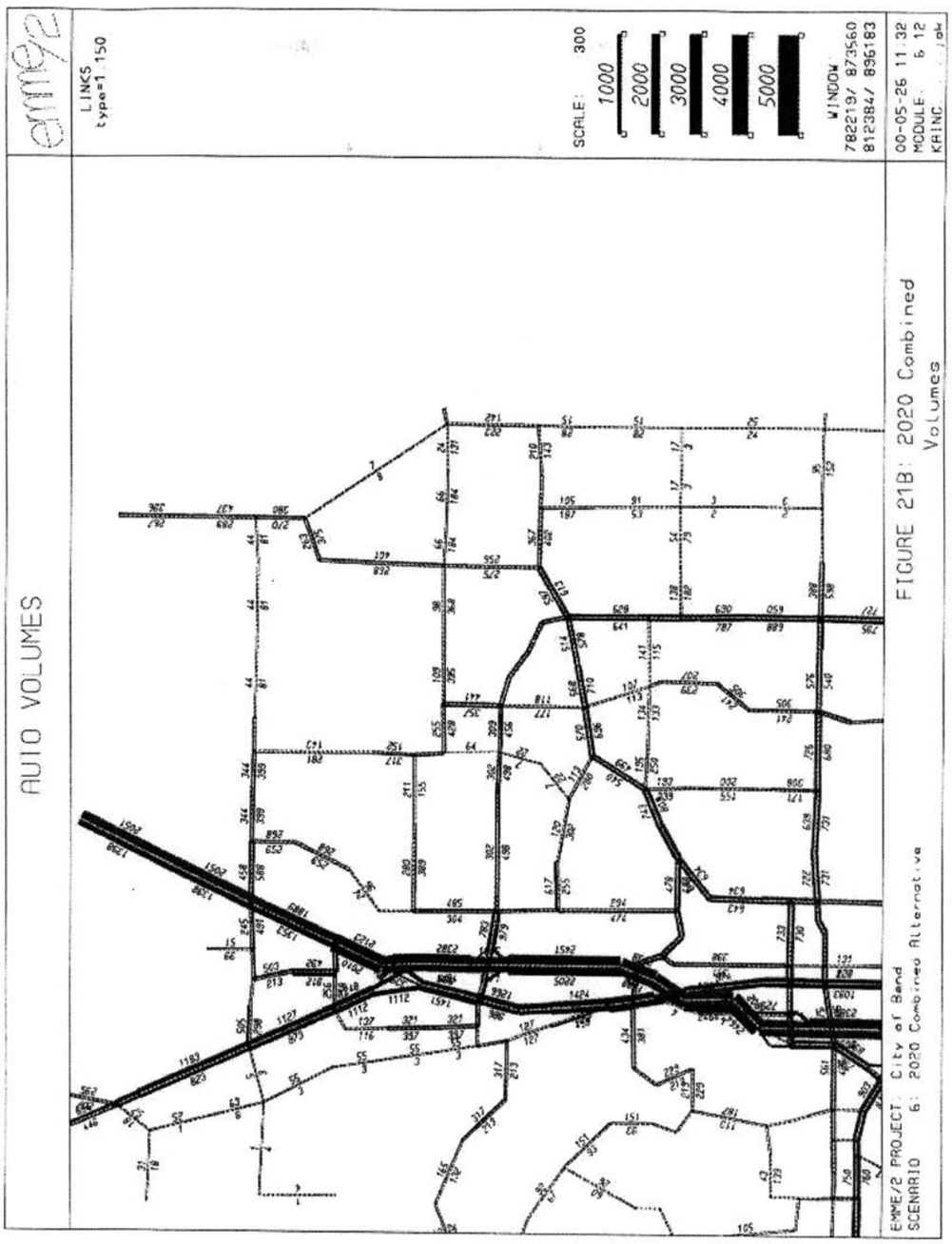
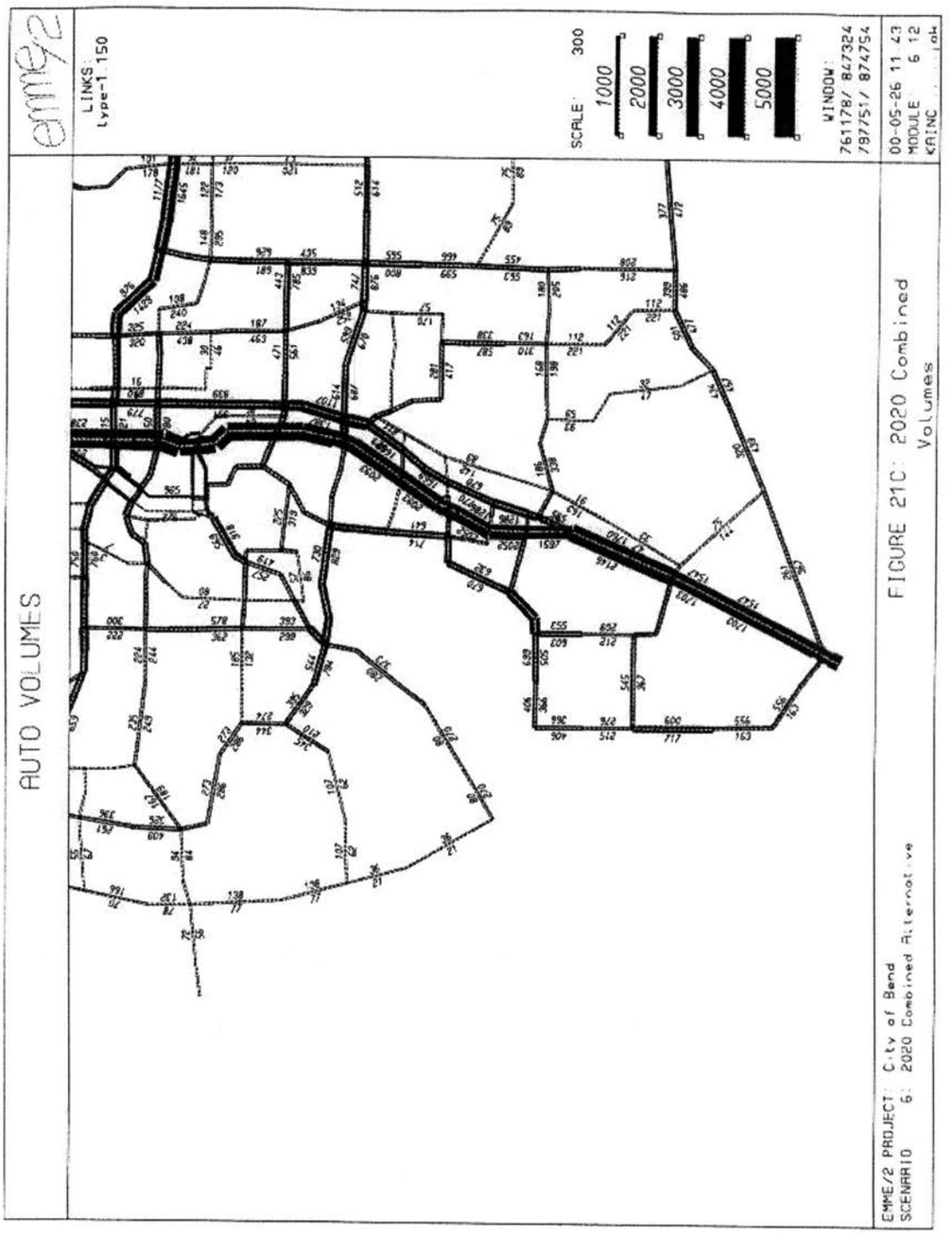
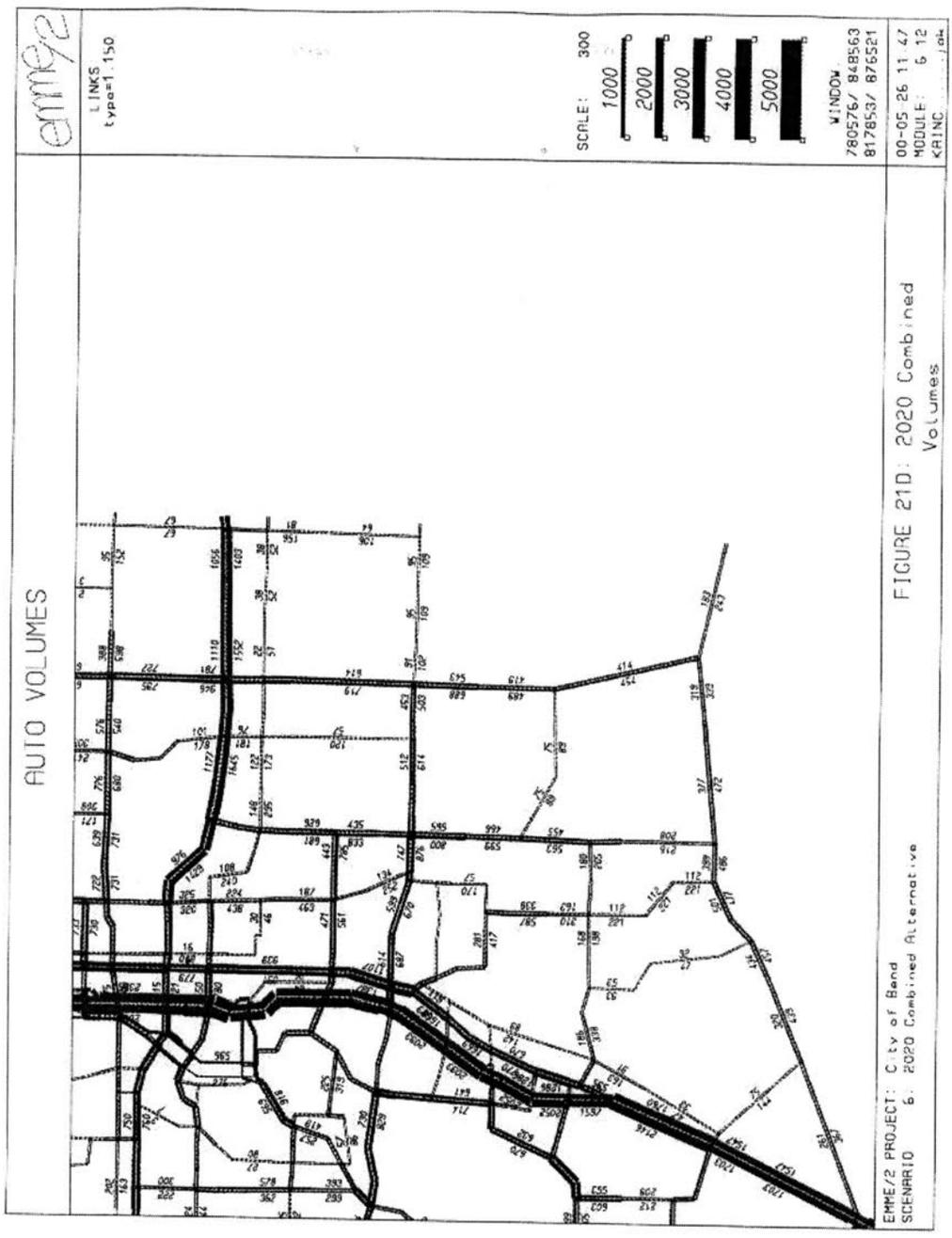
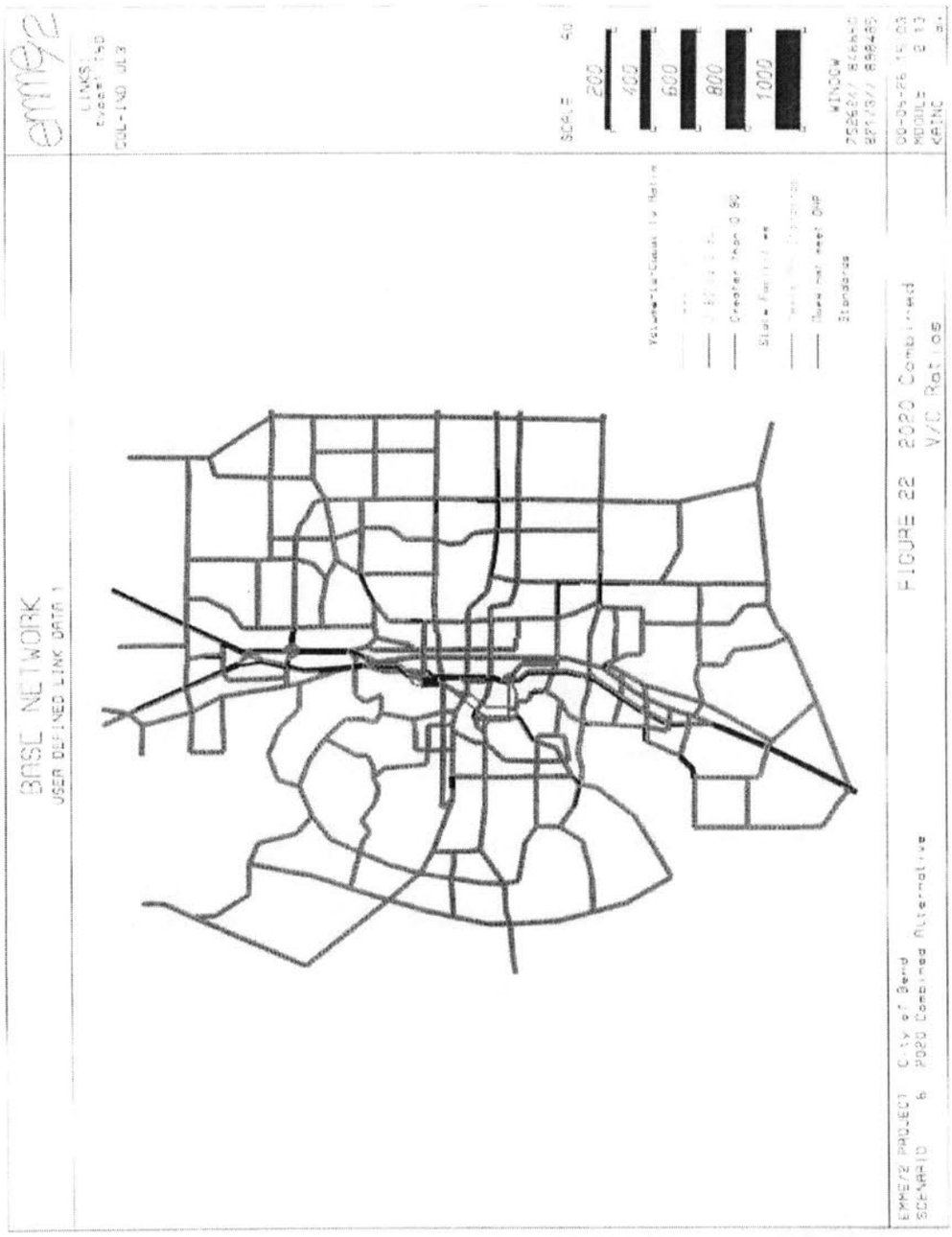
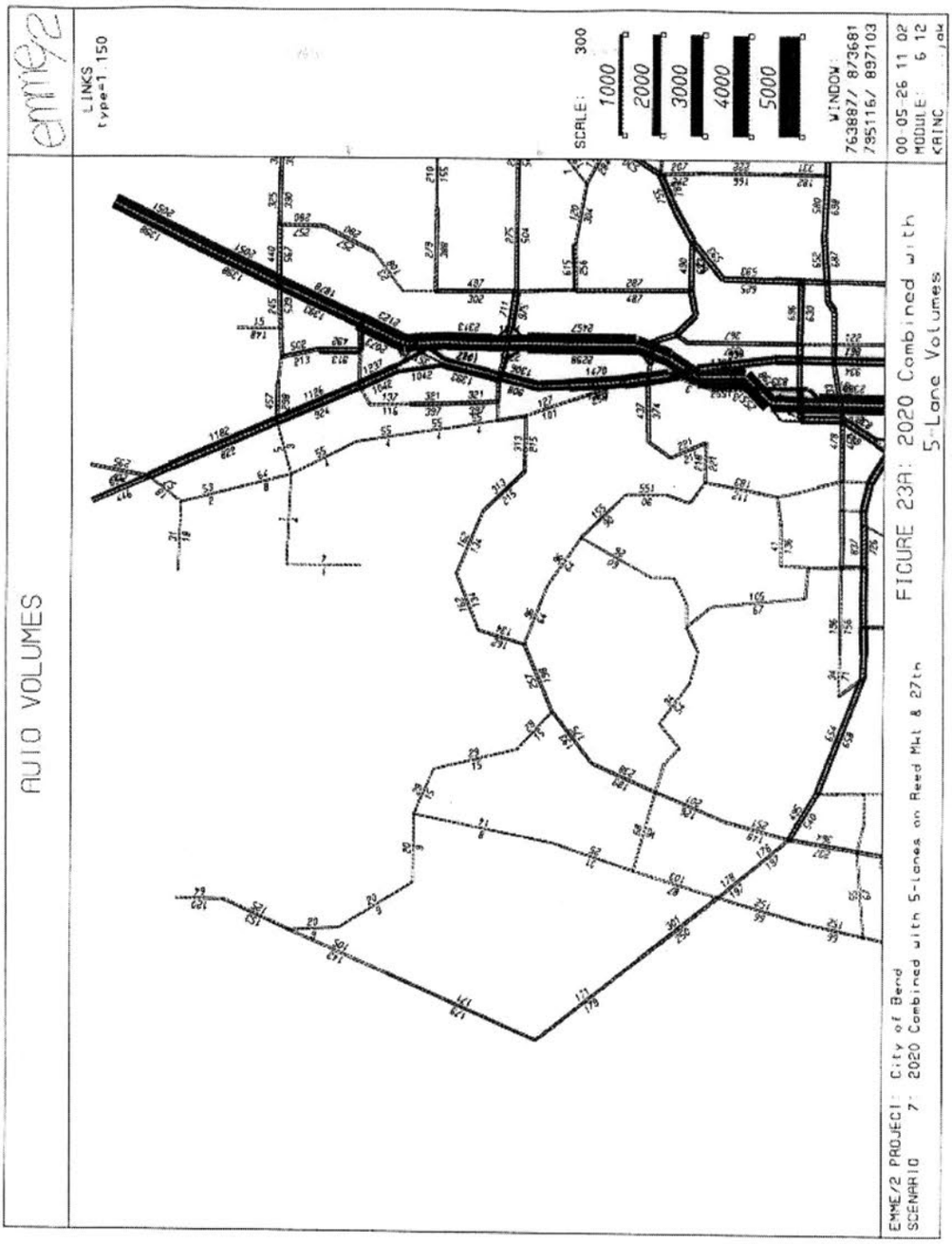


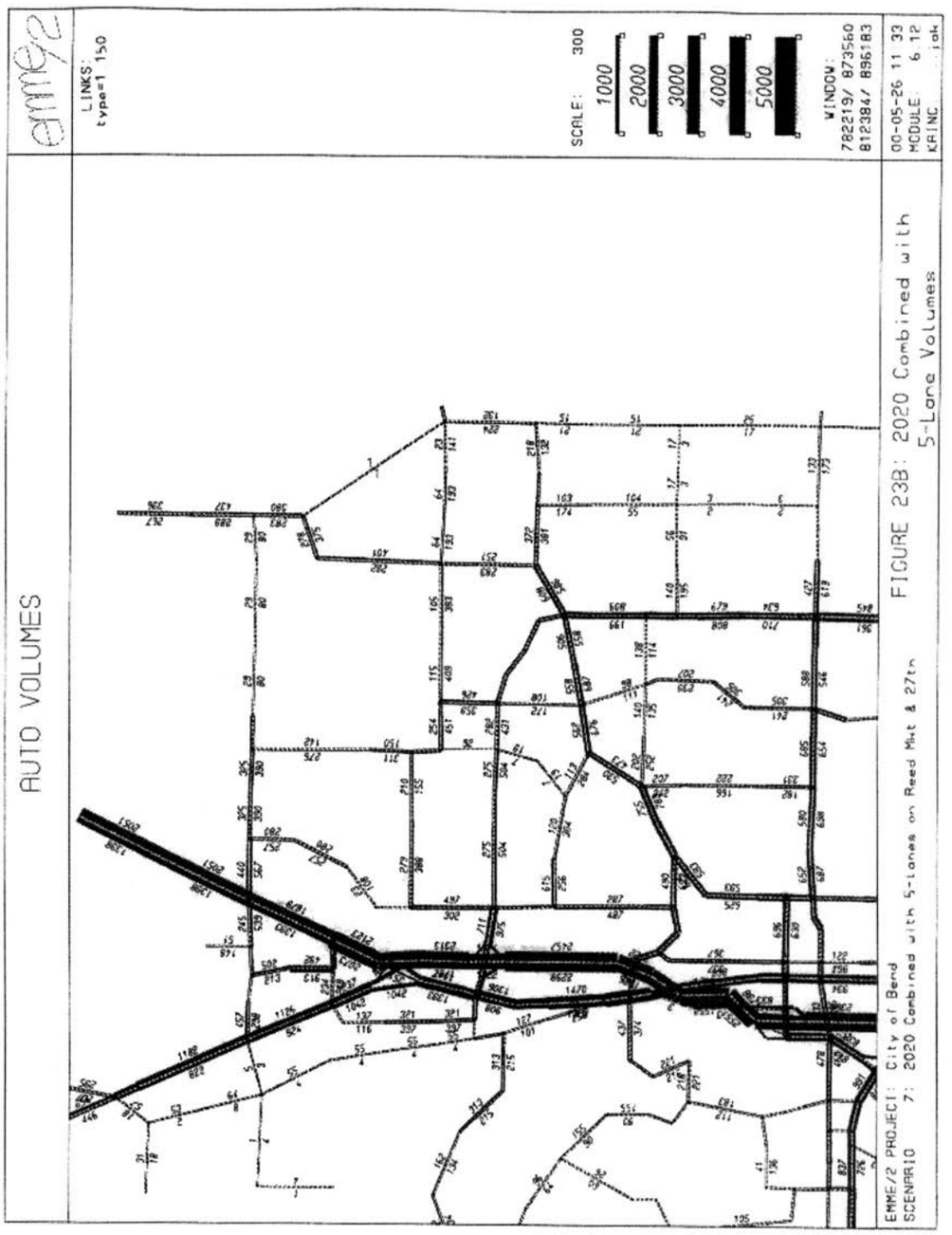
FIGURE 21B: 2020 Combined Volumes

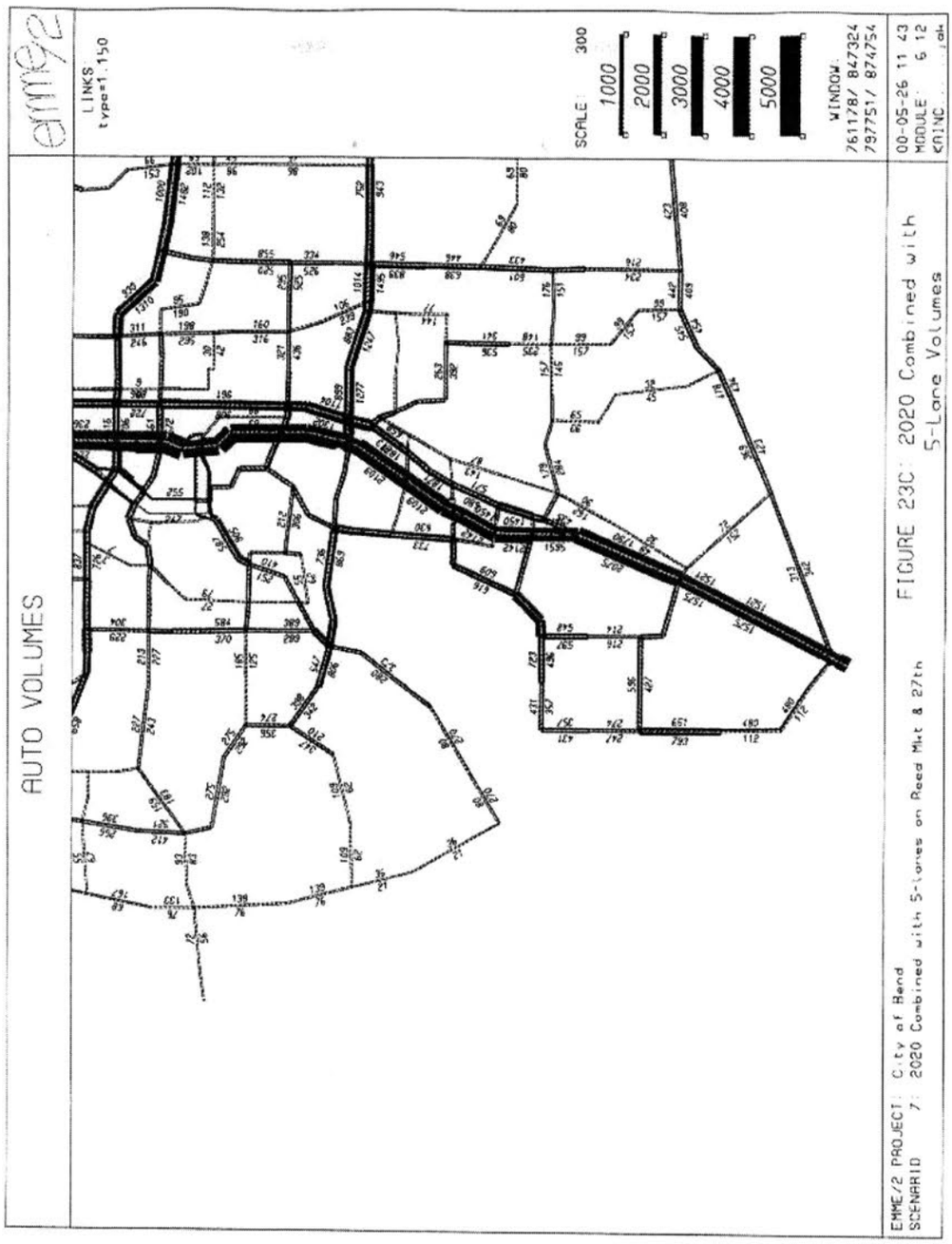

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LINKS
Type-1 150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW:
761178/ 847324
797751/ 874754
00-05-26 11 43
MODULE 6 12
KAINC
AUTO VOLUMES
FIGURE 21C: 2020 Combined Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 6: 2020 Combined Alternative

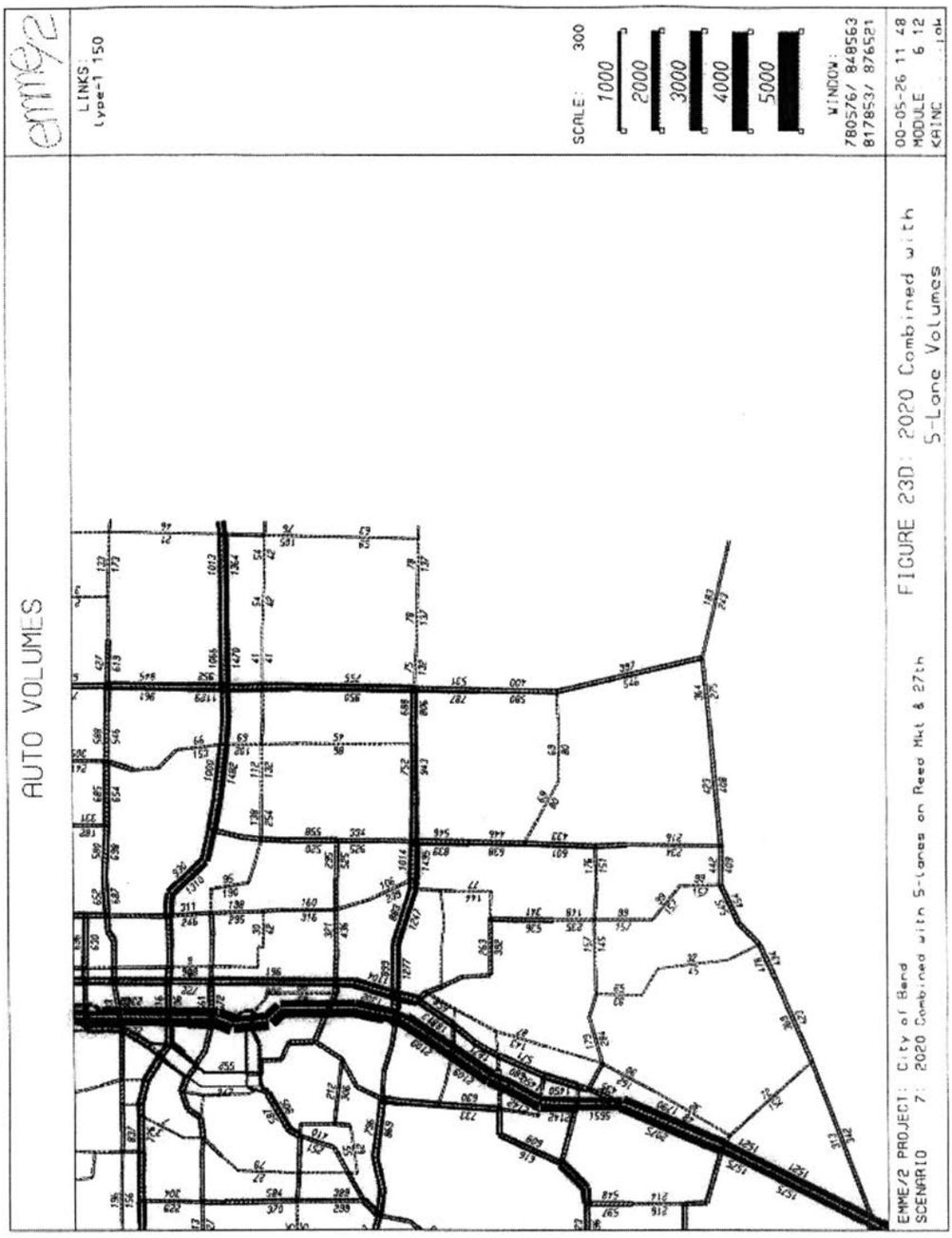

emme/2
LINKS
type=1 150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW
780576/ 848563
817853/ 876521
00-05-26 11:47
MODULE: 6.12
KRINC: .ja4
AUTO VOLUMES
FIGURE 21D: 2020 Combined Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 6: 2020 Combined Alternative

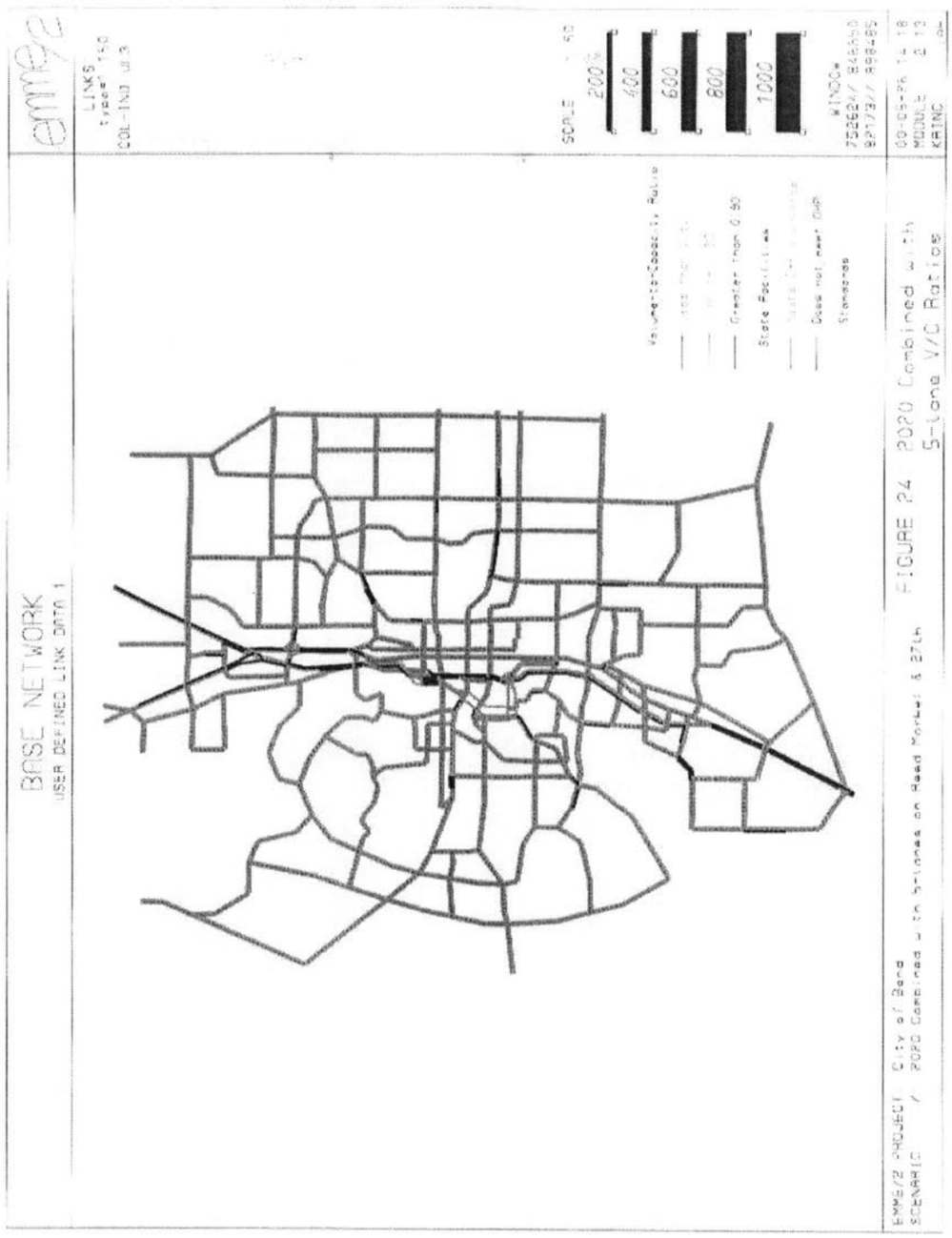

emme/2
BASE NETWORK
USER DEFINED LINK DATA 1
SCALE
200
400
600
800
1000
FIGURE 22 2020 Combined
V/C Ratios
EMME/2 PROJECT City of Bend
SCENARIO 6 2020 Combined Alternative


AUTO VOLUMES
LINKS
type=1 150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW:
763887/ 873681
795116/ 897103
00-05-26 11 02
MODULE: 6 12
KRING
FIGURE 23A: 2020 Combined with 5-Lane Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 7: 2020 Combined with 5-Lanes on Reed Mkt & 27th


AUTO VOLUMES
emme/2
LINKS:
type=1 150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW:
782219/ 873560
812384/ 896183
00-05-26 11 33
MODULE: 6.12
KRINC: jak
EMME/2 PROJECT: City of Bend
SCENARIO 7: 2020 Combined with 5-Lanes on Reed Mkt & 27th
FIGURE 23B: 2020 Combined with 5-Lane Volumes


emme/2
LINKS
type=1,150
AUTO VOLUMES
SCALE 300
1000
2000
3000
4000
5000
WINDOW
761178/ 847324
797751/ 874754
00-05-26 11 43
MODULE 6 12
EMME/2 PROJECT City of Bend
SCENARIO 7: 2020 Combined with 5-Lanes on Reed Mkt & 27th
FIGURE 23C: 2020 Combined with 5-Lane Volumes


emme/2
LINKS
Type=1 150
SCALE: 300
1000
2000
3000
4000
5000
WINDOW:
780576/ 848563
817853/ 876521
00-05-26 11 48
MODULE 6 12
KAINC
AUTO VOLUMES
FIGURE 23D: 2020 Combined with 5-Lane Volumes
EMME/2 PROJECT: City of Bend
SCENARIO 7: 2020 Combined with 5-Lanes on Reed Mkt & 27th


BASE NETWORK
USER DEFINED LINK DATA 1
FIGURE 24 2020 Combined w/ 4th
5-lane V/C Ratios
Greater than 0.99
State Facilities
Does not meet OHP
Standards
200
400
600
800
1000

EVALUATION OF THE ALTERNATIVES

A comparison of the number of trips forecast for each of the alternatives in shown in Table 16.

Table 16
Comparison of Weekday PM Peak Hour Trips

Trip Type	2000 Average Weekday	2000 Summer	2020 No Build	2020 TDM	2020 Comp. Plan	2020 Combined
Internal-Internal	18,713	19,172	27,950	24,690	27,950	25,998
Internal-External/ External-Internal	7,347	7,347	11,822	11,765	11,822	11,765
External	503	624	1,000	1,000	1,000	1,000
Total	26,563	27,143	40,722	37,455* (With no reductions, total = 40,107; therefore, 6.6% reduction)	40,722	38,762 (4.8% reduction from No Build)

*Note: The TDM Alternative has different land use scenario than remainder of 2020 alternatives; the same total number of households were assumed but the TDM alternative has less single family and more multi-family households; therefore, the internal trips are different.

As shown in Table 16, the combined effect of fixed-route transit, increased pedestrian and bicycle usage, and carpooling and parking incentives resulted in a 6.6 percent system wide reduction in weekday p.m. peak hour trips for the TDM Alternative, and a 4.8 percent reduction in reduction in weekday p.m. peak hour trips for the Combined Alternative.

Three quantitative measures of effectiveness were used to compare the alternatives. These include: lane-miles of congestion, vehicle miles traveled and vehicle hours traveled. The results of these analyses are summarized below.

Lane Miles of Congestion

The link volume-to-capacity ratios were calculated for all city and state facilities in each of the alternatives analyzed. This was used to prepare a comparison of the lane miles of congestion in each alternative. The lane miles of congestion measure of effectiveness evaluates the roadway links operating below capacity (volume-to-capacity ratio of less than 0.8 for city facilities and those state facilities that meet the 1999 Oregon Highway Plan mobility standards), near capacity (v/c between 0.8 and 0.9 for city facilities), and over capacity (v/c greater than 0.9 for city facilities and those state facilities that do not meet the mobility standards in the 1999 Oregon Highway Plan). The results of this analysis are summarized in Tables 17 - 19.

Table 17
Lane Miles of Congestion – All Roadway Facilities

Alternative	Lane Miles			Total Miles
	Under Capacity	Near Capacity	Over Capacity	
2000 Average Weekday	288.0 (94.3%)	2.5 (0.8%)	14.9 (4.9%)	305.3
2000 Summer	286.3 (93.8%)	3.3 (1.1%)	15.8 (5.1%)	305.3
2020 Base Case	260.2 (81.7%)	10.6 (3.3%)	47.7 (15.0%)	318.6
2020 Comprehensive Plan	296.6 (84.8%)	10.7 (3.1%)	42.3 (12.1%)	350.7
2020 TDM	267.3 (83.9%)	11.2 (3.5%)	40.0 (12.6%)	318.6
2020 Combined	301.8 (86.3%)	11.0 (3.1%)	36.9 (10.6%)	349.7
2020 Combined with 5-lanes	314.0 (87.7%)	7.7 (2.1%)	36.4 (10.2%)	358.1

Table 18
Lane Miles of Congestion – City Facilities Only

Alternative	Lane Miles			Total Miles
	Under Capacity	Near Capacity	Over Capacity	
2000 Average Weekday	228.0 (97.7%)	2.5 (1.1%)	2.9 (1.2%)	233.4
2000 Summer	228.2 (97.8%)	3.2 (1.4%)	2.0 (0.8%)	233.4
2020 Base Case	230.4 (90.9%)	10.6 (4.2%)	12.4 (4.9%)	253.4
2020 Comprehensive Plan	262.7 (92.3%)	10.7 (3.8%)	11.2 (3.9%)	284.6
2020 TDM	235.1 (92.8%)	11.2 (4.4%)	7.1 (2.8%)	253.4
2020 Combined	267.7 (94.0%)	11.0 (3.9%)	5.9 (2.1%)	284.6
2020 Combined with 5-lanes	279.8 (95.5%)	7.7 (2.6%)	5.5 (1.9%)	293.0

Table 19
Lane Miles of Congestion – State Facilities Only

Alternative	Lane Miles		Total Miles
	Under Capacity	Over Capacity	
2000 Average Weekday	60.0 (83.4%)	11.9 (16.6%)	71.9
2000 Summer	58.1 (80.7%)	13.8 (19.3%)	71.9
2020 Base Case	29.8 (45.7%)	35.4 (54.3%)	65.2
2020 Comprehensive Plan	34.0 (52.2%)	31.2 (47.8%)	65.2
2020 TDM	32.2 (49.4%)	33.0 (50.6%)	65.2
2020 Combined	34.2 (52.5%)	31.0 (47.5%)	65.2
2020 Combined with 5-lanes	34.3 (52.6%)	30.9 (47.5%)	65.2

*Note: under existing alternatives, US 97 through Bend is considered a state facility; in the 2020 alternatives, "old 97"/3rd Street from the north end of the Parkway to US 20 is considered a state facility; 3rd Street from US 20 to the south end of the Parkway is considered a city facility.

As shown in Tables 17-19, the Combined Alternative (with and without the 5-lane roadways) had the largest percentage of links operating under and near capacity of the year 2020 alternatives considered. As discussed previously, capacity improvements (intersection and/or corridor) would likely be required on

major corridors and state facilities during the next 20-years under any of the alternatives. These capacity improvements could improve the results of the analysis shown in the tables. As shown in the tables, the majority of links projected to operate over capacity in the 2020 alternatives were on state facilities.

A comparison of the vehicle miles traveled (VMT) and vehicle hours traveled (VHT) is shown in Tables 20 and 21. The Transportation Planning Rule (TPR) requires the analysis of VMT only for metropolitan planning organizations (MPOs). The TPR does not specify requirements related to VHT for MPO or non-MPO areas. Even though Bend is not currently an MPO, per capita VMT and VHT were calculated for as quantitative measures of effectiveness that could be used to compare alternatives. The calculation of VMT and VHT was performed only for those trips with both trip ends inside the urban area, as defined by the "internal" TAZs shown in Figure 1, and was compared against the existing summertime conditions (all 2020 alternatives include summertime travel).

As shown in Table 20, the TDM and the 2020 Combined Alternatives (with and without the 5-lane facilities) have a reduction in per capita VMT of more than five percent, as compared to existing summertime conditions. If Bend were an MPO, this level of reduction would be consistent with the Transportation Planning Rule requirements.

Table 20
Per Capita VMT

Alternative	Internal PM Peak Trips	Internal Daily Trips	Vehicle Miles Traveled	Population	VMT per person	Change from Existing Summer
2000 Average Weekday	18,713	169,719	427,422	61,003	7.01	-1.3%
2000 Summer	19,172	173,900	432,973	61,003	7.10	n/a
2020 No Build	27,950	253,522	671,020	94,443	7.11	+0.1%
2020 Comprehensive Plan	27,950	253,522	663,728	94,443	7.03	+0.1%
2020 TDM	24,690	226,401	607,255	94,443	6.43	-9.4%
2020 Combined	25,998	235,816	629,569	94,443	6.67	-6.1%
2020 Combined with 5-lanes	25,998	235,816	629,441	94,443	6.66	-6.2%

*There are 26,523 households in 2000 and 41,062 households in 2020; consistent with other planning efforts in Bend, the population estimate assumes a persons per household ratio of 2.3.

**Note: methodologies used to calculate VMT were derived from information provided by Metro.

Table 21
Per Capita VHT

Alternative	Internal PM Peak Trips	Internal Daily Trips	Vehicle Hours Traveled	Population	VHT per person	Change from Existing Summer
2000 Average Weekday	18,713	169,719	13,973	61,003	0.229	-0.9%
2000 Summer	19,172	173,900	14,114	61,003	0.231	n/a
2020 No Build	27,950	253,522	23,071	94,443	0.244	+5.6%
2020 Comprehensive Plan	27,950	253,522	22,814	94,443	0.242	+4.8%
2020 TDM	24,690	226,401	20,469	94,443	0.217	-6.1%
2020 Combined	25,998	235,816	21,395	94,443	0.227	-1.7%
2020 Combined with 5-lanes	25,998	235,816	21,193	94,443	0.224	-3.0%

*There are 26,523 households in 2000 and 41,062 households in 2020; consistent with other planning efforts in Bend, the population estimate assumes a persons per household ratio of 2.3.

**Note: methodologies used to calculate VHT were derived from information provided by Metro.

As shown in Table 21, VHT per person would decrease for all future alternatives except the No Build and Comprehensive Plan Alternatives.

Section 4

Recommended Alternative

Recommended Alternative

The findings of the alternatives analysis, as summarized in Section 3, were evaluated by the Transportation Technical Advisory Committee (T-TAC); comprised of city, county, and state staff and representatives from local stakeholder groups, such as the school district, fire department, local commute options, etc.). This evaluation included a review of the advantages and implications of the strategies included in each alternative, as well as the feasibility of implementing the strategies to the level that was modeled. Based on this evaluation, city staff forwarded the strategies associated with the Combined Alternative with 5-lanes on Reed Market Road and 27th Street as the Recommended Alternative.

The remainder of this chapter outlines the land use and transportation strategies associated with the Recommended Alternative.

Recommended Alternative Land Use and Transportation Strategies

The Recommended Alternative includes the future implementation of a fixed-route transit system, increased reliance on walking, cycling and carpooling, construction of roadways to facilitate future capacity and connectivity needs, and the buildout of land uses in a manner consistent with the comprehensive plan. The specific components of these strategies and their estimated affect on future trip making are summarized below.

Land Use

The land use strategy for the Recommended Alternative assumes a 20-year growth in households and employees consistent with the City's current Comprehensive Plan. This strategy includes the continued development of a higher density, mixed use center in downtown Bend; the development of two large mixed use centers outside the downtown, including the Old Mill District and Northwest Crossing; mixed employment zoning, and the development of commercial nodes throughout the city.

Transit

The Recommended Alternative includes the future provision of fixed-route transit service along key arterial and collector facilities within the City of Bend, the provision of intercity transit service between Bend and Redmond, and an expanded demand-responsive transit service for the elderly, disabled, and transportation-disadvantaged. These measures could increase mobility, provide the residents with additional transportation choices, and reduce reliance on single occupancy vehicle (SOV) travel.

Intracity Transit

The number of trips that could be made via a fixed-route transit system in Bend was approximated by applying a 3.5 percent reduction to the trips between Transportation Analysis Zones (TAZs) located adjacent to the identified potential transit routes (shown in Figure 18). This results in a 2.2 percent reduction in systemwide trip making in the p.m. peak hour. This level of ridership is slightly less than the existing capture rate for transit in the City of Eugene and greater than that of Medford.

Intercity Transit

Intercity transit between Bend and Redmond was assumed to provide service to commuters who live in Redmond (or other outlying communities) and work in Bend, and to travelers destined for the Bend-Redmond airport. According to the 1990 census, 80 percent of the Redmond to Bend commuters drive alone. As part of the Recommended Alternative, it was assumed that intercity transit service could capture five percent of the SOV trips between Redmond and Bend in the p.m. peak hour.

Pedestrian and Bicycle

The Recommended Alternative includes the completion of the system of sidewalks, trails, and bicycle lanes in the urban area over the next twenty years, as identified in the Comprehensive Plan. It also includes the development of mixed use centers and commercial nodes throughout the city. The combination of these strategies will provide additional opportunities for pedestrian and bicycle trip-making for commute, shopping, and recreational trips.

The effect of increased pedestrian and bicycle trip-making in the Recommended Alternative was approximated by applying the following reductions to internal trips (i.e., those trips that have both trip ends inside the urban area):

- all trips less than ½ mile were reduced by ten percent;
- all trips between ½ mile and two miles were reduced by five percent; and,
- all trips between two and five miles were reduced by two percent.

No reduction factors were applied to those trips that were greater than five miles in length.

The combined effect of increased transit service and pedestrian and bicycle trip-making resulted in a systemwide reduction in future weekday summertime p.m. peak hour vehicular trips of 4.8 percent.

Other TDM Strategies

The effect of other transportation demand management (TDM) strategies were examined as part of the Recommended Alternative. These include implementing and/or raising parking fees, limiting parking supply, and providing parking incentives for reduced parking in the downtown and at major employment centers within the urban area (for the purposes of this analysis, any TAZ with greater than 500 employees was considered to be a major employment center). These strategies could be implemented in combination with the provision of park-and-ride lots, a reduction in the amount of employer-provided parking supply, and by working with major employers to establish ride-share programs and incentives.

The effect of these strategies on mode split was quantified by evaluating the cumulative effect of transit, pedestrian, bicycle, and carpooling on the number of SOV trips originating in a major employment center. To account for all modes, a total reduction of five percent was applied for trips originating at major employment centers. A review of the effects of pedestrian, bicycle, and transit reductions revealed that the SOV travel to/from the employment centers was reduced by 6.6 – 7 percent; therefore, no additional reductions were made for parking incentives and/or additional carpooling.

The combination of all of the strategies, including carpooling, results in a 4.8 percent systemwide reduction in future weekday summertime p.m. peak hour vehicular trips.

Roadway Capacity and Connectivity Improvements

The Recommended Alternative includes the construction of the proposed arterials and collectors identified in the Comprehensive Plan. The construction of these facilities will serve future capacity and connectivity needs for vehicles, pedestrians and cyclists in the urban area. The proposed roadways included in the Recommended Alternative are summarized below.

New Arterial Roadways

- The addition of a new north-south arterial from Cooley Road to Robal Lane, between Highway 20 and Highway 97.
- The extension of Cooley Road east from 18th Street to Deschutes Market Road.

- The extension of Empire Avenue east from Yeoman Road to Butler Market Road-27th Street.
- The connection of Mount Washington Drive and Reed Market Road between Century Drive and the Bend Parkway.
- The extension of 15th Street from Bear Creek to US 20.

New Collector Roadways

- The extension of Putnam Road-Tumalo Creek Road north to Johnson Market Road.
- The extension of Summit Drive west from Mount Washington Drive to Skyline Ranch Road.
- The extension of Skyline Ranch Road south from Shevlin Park Road to Century Drive.
- The addition of a new east-west collector between the Skyline Ranch Road extension and Mount Washington Drive.
- The addition of a new north-south collector between Robal Lane and Empire Avenue, west of Highway 20.
- The addition of a new north-south collector north of Cooley Road, between Highway 20 and Highway 97.
- The extension of Yeoman Road west to 18th Street and east to Butler Market Road.
- The extension of 18th Street south from Empire Avenue to Brinson Boulevard.
- The addition of a new east-west collector between 27th Street and Hamby Road near Mountain View Senior High School.
- The addition of a new east-west collector between Brosterhous Road and American Lane, south of Reed Market Road.
- The extension of Murphy Road east from Brosterhous Road to 15th Street.
- The realignment of Reed Market Road at 27th Street.
- The extension of 9th Street to Awbrey Road.
- The completion of the Cooley loop road west of OB Riley Road.

In addition, the Recommended Alternative includes the widening of Reed Market Road to five lanes from 27th Street to the Parkway and the widening of 27th Street to five lanes from Reed Market Road to Neff Road to mitigate capacity deficiencies.

2020 P.M. Peak Hour Forecasts

Based on the quantification of the strategies included in the Recommended Alternative, as outlined above, 2020 summertime weekday p.m. peak hour traffic forecasts were developed. These were shown in Figures 23A – 23D. The resulting roadway volume-to-capacity ratios were shown in Figure 24. As shown in Figure 24, primarily the state facilities are projected to operate over capacity (i.e., the roadway volume-to-capacity ratios are in excess of the 1999 Oregon Highway Plan mobility standards) in 2020 under the Recommended Alternative. As previously shown in Table 18, more than 95 percent of the city facilities are projected to operate under capacity in 2020 under this alternative. The near and over capacity city facilities can likely be mitigated through intersection improvements and/or improvements on short sections of the corridor. It is recommended that the city and/or state conduct additional intersection and subarea studies to identify improvements at individual locations, as appropriate.

AREAS FOR FUTURE STUDY

Over the next five years, it is likely that the City of Bend will become part of a Metropolitan Planning Organization. The Transportation Planning and Analysis Unit (TPAU) of the Oregon Department of Transportation also has expressed the desire to modify the EMME/2 model structure for several communities around the state, including Bend, to one closer in nature to an activity-based model, rather than a gravity-based model. They anticipate that this effort will commence in the next three to five years. To respond to these changes, there are a number of activities that could be completed to enhance the next update of the Bend EMME/2 model. Examples include:

- A new origin/destination study could be conducted at the major external stations (e.g., Highway 20 and 97) in Bend. The last study was completed in 1988. Updated information would be helpful in further discerning the amount of external-external travel vs. the external-internal and internal-external travel at these locations.
- Origin/destination studies could be conducted on a select number of major city corridors within the Bend area, such as the Deschutes River Bridges. This information could be helpful in further assessing the calibration of the existing conditions model.
- The city could establish a regular traffic count program to monitor traffic volumes on arterials and collectors, especially those crossing the identified screenline locations. At this time, the city has comprehensive data on the westside; traffic volumes in other areas of the city are limited.
- A comprehensive study of the effects of fixed-route transit could be conducted. This study should identify the potential ridership and mode shift due to the implementation of a transit system.
- The city could collect household data using a cross-classification scheme with car ownership and annual income. At the same time, the city could conduct a household survey that could be used to modify the trip production rates, by purpose, to reflect the cross-classification.

Regardless of MPO status or TPAU revisions to the model, the city should conduct location-specific studies of intersections and transportation corridors in areas of identified congestion to determine the appropriate infrastructure needs over the 20-year planning horizon. Specific connectivity improvements for pedestrians, bicycles, and vehicles should also be studied at a more microscopic level. The combination of all of these efforts will help the city to appropriately plan for and accommodate growth over the next twenty years.

Appendix A

Year 2000 Land Use Data

Appendix A
Year 2000 Land Use Data

TAZ	EMPLOYMENT				SCHOOLS		MOTEL	HOUSEHOLDS		
	Total	Retail	Service	Other	Staff	Students	ROOMS	Single Family	Multi-Family	Mobile Homes
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19	54	10	3	41	0	0	0	355	0	20
20	32	10	20	2	0	0	149	83	4	29
21	531	444	44	43	0	0	0	2	0	0
22	0	0	0	0	0	0	0	108	0	80
23	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	60	0	0
25	139	0	0	0	139	1490	0	68	0	0
26	0	0	0	0	0	0	0	71	0	0
27	0	0	0	0	0	0	0	557	0	0
28	2	0	0	2	0	0	0	76	0	0
29	20	20	0	0	0	0	0	45	0	0
30	2232	50	20	2162	0	0	0	4	0	0
31	1367	610	544	213	0	0	520	0	0	0
32	0	0	0	0	0	0	0	59	0	0
33	0	0	0	0	0	0	0	16	0	0
34	371	25	221	125	0	0	0	101	0	0
35	40	0	0	40	0	0	0	175	2	0
36	0	0	0	0	0	0	0	40	0	0
37	0	0	0	0	0	0	0	88	0	0
38	10	0	0	10	0	0	0	107	0	0
39	100	0	0	100	0	0	0	2	0	0
40	69	0	0	6	63	660	0	245	0	0
41	0	0	0	0	0	0	0	237	0	0
42	54	20	10	0	24	306	0	320	0	38
43	51	0	0	6	45	300	0	576	118	0
44	346	0	210	0	136	1910	0	112	42	0
45	1193	0	1193	0	0	0	0	0	0	0
46	30	0	30	0	0	0	0	439	317	0
47	23	0	0	23	0	0	0	371	0	0
48	6	0	6	0	0	0	0	370	0	0
49	57	5	30	22	0	0	0	461	22	0
50	3	0	3	0	0	0	0	138	40	0
51	201	127	46	28	0	0	9	376	4	0
52	158	0	0	0	158	1536	0	0	0	0
53	834	0	814	20	0	0	0	63	547	0
54	117	20	87	10	0	0	0	0	0	0
55	562	456	106	0	0	0	59	77	486	75
56	97	12	85	0	0	0	0	392	257	110
57	19	5	0	14	0	0	0	66	0	0
58	0	0	0	0	0	0	0	123	0	0
59	65	14	36	15	0	0	0	111	0	0
60	0	0	0	0	0	0	0	230	39	0
61	0	0	0	0	0	0	0	214	0	0
62	88	46	30	12	0	0	0	154	0	202
63	0	0	0	0	0	0	0	192	12	0
64	8	0	8	0	0	0	0	103	94	0
65	282	70	15	197	0	0	0	0	0	0
66	66	0	0	0	66	626	0	71	251	25
67	160	20	0	140	0	0	0	3	0	0
68	545	60	10	475	0	0	0	0	4	0
69	168	0	0	36	132	1606	0	222	41	0
70	14	0	12	2	0	0	0	119	0	0
71	0	0	0	0	0	0	0	227	0	0
72	0	0	0	0	0	0	0	232	0	0
73	5	0	5	0	0	0	0	133	0	0
74	0	0	0	0	0	0	0	140	0	0
75	0	0	0	0	0	0	0	201	0	148
76	0	0	0	0	0	0	0	0	0	0
77	91	0	5	0	86	890	0	120	0	0
78	4	0	4	0	0	0	0	5	0	14
79	100	0	0	100	0	0	0	220	0	0
80	0	0	0	0	0	0	0	221	0	0

Appendix A
Year 2000 Land Use Data

TAZ	EMPLOYMENT				SCHOOLS		MOTEL	HOUSEHOLDS		
	Total	Retail	Service	Other	Staff	Students	ROOMS	Single Family	Multi-Family	Mobile Homes
81	10	10	0	0	0	0	0	130	0	0
82	10	10	0	0	0	0	0	232	0	0
83	75	0	62	13	0	0	0	109	0	0
84	10	0	5	5	0	0	0	0	0	306
85	61	0	0	0	61	568	0	223	0	0
86	5	0	0	5	0	0	0	155	56	0
87	46	0	46	0	0	0	0	48	0	93
88	110	15	95	0	0	0	0	52	54	0
89	3	0	0	3	0	0	0	11	0	99
90	38	8	15	15	0	0	0	239	60	53
91	278	79	50	68	81	0	69	170	150	18
92	716	39	417	260	0	0	0	0	0	0
93	0	0	0	0	0	0	0	158	46	0
94	707	302	397	8	0	0	182	38	82	38
95	364	256	87	21	0	0	22	107	12	145
96	0	0	0	0	0	0	0	77	2	0
97	169	134	30	5	0	0	20	2	10	0
98	394	281	73	40	0	0	76	0	0	0
99	0	0	0	0	0	0	0	5	122	20
100	2	0	0	2	0	0	0	86	0	0
101	0	0	0	0	0	0	0	277	0	0
102	0	0	0	0	0	0	0	264	0	0
103	93	15	8	0	70	690	0	737	0	227
104	62	6	5	9	42	193	0	860	0	425
105	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0
107	437	10	45	382	0	0	49	0	0	0
108	80	46	34	0	0	0	0	202	113	71
109	240	50	55	135	0	0	0	0	0	0
110	158	0	121	37	0	0	101	14	188	0
111	225	0	0	155	70	790	0	0	0	0
112	0	0	0	0	0	0	0	43	0	0
113	60	23	12	25	0	0	0	178	0	0
114	0	0	0	0	0	0	79	180	0	0
115	60	0	0	0	60	600	0	0	0	0
116	8	8	0	0	0	0	0	528	0	0
117	200	107	73	0	20	196	0	656	12	0
118	130	27	55	4	44	421	0	364	12	0
119	0	0	0	0	0	0	0	264	88	0
120	32	12	10	10	0	0	0	642	243	0
121	778	0	0	394	384	4150	0	0	40	0
122	60	8	27	25	0	0	0	94	0	0
123	0	0	0	0	0	0	0	190	0	0
124	10	5	0	5	0	0	0	152	0	0
125	310	91	93	126	0	0	250	132	207	0
126	1766	235	972	559	0	0	0	30	26	0
127	1063	208	470	348	37	286	102	97	172	0
128	81	48	33	0	0	0	0	313	37	0
129	90	10	80	0	0	0	0	450	120	0
130	865	437	214	214	0	0	0	44	42	0
131	889	277	348	241	23	150	219	70	46	0
132	851	570	210	71	0	0	245	99	32	29
133	154	0	4	150	0	0	0	4	0	0
134	0	0	0	0	0	0	0	330	60	0
135	0	0	0	0	0	0	0	110	0	0
136	12	12	0	0	0	0	0	10	288	50
137	0	0	0	0	0	0	0	4	0	0
138	95	0	65	30	0	0	0	0	0	0
139	24	0	24	0	0	0	0	12	12	0
140	202	37	0	165	0	0	0	1	0	0
141	0	0	0	0	0	0	0	0	0	0
142	0	0	0	0	0	0	0	0	0	0
143	30	5	20	5	0	0	0	75	182	0
144	0	0	0	0	0	0	0	140	0	0
145	40	0	20	20	0	0	0	0	0	0
146	10	0	0	10	0	0	0	115	37	0
147	0	0	0	0	0	0	0	237	74	0
148	405	5	165	235	0	0	0	0	0	0
149	20	20	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	15	0	0
151	0	0	0	0	0	0	0	0	0	0
152	30	10	0	20	0	0	0	225	0	0
153	0	0	0	0	0	0	0	2	0	0
TOTALS	22882	5440	8037	7664	1741	17368	2151	19303	4905	2315

Appendix B

Year 2000 Calibration

Appendix B
Screenline Volumes - Weekday PM Peak Hour

Location	PM Peak Hour Count		Model Volume		Traffic Count Source
	Northbound/Eastbound	Southbound/Westbound	Northbound/Eastbound	Southbound/Westbound	
East-West Screenline #1: South of Cooley					
Johnson	90	105	90	105	
OB Riley	95	45	45	25	
US 20	780	545	835	560	October 1999 Traffic Study
US 97	1365	825	1340	805	November 1999 ODOT Count
9th	no data	no data	55	85	
Deschutes Market	275	185	270	185	May 1999 Deschutes County Count
Total (less 18th)	**2605**	**1705**	**2580**	**1680**	
		Screenline/Count	**99%**	**99%**	
East-West Screenline #2: North of Newport/Greenwood					
Mount Washington	110	90	175	120	October 1999 ODOT Count
College	235	245	175	270	November 1999 ODOT Count
9th	170	110	265	180	November 1999 ODOT Count
Aubrey	45	55	90	75	August 1999 ODOT Count
Wall	50	465	50	505	March 1999 ODOT Count
Bond	495	0	405	0	
Parkway/Division	1110	1515	1385	1220	November/December 1999 ODOT Counts
US 97	1070	930	745	760	
4th	165	250	215	245	February 2000 Manual Count
8th	505	640	610	585	May 1999 ODOT Count
Williamson	140	110	200	275	
27th	650	825	565	650	May 1999 ODOT Count
Total	**4745**	**5235**	**4880**	**4885**	
		Screenline/Count	**103%**	**93%**	
East-West Screenline#3: North of Reed Market					
Century Drive	450	370	470	315	
Parkway/Division	860	1165	1100	1305	July 1999 Manual Count
3rd/HWY97	1080	1320	1055	1285	1998 ODOT Traffic Volume Tables
9th	235	290	145	185	1999 City Traffic Volume Binder
15th	250	475	165	270	August 1999 Manual Count
Pettigrew	85	85	85	55	
27th	510	800	520	695	August 1998 Manual Count
Total	**3470**	**4505**	**3540**	**4110**	
		Screenline/Count	**102%**	**91%**	
East-West Screenline #4: North of Knott					
US 97	965	1250	845	905	
China Hat	45	75	35	60	February 2000 Manual Count
Country Club	85	120	20	35	
Brasierhous	105	140	135	190	
15th	90	175	155	190	February 2000 Manual Count
27th	190	220	310	365	
Total	**1480**	**1980**	**1500**	**1745**	
		Screenline/Count	**101%**	**88%**	
New East-West Screenline #5: North of Mount Washington Drive/Butler Market Road					
Putnam					
US 97	1070	1980	1190	1825	July 1999 Manual Count
Parkway	1435	545	1445	565	November/December 1999 ODOT Counts
Boyd Acres	310	505	190	340	June 1998 Manual Count
Jnson	125	260	110	270	February 2000 Manual Count
Jnson	80	55	130	170	August 1997 Manual Count
Deschutes Market	260	170	275	205	1999 Deschutes County Count
Hamby	165	115	150	150	1999 Deschutes County Count
Total	**3445**	**3630**	**3500**	**3525**	
		Screenline/Count	**102%**	**97%**	
North-South Screenline #1: East of College Way/West of 14th					
Portland	95	75	75	35	November 1999 ODOT Count
Newport	510	515	575	515	November 1999 ODOT Count
Galveston	65	75	45	55	November 1999 ODOT Count
Simpson	90	125	70	95	November 1999 ODOT Count
Total	**760**	**790**	**765**	**700**	
		Screenline/Count	**101%**	**89%**	

Appendix B
Screenline Volumes - Weekday PM Peak Hour

Location	PM Peak Hour Count		Model Volume		Traffic Count Source
	North/East	South/West	North/East	South/West	
North-South Screenline #2: West of Deschutes River					
Mount Washington Drive	150	160	345	205	October 1999 ODOT Count
Portland	355	500	365	420	November 1999 ODOT Count
Newport	520	795	780	840	November 1999 ODOT Count
Galveston	415	630	415	655	October 1999 ODOT Count
Colorado	715	485	815	555	January 2000 Traffic Study
Total	**2155**	**2570**	**2520**	**2675**	
		Screenline/Count	**117%**	**104%**	
North-South Screenline #3: East of the Parkway					
Conley	220	135	215	120	November 1999 ODOT Count
Empire	495	480	425	355	June 1999 ODOT Count
Butler Market	450	605	295	475	Lancaster Eng Traffic Study
Revere	715	695	705	505	February 2000 Manual Count
Greenwood	920	760	650	485	February 2000 Manual Count
Franklin	830	625	735	885	February 2000 Manual Count
Colorado	180	70	145	115	September 1999 Traffic Study
Wilson	425	310	320	275	February 2000 Manual Count
Reed Market	290	230	290	105	July 1999 Manual Count
US 97	1080	1370	1115	1350	August 1999 Manual Count
Total	**5605**	**5280**	**4895**	**4670**	
		Screenline/Count	**87%**	**88%**	
North-South Screenline#4: West of 8th/9th					
Butler Market	665	455	575	440	February 2000 Manual Count
Revere	645	415	855	725	February 2000 Manual Count
Greenwood	1055	1085	895	620	May 1999 ODOT Count
Franklin	425	370	660	435	August 1999 Manual Count
Wilson	405	405	290	350	February 2000 Manual Count
Reed Market	870	645	730	590	February 2000 Manual Count
Brosterhous	140	150	80	135	February 2000 Manual Count
Murphy	150	175	80	70	February 2000 Manual Count
Knott	155	100	415	485	
Total	**4310**	**3800**	**4560**	**3840**	
		Screenline/Count	**106%**	**101%**	
North-South Screenline #5: West of 27th					
Butler Market	655	445	685	505	August 1999 Manual Count
Wells Acres	150	140	100	160	February 2000 Manual Count
Nett	270	425	635	475	May 1999 ODOT Count
US 20	810	550	915	500	February 1999 Traffic Study
Bear Creek	160	115	215	230	August 1998 Manual Count
Reed Market	310	325	430	440	
Ferguson	no data	no data	65	65	
Knott	no data	no data	235	260	
Total (less Ferguson and Knott)	**2355**	**1980**	**2980**	**2310**	
		Screenline/Count	**126.5%**	**116.7%**	

Appendix C

Year 2020 Land Use Forecasts

Appendix C-1
Year 2020 Land Use Forecasts

TAZ	EMPLOYMENT				SCHOOLS		MOTEL	HOUSEHOLDS		
	Total	Retail	Service	Other	Staff	Students	ROOMS	Single Family	Multi-Family	Mobile Homes
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19	54	10	3	41	0	0	0	425	0	25
20	870	190	170	510	0	0	299	91	4	9
21	2034	1464	384	186	0	0	0	0	0	0
22	0	0	0	0	0	0	0	206	0	120
23	1003	51	34	918	0	0	0	84	124	28
24	0	0	0	0	0	0	0	75	0	0
25	155	0	0	0	155	1550	0	113	0	0
26	0	0	0	0	0	0	0	80	0	0
27	280	80	200	0	0	0	0	1023	372	0
28	10	0	10	0	0	0	0	216	0	0
29	40	20	20	0	0	0	0	160	0	0
30	3634	50	20	3564	0	0	0	4	0	0
31	1547	730	604	213	0	0	640	0	0	0
32	0	0	0	0	0	0	0	59	0	0
33	0	0	0	0	0	0	0	21	0	0
34	845	195	381	269	0	0	0	289	186	0
35	40	0	0	40	0	0	0	285	2	0
36	0	0	0	0	0	0	0	45	0	0
37	0	0	0	0	0	0	0	103	0	0
38	10	0	0	10	0	0	0	112	0	0
39	100	0	0	100	0	0	0	2	0	0
40	71	0	0	6	65	662	0	270	0	0
41	0	0	0	0	0	0	0	479	0	0
42	60	20	10	0	30	350	0	400	0	38
43	371	0	320	6	45	350	0	830	118	0
44	735	0	610	0	125	1325	0	112	42	0
45	1421	0	1421	0	0	0	0	0	0	0
46	350	0	285	0	65	650	0	473	565	0
47	23	0	0	23	0	0	0	371	0	0
48	6	0	6	0	0	0	0	370	0	0
49	57	5	30	22	0	0	0	461	262	0
50	3	0	3	0	0	0	0	146	350	0
51	241	167	46	28	0	0	9	376	4	0
52	155	0	0	0	155	1500	0	0	0	0
53	1234	0	1214	20	0	0	0	63	646	0
54	117	20	87	10	0	0	0	0	0	0
55	662	556	106	0	0	0	79	77	734	75
56	117	12	105	0	0	0	0	420	505	190
57	19	5	0	14	0	0	0	346	248	0
58	0	0	0	0	0	0	0	123	0	0
59	165	14	136	15	0	0	0	223	0	0
60	0	0	0	0	0	0	0	314	39	0
61	0	0	0	0	0	0	0	214	0	0
62	193	106	70	17	0	0	0	182	248	207
63	0	0	0	0	0	0	0	192	12	0
64	8	0	8	0	0	0	0	117	114	0
65	402	70	75	257	0	0	0	0	0	0
66	65	0	0	0	65	680	0	71	251	25
67	191	20	0	171	0	0	0	3	0	0
68	637	60	10	567	0	0	0	0	4	0
69	161	0	0	36	125	1432	0	222	41	0
70	14	0	12	2	0	0	0	119	0	0
71	0	0	0	0	0	0	0	255	0	0
72	0	0	0	0	0	0	0	232	0	0
73	5	0	5	0	0	0	0	209	0	0
74	65	0	0	0	65	650	0	145	0	0
75	0	0	0	0	0	0	0	201	0	148
76	125	0	0	0	125	1350	0	440	0	200
77	95	0	5	0	90	800	0	164	0	0
78	4	0	4	0	0	0	0	117	0	14
79	100	0	0	100	0	0	0	270	0	0
80	0	0	0	0	0	0	0	226	0	0
81	10	10	0	0	0	0	0	145	0	0

Appendix C-1
Year 2020 Land Use Forecasts

TAZ	EMPLOYMENT				SCHOOLS		MOTEL	HOUSEHOLDS		
	Total	Retail	Service	Other	Staff	Students	ROOMS	Single Family	Multi-Family	Mobile Homes
82	10	10	0	0	0	0	0	262	0	0
83	75	0	62	13	0	0	0	145	0	200
84	90	80	5	5	0	0	0	0	0	306
85	65	0	0	0	65	675	0	503	0	200
86	5	0	0	5	0	0	0	165	56	0
87	46	0	46	0	0	0	0	76	0	193
88	110	15	95	0	0	0	0	66	54	0
89	3	0	0	3	0	0	0	11	496	99
90	398	8	15	375	0	0	0	239	122	253
91	317	94	65	68	90	0	69	170	150	18
92	2286	519	1447	320	0	0	50	0	0	0
93	0	0	0	0	0	0	0	188	46	0
94	747	342	397	8	0	0	182	38	82	38
95	449	341	87	21	0	0	22	107	12	145
96	0	0	0	0	0	0	0	105	2	0
97	361	326	30	5	0	0	20	2	10	0
98	419	296	83	40	0	0	76	0	0	0
99	0	0	0	0	0	0	0	5	370	70
100	2	0	0	2	0	0	0	126	0	0
101	10	0	10	0	0	0	0	297	50	0
102	0	0	0	0	0	0	0	608	0	0
103	598	355	178	0	65	650	0	779	0	267
104	73	12	10	9	42	200	0	1460	0	625
105	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0
107	743	180	181	382	0	0	49	0	0	0
108	148	46	102	0	0	0	0	212	125	71
109	240	50	55	135	0	0	0	0	0	0
110	368	85	226	57	0	0	131	36	388	0
111	960	520	200	155	85	760	0	0	0	0
112	0	0	0	0	0	0	0	80	0	0
113	60	23	12	25	0	0	0	428	0	0
114	0	0	0	0	0	0	79	295	0	0
115	1571	304	170	972	125	1400	0	206	0	0
116	8	8	0	0	0	0	0	634	20	0
117	200	107	73	0	20	165	0	656	12	0
118	141	27	65	4	45	425	0	364	12	0
119	0	0	0	0	0	0	0	264	88	0
120	268	72	30	89	77	830	0	664	629	0
121	778	0	0	394	384	4150	0	0	40	0
122	60	8	27	25	0	0	0	144	0	0
123	0	0	0	0	0	0	0	240	0	0
124	95	56	34	5	0	0	100	409	0	0
125	310	91	93	126	0	0	250	132	269	0
126	1906	275	1072	559	0	0	0	0	26	0
127	1291	308	590	348	45	156	102	57	172	0
128	175	91	84	0	0	0	0	313	50	0
129	90	10	80	0	0	0	0	474	120	0
130	916	437	214	265	0	0	0	44	115	0
131	886	277	348	241	20	100	219	70	46	0
132	871	590	210	71	0	0	245	99	32	29
133	562	0	4	558	0	0	0	0	0	0
134	0	0	0	0	0	0	0	330	60	0
135	0	0	0	0	0	0	0	110	0	0
136	42	12	30	0	0	0	0	10	528	130
137	100	60	40	0	0	0	0	529	0	0
138	287	0	185	102	0	0	0	0	0	0
139	134	0	124	10	0	0	0	12	17	0
140	422	197	40	185	0	0	0	1	0	0
141	0	0	0	0	0	0	0	0	0	0
142	0	0	0	0	0	0	0	153	0	0
143	30	5	20	5	0	0	0	92	182	0
144	60	20	40	0	0	0	0	180	74	0
145	55	0	30	25	0	0	0	0	0	0
146	10	0	0	10	0	0	0	135	47	0
147	0	0	0	0	0	0	0	247	74	0
148	702	107	360	235	0	0	0	45	365	0
149	244	200	44	0	0	0	0	30	0	0
150	90	0	0	0	90	825	0	20	0	0
151	0	0	0	0	0	0	0	0	0	0
152	40	20	5	15	0	0	0	300	0	0
153	0	0	0	0	0	0	0	226	0	0
154	65	0	0	0	65	650	0	467	125	0
155	334	234	100	0	0	0	0	503	68	0
TOTALS	39830	10673	13812	13017	2328	22285	2621	27334	10005	3723

Appendix C-2
2020 TDM Alternative Land Use Forecast

TAZ	EMPLOYMENT				SCHOOLS		MOTEL	HOUSEHOLDS		
	Total	Retail	Service	Other	Staff	Students	ROOMS	Single Family	Multi-Family	Mobile Homes
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19	54	10	3	41	0	0	0	425	0	25
20	870	190	170	510	0	0	299	91	4	9
21	2034	1464	384	186	0	0	0	0	0	0
22	0	0	0	0	0	0	0	175	0	120
23	1003	51	34	918	0	0	0	84	124	28
24	0	0	0	0	0	0	0	75	0	0
25	155	0	0	0	155	1550	0	113	0	0
26	0	0	0	0	0	0	0	80	0	0
27	280	80	200	0	0	0	0	923	272	0
28	10	0	10	0	0	0	0	216	0	0
29	40	20	20	0	0	0	0	160	0	0
30	3634	50	20	3564	0	0	0	4	0	0
31	1547	730	604	213	0	0	640	0	0	0
32	0	0	0	0	0	0	0	59	0	0
33	0	0	0	0	0	0	0	21	0	0
34	845	195	381	269	0	0	0	289	186	0
35	40	0	0	40	0	0	0	285	2	0
36	0	0	0	0	0	0	0	45	0	0
37	0	0	0	0	0	0	0	103	0	0
38	10	0	0	10	0	0	0	112	0	0
39	100	0	0	100	0	0	0	2	0	0
40	71	0	0	6	65	662	0	270	0	0
41	0	0	0	0	0	0	0	429	0	0
42	60	20	10	0	30	350	0	400	0	38
43	371	0	320	6	45	350	0	755	118	0
44	735	0	610	0	125	1325	0	112	42	0
45	1421	0	1421	0	0	0	0	0	0	0
46	350	0	285	0	65	650	0	473	565	0
47	23	0	0	23	0	0	0	371	0	0
48	6	0	6	0	0	0	0	370	0	0
49	57	5	30	22	0	0	0	461	262	0
50	3	0	3	0	0	0	0	146	350	0
51	241	167	46	28	0	0	9	376	4	0
52	155	0	0	0	155	1500	0	0	0	0
53	1234	0	1214	20	0	0	0	63	646	0
54	117	20	87	10	0	0	0	0	0	0
55	617	516	101	0	0	0	79	77	659	75
56	112	12	100	0	0	0	0	420	505	190
57	19	5	0	14	0	0	0	246	248	0
58	0	0	0	0	0	0	0	123	0	0
59	165	14	136	15	0	0	0	223	0	0
60	0	0	0	0	0	0	0	314	39	0
61	0	0	0	0	0	0	0	214	0	0
62	193	106	70	17	0	0	0	182	248	207
63	0	0	0	0	0	0	0	192	12	0
64	8	0	8	0	0	0	0	88	703	0
65	402	70	75	257	0	0	0	0	0	0
66	65	0	0	0	65	680	0	71	251	25
67	191	20	0	171	0	0	0	3	0	0
68	637	60	10	567	0	0	0	0	4	0
69	161	0	0	36	125	1432	0	222	41	0
70	14	0	12	2	0	0	0	119	0	0
71	0	0	0	0	0	0	0	227	211	0
72	0	0	0	0	0	0	0	232	0	0
73	5	0	5	0	0	0	0	209	0	0
74	65	0	0	0	65	650	0	145	0	0
75	0	0	0	0	0	0	0	201	0	148
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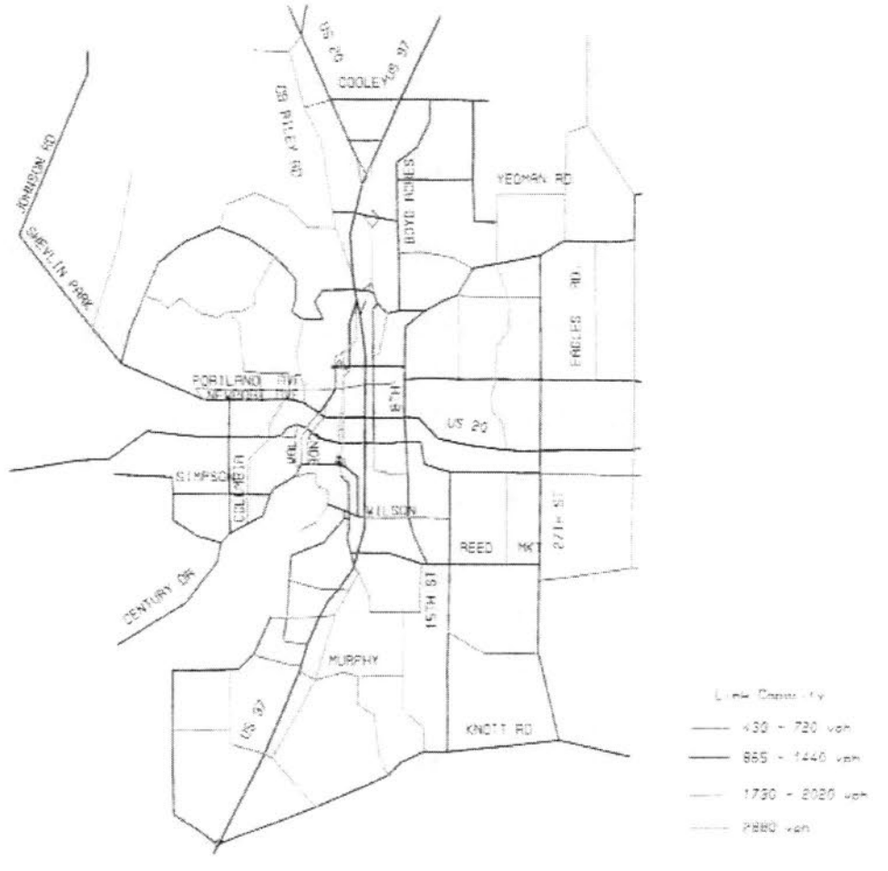
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79	100	0	0	100	0	0	0	270	0	0
80	0	0	0	0	0	0	0	226	0	0
81	10	10	0	0	0	0	0	145	0	0
82	10	10	0	0	0	0	0	262	0	0
83	75	0	62	13	0	0	0	145	0	200
84	70	60	5	5	0	0	0	0	0	306
85	65	0	0	0	65	675	0	411	186	200
86	5	0	0	5	0	0	0	165	56	0
87	46	0	46	0	0	0	0	76	0	193
88	110	15	95	0	0	0	0	66	54	0
89	3	0	0	3	0	0	0	11	296	99
90	398	8	15	375	0	0	0	239	122	253
91	307	84	65	68	90	0	69	170	150	18
92	2246	479	1447	320	0	0	50	0	0	0
93	0	0	0	0	0	0	0	188	46	0
94	717	317	392	8	0	0	182	38	82	38
95	424	316	87	21	0	0	22	107	12	145
96	0	0	0	0	0	0	0	105	2	0
97	341	306	30	5	0	0	20	2	10	0
98	409	286	83	40	0	0	76	0	0	0
99	0	0	0	0	0	0	0	5	370	70
100	2	0	0	2	0	0	0	126	0	0
101	10	0	10	0	0	0	0	297	50	0
102	0	0	0	0	0	0	0	508	0	0
103	588	345	178	0	65	650	0	779	0	267
104	73	12	10	9	42	200	0	1460	0	625
105	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0
107	743	180	181	382	0	0	49	0	0	0
108	148	46	102	0	0	0	0	212	125	71
109	240	50	55	135	0	0	0	0	0	0
110	368	85	226	57	0	0	131	36	388	0
111	960	520	200	155	85	760	0	0	0	0
112	0	0	0	0	0	0	0	80	0	0
113	60	23	12	25	0	0	0	428	0	0
114	0	0	0	0	0	0	79	295	0	0
115	1571	304	170	972	125	1400	0	206	0	0
116	8	8	0	0	0	0	0	634	20	0
117	200	107	73	0	20	165	0	356	300	0
118	141	27	65	4	45	425	0	364	12	0
119	0	0	0	0	0	0	0	264	88	0
120	268	72	30	89	77	830	0	464	821	0
121	778	0	0	394	384	4150	0	0	40	0
122	60	8	27	25	0	0	0	144	0	0
123	0	0	0	0	0	0	0	240	0	0
124	95	56	34	5	0	0	100	409	0	0
125	310	91	93	126	0	0	250	132	269	0
126	1906	275	1072	559	0	0	0	0	26	0
127	1236	308	535	348	45	156	102	57	203	0
128	145	91	54	0	0	0	0	313	97	0
129	90	10	80	0	0	0	0	474	120	0
130	916	437	214	265	0	0	0	44	115	0
131	886	277	348	241	20	100	219	70	46	0
132	871	590	210	71	0	0	245	99	32	29
133	562	0	4	558	0	0	0	0	0	0
134	0	0	0	0	0	0	0	330	60	0
135	0	0	0	0	0	0	0	110	0	0
136	42	12	30	0	0	0	0	10	528	130
137	100	60	40	0	0	0	0	479	0	0
138	287	0	185	102	0	0	0	0	0	0
139	134	0	124	10	0	0	0	12	17	0
140	422	197	40	185	0	0	0	1	0	0
141	0	0	0	0	0	0	0	0	0	0
142	0	0	0	0	0	0	0	153	0	0
143	30	5	20	5	0	0	0	92	182	0
144	60	20	40	0	0	0	0	180	74	0
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146	10	0	0	10	0	0	0	135	47	0
147	0	0	0	0	0	0	0	247	74	0
148	702	107	360	235	0	0	0	45	365	0
149	244	200	44	0	0	0	0	30	0	0
150	90	0	0	0	90	825	0	20	0	0
151	0	0	0	0	0	0	0	0	0	0
152	40	20	5	15	0	0	0	275	0	0
153	0	0	0	0	0	0	0	76	0	0
154	65	0	0	0	65	650	0	467	125	0
155	334	234	100	0	0	0	0	503	68	0
TOTALS	39830	10673	13812	13017	2328	22285	2621	25918	11422	3723

Appendix D

Link Capacity Assumptions

BASE NETWORK

emme/2



LINKS
typeFT 150
COL IND JL3

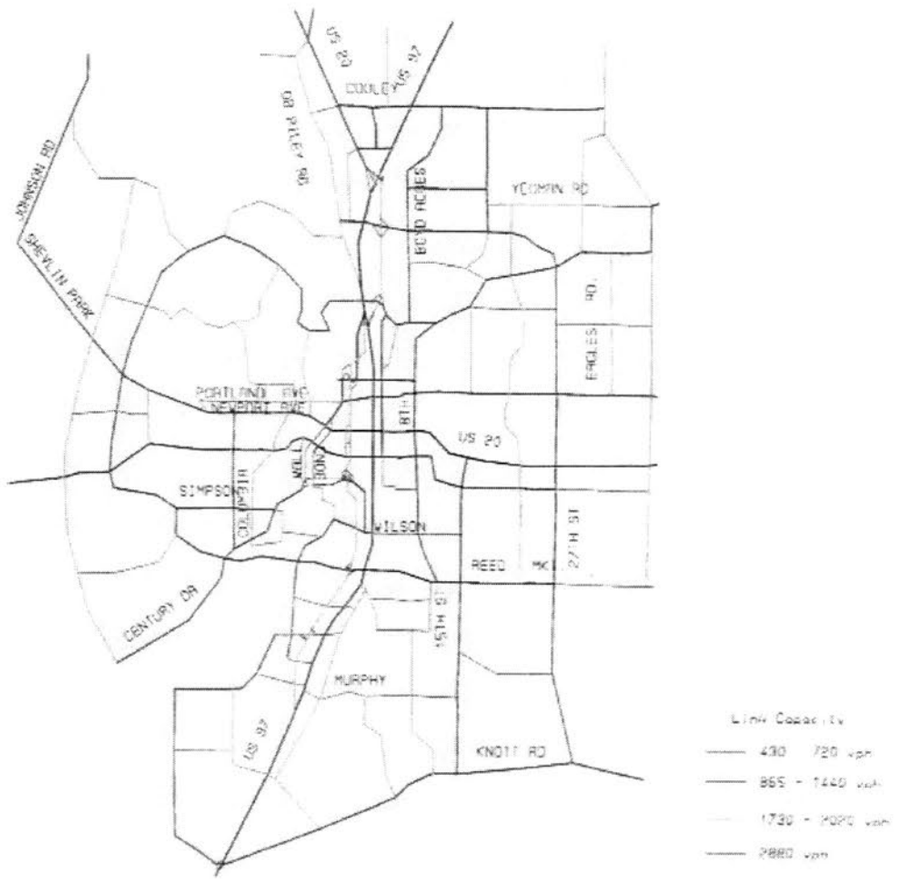
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821737/ 888484

PMME/2 PROJECT City of Bend
SCENARIO 1 2000 Average Weekday PM Peak Hour

Link Capacity

00-06-14 10:54
MODULE 2.13
UNITS veh

BASE NETWORK



emme/2

LINKS
typeA 150
COL IND UL3

WINDOW
752624/ 846650
821737/ 888484

EMME/2 PROJECT City of Bend
SCENARIO / 2020 Combined with 5-Lanes on 27th RM US20 & Revere

Link Capacity

00 06 14 10 46
MODULE 2 13
KM/NC vph

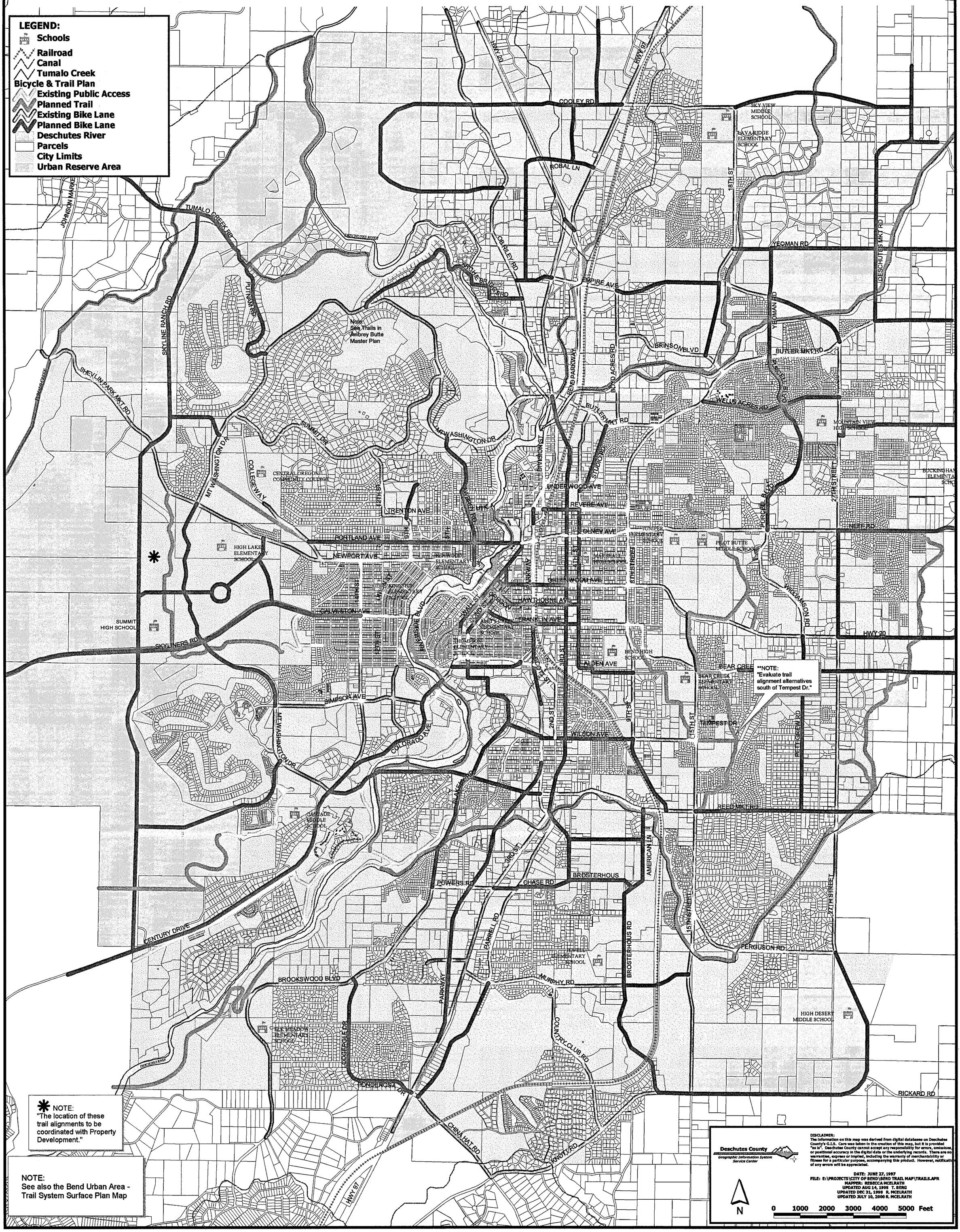
BEND URBAN AREA TRANSPORTATION SYSTEM PLAN

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

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BEND URBAN AREA
BICYCLE AND PRIMARY TRAIL SYSTEM PLAN



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.

****NOTE:**
"Alternative North-South Connections are under consideration between Arizona Ave and Industrial Way."

****NOTE:**
Parkway frontage road alternatives and an extension of Murphy Road are under consideration. (See: TSP Section 6.5)

BEND URBAN AREA ROADWAY SYSTEM PLAN

Map Symbols

- Expressway
- Expressway Under Construction
- Principal Arterial
- Major Arterial
- Proposed Major Arterial
- Minor Arterial
- Proposed Minor Arterial
- Major Collector
- Proposed Major Collector
- Frontage Road
- Railroad
- Tumalo Creek
- Deschutes River
- Parcels
- City Limits
- Urban Reserve Area

N W E S

Deschutes County
Geographic Information System Service Center

Additional copies of this map or other maps are available at the Deschutes County GIS Service Center located in the Deschutes County Community Development Building.
117 NW Lafayette Ave. Bend OR 97701

Phone: 541-388-6575
Fax: 541-385-1764

Web Page: http://newberry.deschutes.org/GISWeb/gis.htm

0 1320 2640 3960 5280 Feet

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MAP PRODUCED BY:

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MAP UPDATED (06-09-00) BY:

Rebecca McElrath
Lead GIS Analyst\Programmer
email: rlm@transport.com

DATE: JULY 10, 2000

BEND URBAN AREA - TRAIL SYSTEM SURFACE PLAN

LEGEND:

TRAIL SURFACE TYPE
- NATIVE
- ALTERNATIVE
- HARD
- SCHOOL
- CANAL
- CREEK
- RAILROAD
- DESCHUTES RIVER
- PARCELS
- BEND CITY LIMITS
- BEND URBAN RESERVE AREA

Note:
See Trails in Awbrey Butte Master Plan

Note:
The location of this trail alignment to be coordinated with Property Develpment

NOTE:
See also Bend Urban Area Bicycle and Primary Trail System Plan

DISCLAIMER:
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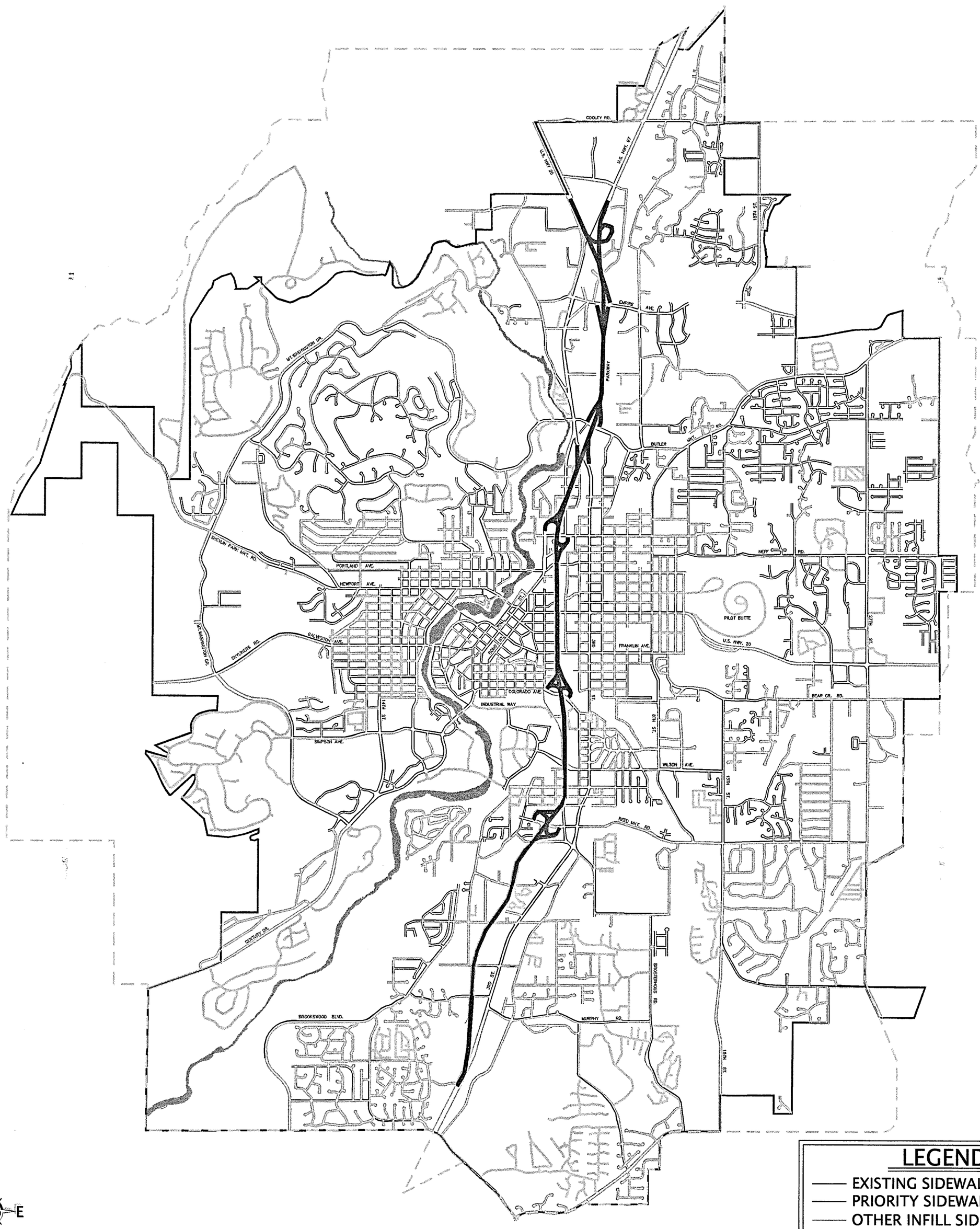
Deschutes County
Geographic Information System
Service Center

DATE: JULY 10, 2000
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N

0 1000 2000 3000 4000 5000 Feet

BEND URBAN AREA
SIDEWALK INVENTORY MAP



N
W E
S

LEGEND

- EXISTING SIDEWALKS
- PRIORITY SIDEWALK NEEDS
- OTHER INFILL SIDEWALK NEEDS
- PRIVATE ROADWAYS
- PARKWAY
- URBAN GROWTH BOUNDARY
- OUTER URBAN RESERVE

MAP ADOPTED BY BEND CITY COUNCIL, OCTOBER 11, 2000

BEND AREA GENERAL PLAN

CHAPTER 7: TRANSPORTATION SYSTEMS

NOTE:

On October 11, 2000, the Bend City Council adopted the Bend Urban Area Transportation System Plan (TSP) by Ordinance No. NS-1756. City Council's action included a simultaneous update of the General Plan, Chapter 7, Transportation Systems. The following sections (TSP sections and exhibit references are noted in ***bold italics***) describing the Transportation Goals, Objectives, Policies, Implementation, Benchmarks and Funding have been extracted from the referenced sections of the Bend TSP. This TSP text has been included in this document to provide the reader with the basic transportation planning framework that is envisioned by the Bend General Plan.

For brevity's sake, the entire TSP text has NOT been included in the updated General Plan. For more detail and specifics concerning transportation planning for the community, the reader is directed to reference the entire Bend Transportation System Plan document.

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TSP sections related only to Objectives, Policies, Implementation Benchmarks and Funding:

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TRANSPORTATION SYSTEM MANAGEMENT..... 6

TRANSPORTATION DEMAND MANAGEMENT..... 6

PEDESTRIAN AND BICYCLE SYSTEMS..... 12

PUBLIC TRANSPORTATION SYSTEM..... 17

STREET SYSTEM..... 20

RAIL SYSTEM..... 26

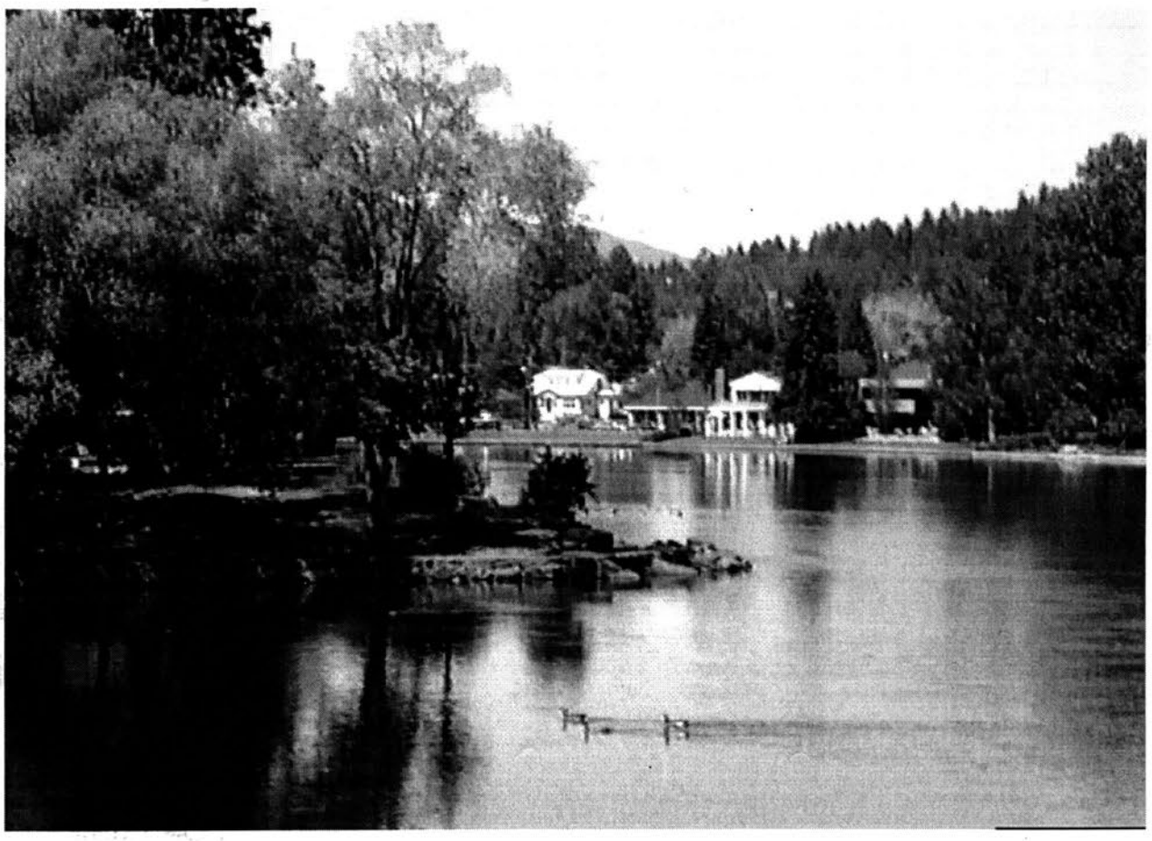
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MAP EXHIBITS

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.



5.0.1 TRANSPORTATION GOALS

5.0.1.1 Goal Statement

"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

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.
- 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.

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.

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.

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.

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.

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

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.

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 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.

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.

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.

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.

Years 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 Primary Trail System Plan Map*** (***Exhibit A***). These trails, and future trail additions, shall support the need for non-motorized travel in the community.

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, and when practical on local streets within commercial and industrial areas. 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) Retrofitting 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.

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.

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, dated October 1997, and subsequent amendments. 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.

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 shall be created and maintained following the design standards described in the Bend Urban Trails Plan, or subsequent updates.

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.

8. The City shall update inventories of existing bike lanes and sidewalks, and identify gaps and missing system segments, and, in conjunction with the Deschutes County Pedestrian and Bicycle Advisory Committee, prioritize these for completion.

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.

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

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.

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

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.

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.

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 is 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" and the "Access Management Policy" (Street Policy No. 4) shall be reviewed and revised, and new street policies shall be adopted if necessary, to:
   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.

14. A grid-like pattern of residential local streets shall be developed whenever practical in order to increase street connectivity within a neighborhood.

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 implement transportation demand management (TDM) and transportation system management (TSM) measures prior to major and minor arterial street widening beyond three lanes. If TDM and TSM techniques are determined insufficient in solving the transportation corridor problems, then an evaluation of the consequences that additional roadway widening may have on adjoining neighborhoods versus the benefits gained by additional street construction should be conducted as a part of the determination of need for a road widening project.
    a) *Consequences* may include: reduced crossing comfort and safety for pedestrians and bicyclists, increased traffic noise impacts, residential or business displacements, increased storm water run-off and water quality impacts, the potential for "generated" traffic and the disruption to neighborhood cohesiveness.
    b) *Benefits* may include: improved traffic flow, bicycle and pedestrian improvements, reduced crash potential, reduced traffic diversion to adjacent neighborhood streets and improved air or noise quality (caused by congestion).

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.

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, and Century Drive along with 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.

Parkway:

28. The Bend Parkway will be planned, constructed, and managed to limit direct access to the facility to meet the objectives of the Access Oregon Highway (AOH) system, to protect the integrity of the route's through capacity, and to promote public safety.

29. 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.

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

Safety:

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

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

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

34. 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.

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

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

<u>Implementation</u>:

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:
   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/Brookswood connection and determine the priority in light of the Southern Bridge Crossing project.
   f) Regarding the study of road connection alternatives between Arizona and Industrial Way (i.e., Bond and Lava streets):

      i) Before finalizing any alternative to the Bond Street connection to the Old Mill District that uses an extension of Lava Road, the City shall conduct a study, with public involvement from the affected neighborhood and other interested parties, of the relative performance of the Bond Street alternatives. This study shall include evaluating the adequacy of the street system to handle anticipated traffic loads, impacts on the affected neighborhood (located between downtown and the Old Mill District) and how those impacts could be mitigated.

      ii) If the study shows that using the Lava Road extension alternative will operate at a more acceptable level of service, minimize neighborhood cut-through traffic and that neighborhood access will be adequately accommodated, the City shall proceed with the completion of the roadway improvements and traffic mitigation measures. It is important that the study demonstrate that adverse traffic impacts on the neighborhood can be mitigated without unduly compromising the residents' ability to enter and leave the neighborhood. Consequently, the study shall include the following elements:
         (1) A mitigation plan that combines traffic control and traffic calming measures that will minimize cut-through traffic through the adjacent neighborhoods while allowing neighborhood residents reasonable ingress and egress to streets adjoining the neighborhood;
         (2) Analyzing the level of service at nearby intersections and making any changes that may be necessary to attain at least an acceptable level of service so long as those improvements can be accomplished within the existing pavement.

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.

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.

Figure 13
5-Bus Route Alternative

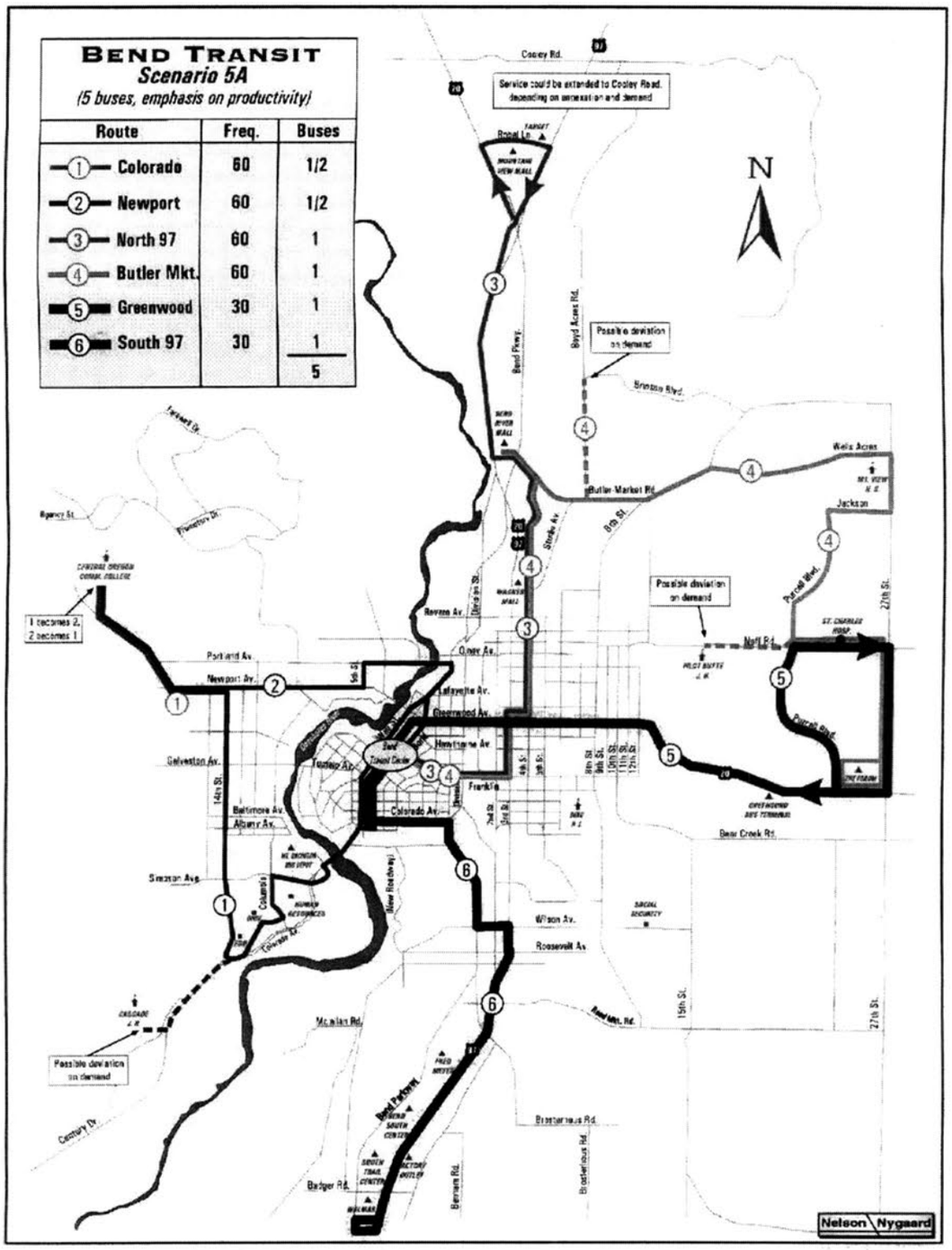


Figure 14
9-Bus Route Alternative

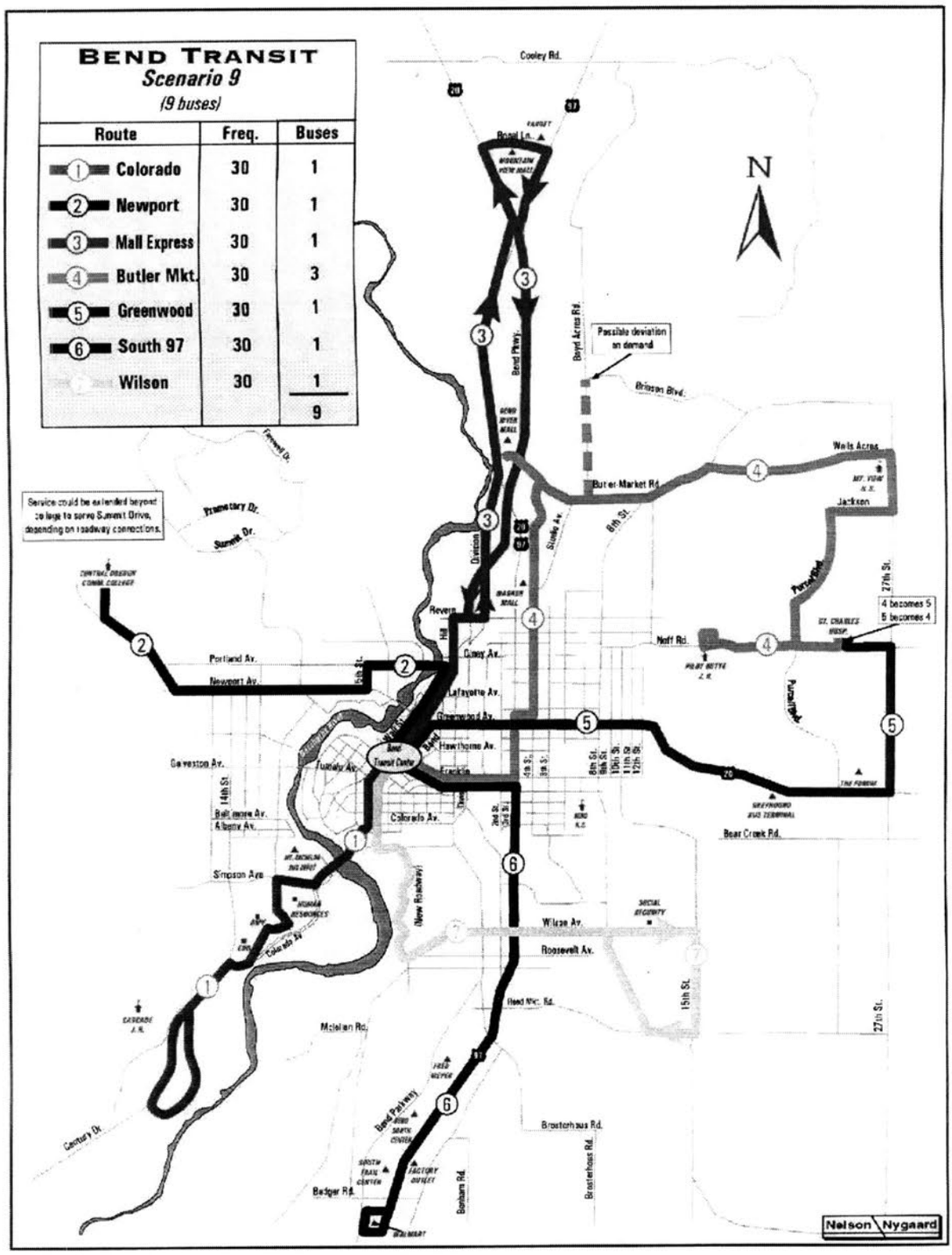


Table 12

Street Functional Classification System

Typical Characteristics

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

Figure 28
Arterial Streetscape
Typicals

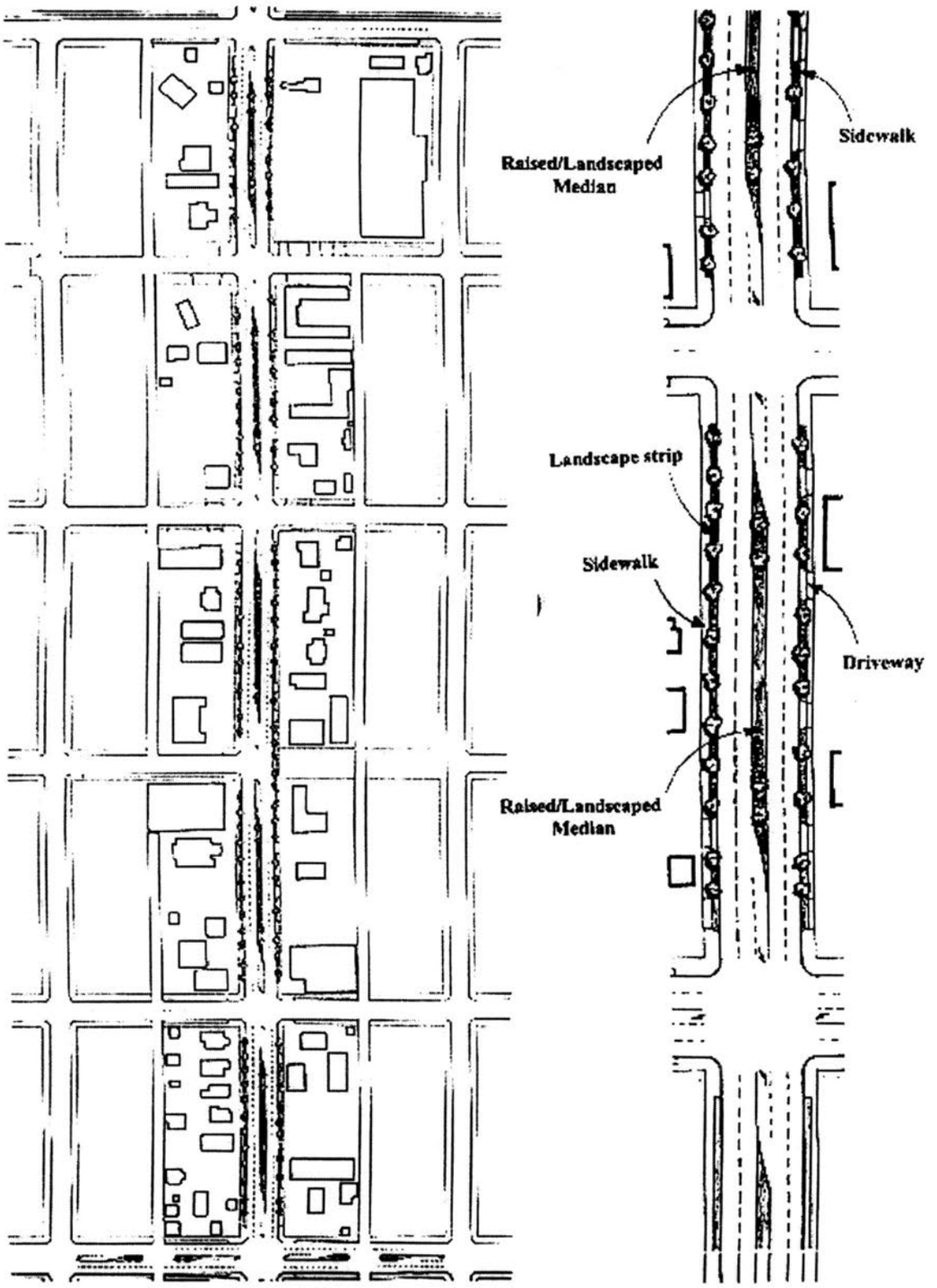
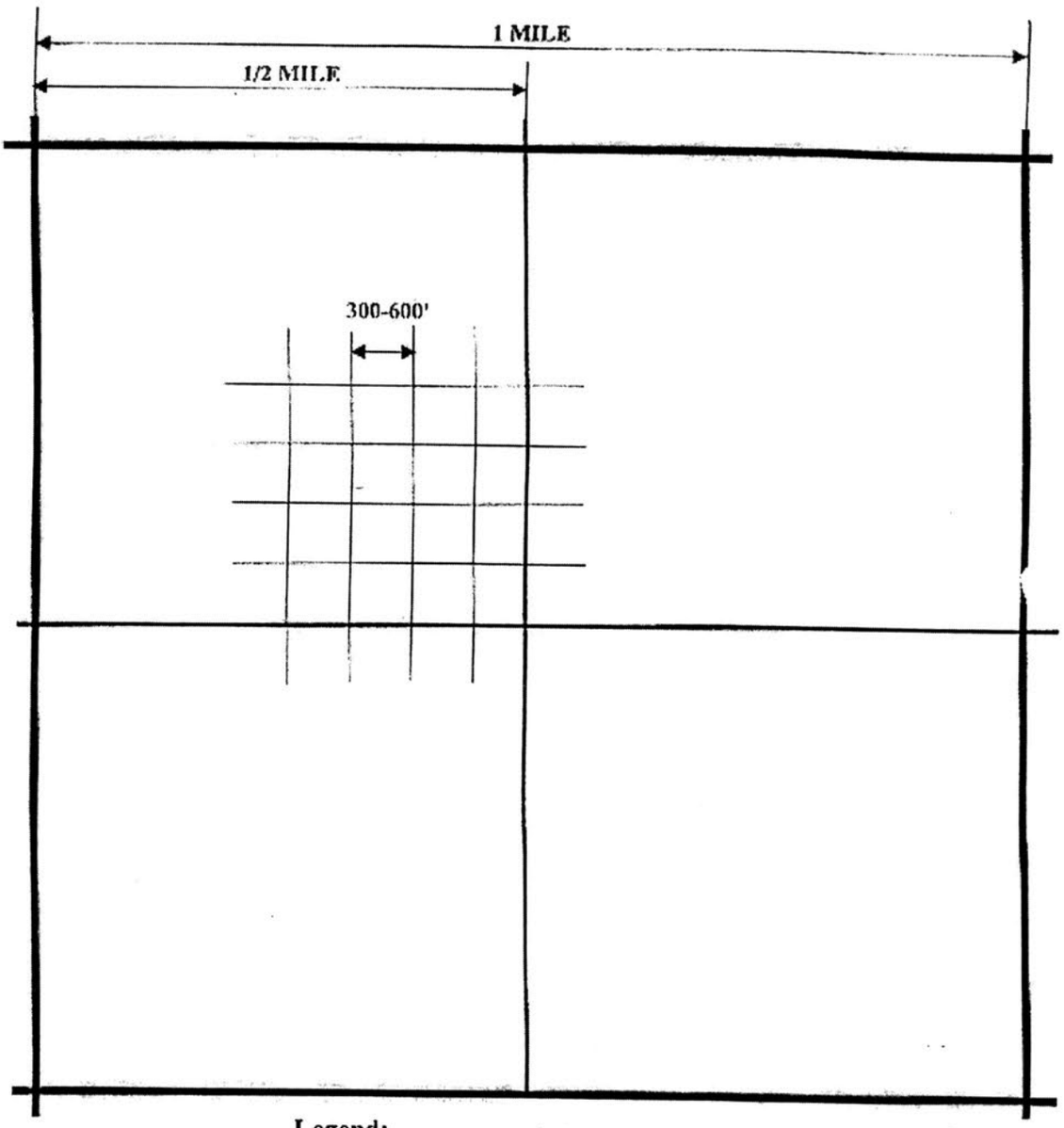


Figure 29
Street Grid System
Typical Street Spacing



7.5 TRANSPORTATION FUNDING AND PRIORITIZATION POLICIES

Funding Policies:

1. The City, County and State shall work together to develop new sources of transportation funding for all transportation modes.

2. The selection of transportation improvements, within the City's yearly Capital Improvement Program plan, shall be subject to public review and comment through a City Council public hearing process.

3. The City shall annually prepare a 5-year capital improvement program for a balanced transportation system.

4. The City should explore ways in which to better inform and involve citizens in the development of transportation system budgets.

5. The City should consider taking steps to utilize transportation system development charges (SDCs) for the full range of road capacity improvements, including: transportation demand management, trails, transit, sidewalks and bike lanes.

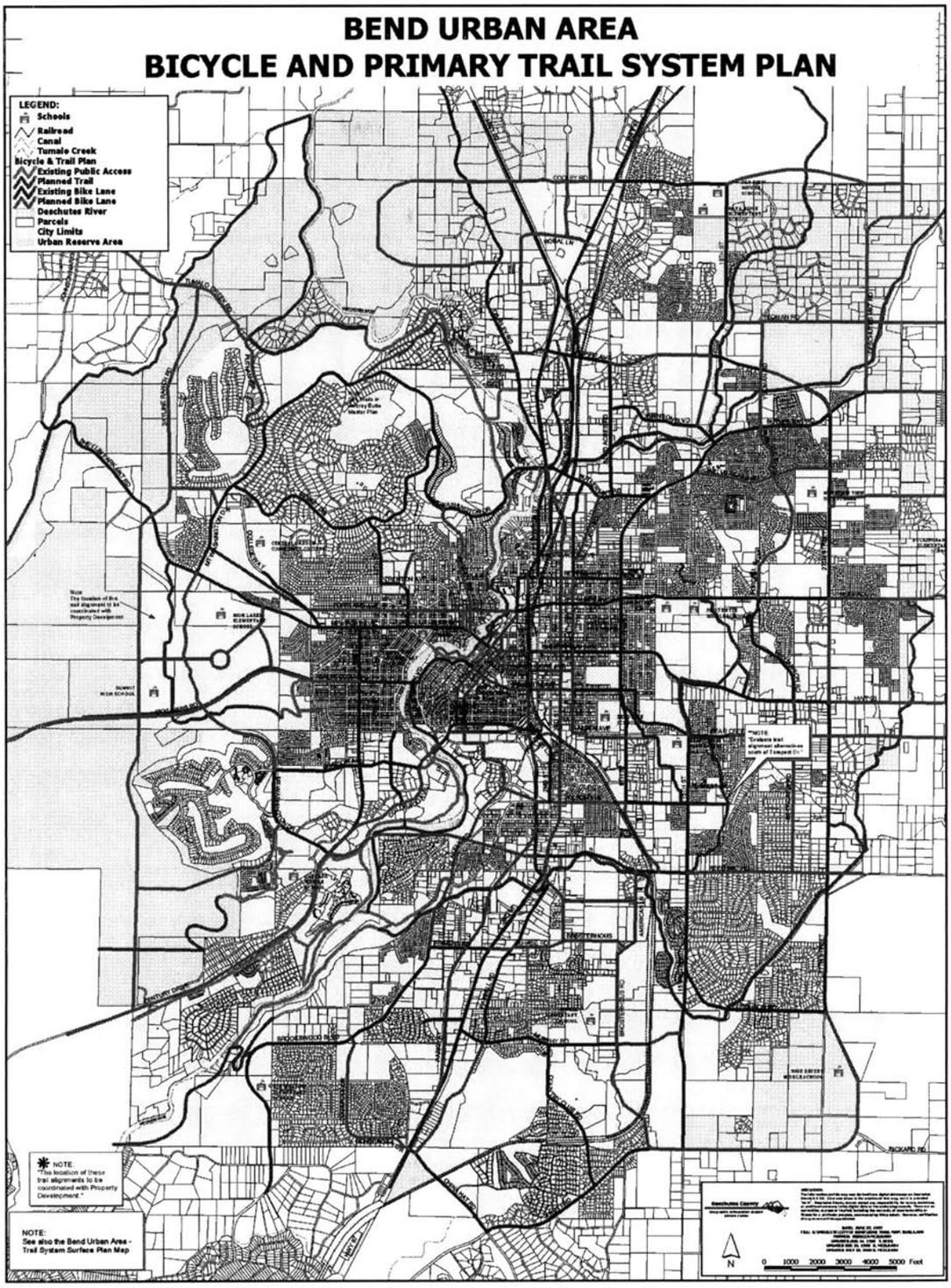
6. Encourage the County to adopt Transportation SDCs and share funding for the cities' projects serving all County residents. This would help reduce sprawl by equalizing development costs between City and County properties. By having SDC money available for transportation improvements, the County could share gas tax revenues with the cities for maintenance of major transportation elements used by all county residents.

Benchmark Policy

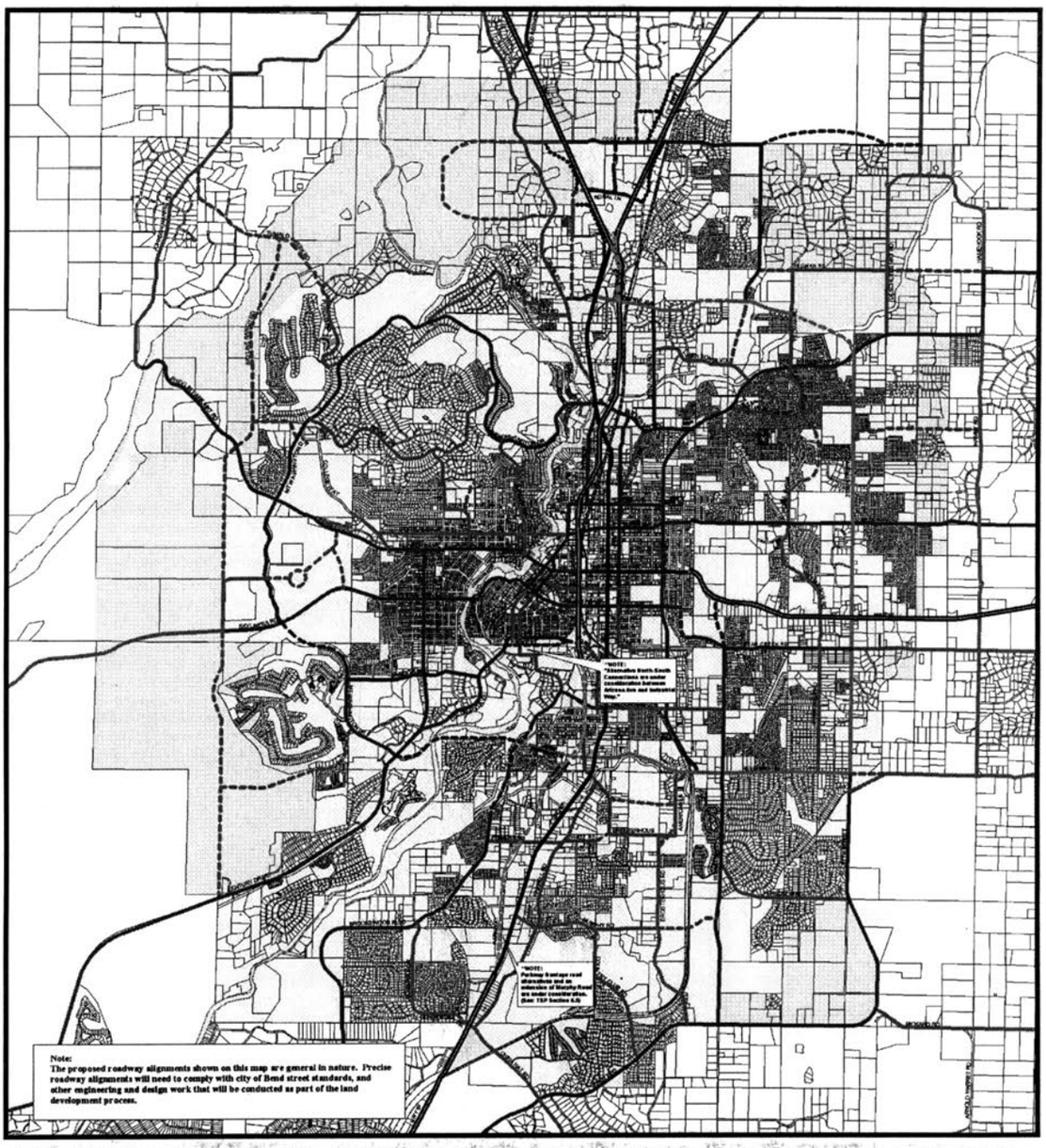
The City shall establish transportation benchmarks to monitor progress toward fulfilling a balanced transportation system.

LIST OF MAP EXHIBITS

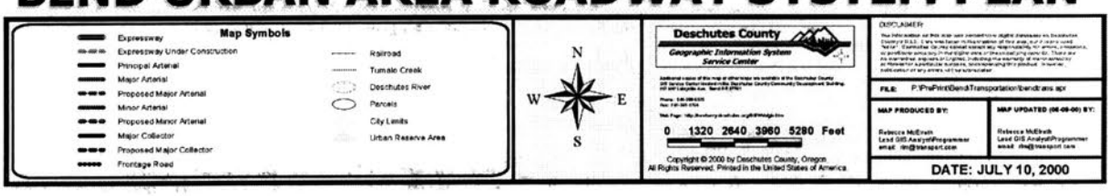
A. Bend Urban Area Bicycle and Primary Trail System Plan Map
B. Bend Urban Area Roadway System Plan Map
C. Bend Urban Area Trail Surface Type Map
D. Bend Urban Area Sidewalk Inventory Map



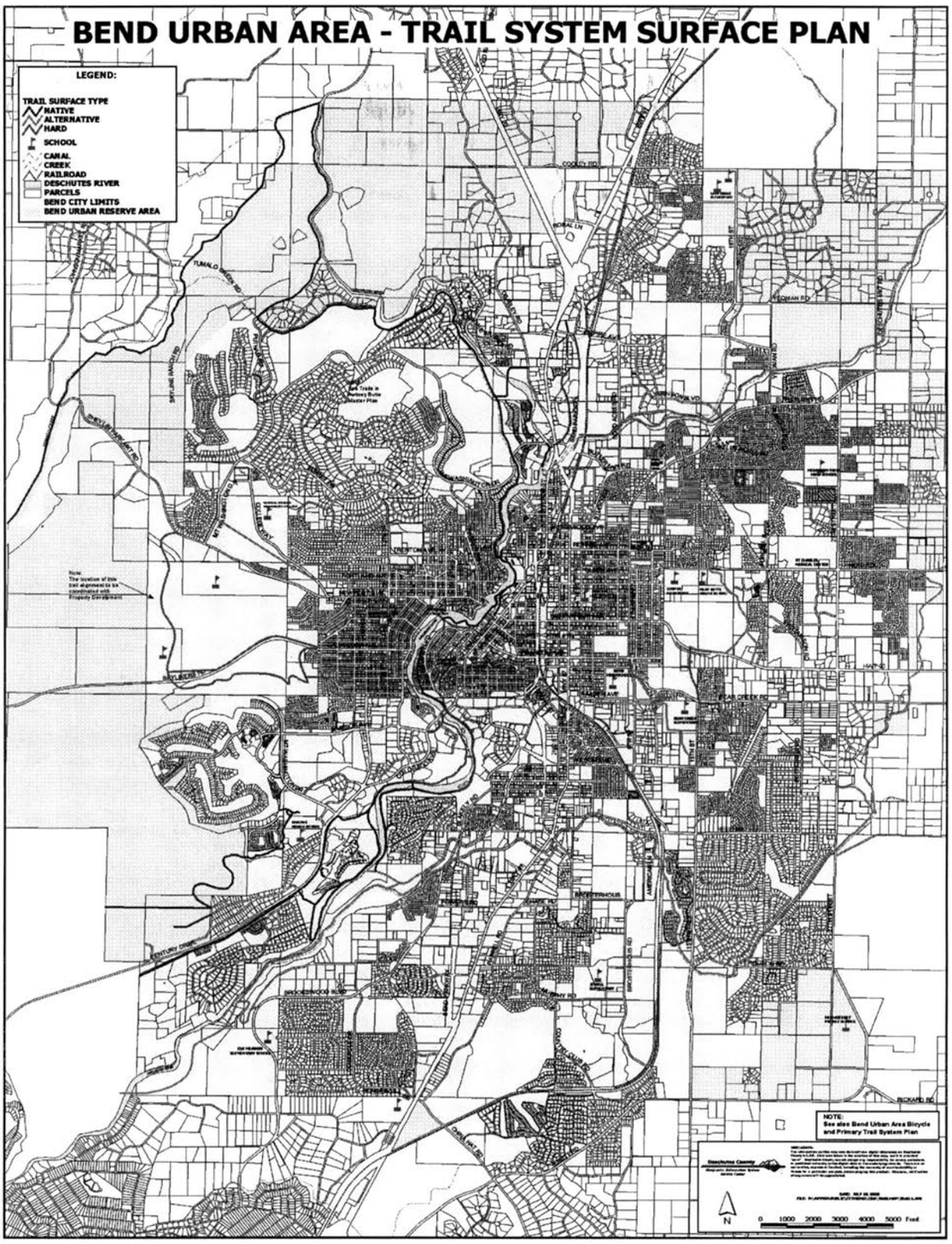
Map Exhibit A



BEND URBAN AREA ROADWAY SYSTEM PLAN

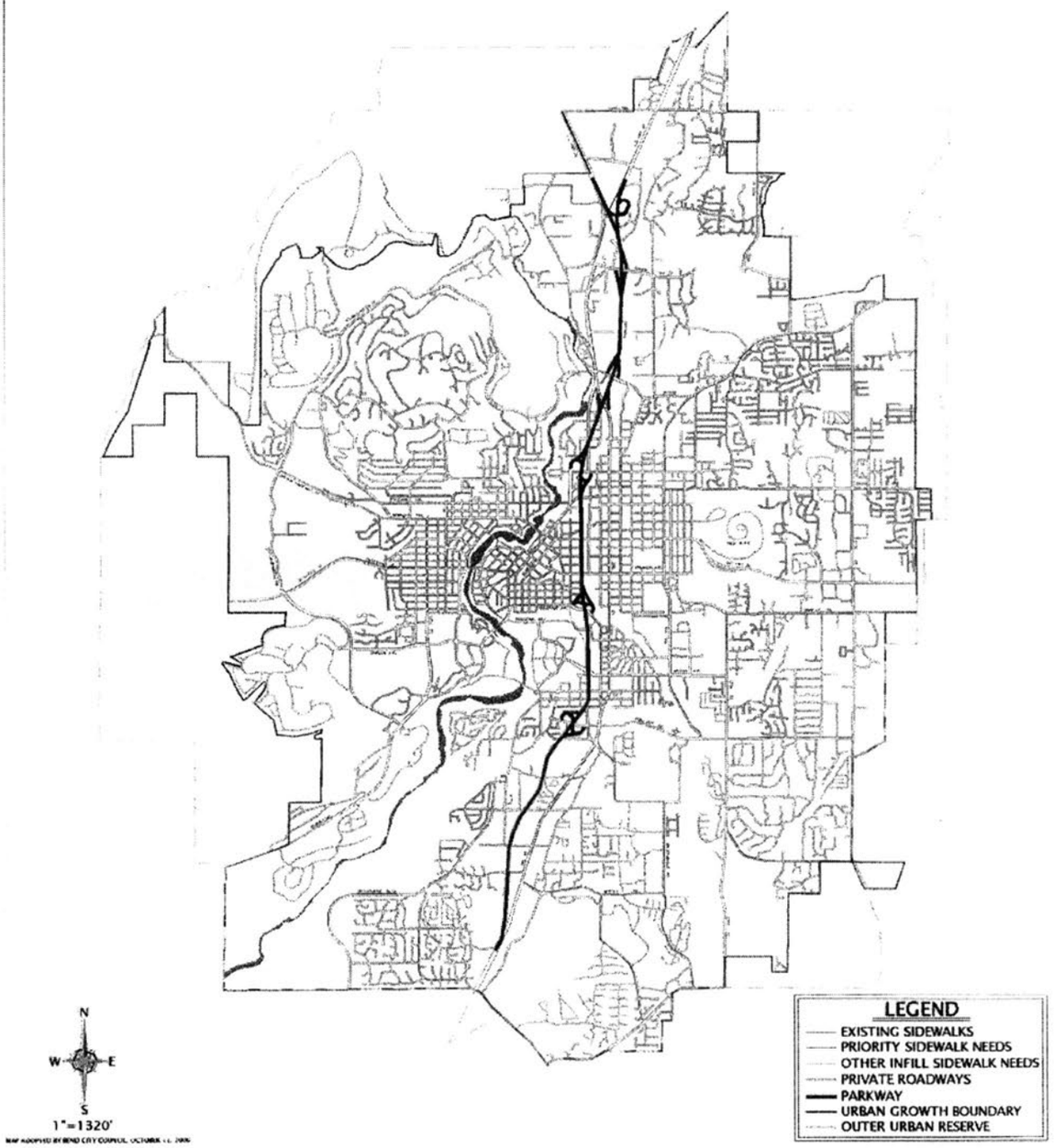


Map Exhibit B



Map Exhibit C

BEND URBAN AREA
SIDEWALK INVENTORY MAP



Map Exhibit D