- 1880's Theme Code
- Application Forms
- Code Enforcement
- Dark Skies Code
- Development Code
- Long Range Plans
- Planning Commission
- Planning Fees
- Signage Code
- Site Plan Application
- Zoning Map
- Department Contacts

Long Range Plans

More to come...

SISTERS TRANSPORTATION SYSTEM PLAN

Office hours 8:00 a.m. to 5:00 p.m.
150 N. Fir Street
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CHAPTER 1: INTRODUCTION

The City of Sisters Transportation System Plan (TSP) guides the management of existing transportation facilities and the design and implementation of future facilities for the next 20 years. This Transportation System Plan constitutes the transportation element of the city's Comprehensive Plan and satisfies the requirements of the Oregon Transportation Planning Rule established by the Department of Land Conservation and Development. It identifies and prioritizes transportation projects for inclusion in the Oregon Department of Transportation's (ODOT's) Statewide Transportation Improvement Program (STIP) and the City of Sisters' Capital Improvement Program (CIP).

LAND USE AND TRANSPORTATION CONNECTION

The City of Sisters TSP needs to meet the requirements of Statewide Planning Goal 12 and its implementing division, the Transportation Planning Rule (OAR Chapter 660, Division 12). Goal 12 affects all levels of government, and requires that transportation plans be coordinated among all jurisdictions. For the City of Sisters this would principally include coordination with the Oregon Department of Transportation (ODOT). For example, the City of Sisters plan must be coordinated with statewide transportation plans. The elements of these plans that pertain to the City of Sisters are delineated in this chapter.

Goal 12

In the mid-1970s, Oregon adopted 19 Statewide Planning Goals to be implemented in comprehensive plans. The aim of Goal 12, Transportation is "to provide and encourage a safe, convenient, and economic transportation system."

Each community, region, and metropolitan area updated the transportation element of their comprehensive plans according to the following guidelines set forth in Goal 12.

> "A 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 comprehensive plan for the City of Sisters includes land use policies corresponding to the Transportation Planning Rule.

The Transportation Planning Rule

The Transportation Planning Rule (TPR) was developed by the Department of Land Conservation and Development (DLCD) and ODOT. It was adopted in April 1991, and has been revised several times since then. The TPR implements Goal 12.

Overview

The Transportation Planning Rule requires that cities, counties, Metropolitan Planning Organizations (MPOs), and state agencies prepare and adopt TSPs. A TSP is "a plan for one or more transportation facilities that are planned, developed, operated, and maintained in a coordinated manner to supply continuity of movement between modes, and within and between geographic and jurisdictional areas."

The City of Sisters could have sought an exemption from several aspects of the TPR, due to its population being less than 2,500. However, given the city's critical role on US 20, ODOT agreed to fund a TSP for the city.

The ultimate aim of the rule is to encourage a multi-modal transportation network throughout the state that will reduce our reliance on the automobile and ensure that local, state, and regional transportation systems "support a pattern of travel and land use in urban areas which will avoid the air pollution, traffic and livability problems faced by other areas of the country."

The following plan elements are required in order to satisfy the TPR.

1. Identification of transportation needs.
2. A street system plan for a network of arterial and collector roadways.
3. Bicycle and pedestrian plans.
4. A public transportation plan.
5. Air, rail, water, and pipeline plans.
6. Policies and land use regulations for implementing the TSP.
7. A transportation financing program.

Oregon Transportation Plan

The Oregon Transportation Plan (OTP) was completed and adopted by the Oregon Transportation Commission in September 1992. Several alternative approaches to developing the transportation plan were evaluated as part of the OTP planning process. The preferred plan presented in the OTP followed the Livability Approach, which "depends heavily on the concept of minimum levels of service within each transportation mode to assure appropriate transportation alternatives to all areas of the state."

PLANNING AREA

The City of Sisters is located at the eastern fringe of Oregon's Cascade Mountain Range, approximately 20 miles northwest of Bend. A project location map is shown in Figure 1-1. The City of Sisters TSP covers the incorporated area within the Sisters Urban Growth Boundary (UGB). The current Urban Growth Boundary (same as city limits) contains 920 total acres, and is inside Deschutes County. The Comprehensive Plan land use map of the Sisters Transportation System Plan planning area is shown in Figure 1-2.

The City of Sisters has a population of approximately 900 people; however, it is the commercial and service node for a larger area of approximately 9,000 people. The city provides opportunities to live, work, shop, and recreate within a rural small-town setting. The area outside of Sisters is rural, characterized by periodic development surrounded by Ponderosa forests, open fields used for agriculture and grazing, with scenic views of the Three Sisters and other Cascade peaks. With an elevation of 3,186 feet, Sisters typically receives snow and precipitation during the winter and has warm dry summers.

The principal routes into and out of the city include McKenzie Highway (OR 242 and OR 126), McKenzie-Bend Highway (US 20) and the Santiam Highway (US 20/OR 126). These are the arterials for the local street system and are the primary connections to Bend and Redmond to the east and the Willamette Valley to the west.

The city is bordered on the west, northwest, south and east by either agricultural or forest land. Exception land borders the town to the north and northeast. The city has adopted polices to prevent sprawl on the east-west axis along the state highways. Therefore, the city plans to grow into the exception lands to the north and northeast.

The city's historic growth pattern has been dictated by the lack of a municipal sewer system and the requirement of on-site septic systems. An inventory indicated that approximately 50 residential lots were not practical for development because they were too small to accommodate on-site systems. Multi-family dwellings were also impractical because of the demands of on-site septic systems. City Staff estimated that up to 60 percent of residential properties are non-owner occupied and assumed to be investment properties.

The advent of the sewer will allow redevelopment and investment on lots where previously there was little incentive to do so. A compact pattern of development is expected and the city has participated in the "Model Development Code" process to adopt policies to that end. Reserve development property within the city can now be developed more efficiently. In balance to this, growth pressure is great, and demand is high for Sisters real estate, yielding high housing costs and investment potential.

Historically, the city relied heavily upon agriculture and its proximity to transportation routes for its economic livelihood. This has evolved into a more diversified economy that relies less upon agriculture and more upon the commercial, light industrial, and recreational/tourism sectors. According to the 1999 City of Sisters Comprehensive Plan, the Technical/Sales/Administrative and Manager/Professional industrial codes currently account for the leading employment sectors.

The one- and two-story buildings along Cascade Avenue are located close to the sidewalk which helps to create a more-pedestrian-friendly streetscape. Commercial buildings close to the street eliminate the need for large, free-standing signs which can be obtrusive and out of scale to pedestrians. The one-half mile long commercial core is about eight blocks long, and blocks are about 250 feet in length with very few driveways. Slow vehicle speed, on-street parking and western theme architecture also help to create a pleasant and convenient walking environment. Unlike most commercial strips, patrons in Sisters do not pull into a driveway and park in a parking lot that is located adjacent to the street, with the building set back at the edge of the parking lot. Patrons park on Cascade Avenue, on a side street, or in a small parking lot behind the stores. Sisters has become a tourist attraction with many antique shops, souvenir shops and weekend events. There are several weekends with special events such as the rodeo, the quilt shown and the folk festival.

PLANNING PROCESS

The City of Sisters TSP was developed through a series of technical analyses combined with systematic input and review by the Transportation Advisory Committee (TAC), ODOT, and the public. The TAC consisted of staff, elected and appointed officials, residents, and business people from the community. Key elements of the process include:

- Involving the Sisters community (Chapter 1)
- Defining goals and objectives (Chapter 2)
- Reviewing existing plans and transportation conditions (Chapters 3 and 4; Appendices A and B)
- Developing population, employment, and travel forecasts (Chapter 5; Appendix C)
- Developing and evaluating potential transportation system improvements (Chapter 6; Appendices D, E, and F)
- Developing the Transportation System Plan (Chapter 7)
- Developing a Financing Plan (Chapter 8)
- Developing recommended policies and ordinances (Chapter 9; Appendix G)

Community Involvement

Community involvement is an integral component in the development of a TSP. Several different techniques were utilized to involve the City, ODOT, and the general public.

A Transportation Advisory Committee (TAC) provided guidance on technical issues and direction regarding policy issues to the consultant team. The TAC was appointed by the City Council in October 2000. The TAC consisted of 29 members of the community and represented a wide range of interests. The TAC was comprised of the following individuals:

- City of Sisters Planner
- City of Sisters Public Works Director
- Two Sisters City Council Representatives
- Two Sisters Planning Commission Representatives
- Two Community Action Team of Sisters (CATS) Representatives
- Two Sisters School District Representatives
- Sisters Airport Representative
- Sisters Chamber of Commerce Representative
- Deschutes County Transportation Planner
- Deschutes County Road Department Representative
- United States Forest Service Representative
- Two Oregon Department of Transportation (ODOT) Representatives
- Two Department of Land Conservation and Development (DLCD) Representatives
- Ten Citizen Representatives

The role of the TAC was to identify transportation needs, develop project alternatives, and advise the City Council when it came to recommending alternatives and project priorities. Some of the issues raised by this group include the capacity of Cascade Avenue and pedestrian amenities. The TAC met five times during the course of the project.

The second part of the community involvement effort consisted of community meetings within the City of Sisters. The first public meeting was held in February 2000. The general public was invited to learn about the TSP planning process and provide input on transportation issues and concerns. A second public meeting was held in December 2000. The public was notified of the public meetings through public announcements in the local newspapers and on the local radio stations.

The third part of the community involvement effort consisted of public hearings before the City Council. The first public hearing was held in March 2001, after a work session with the City Council. A second work session with the City Council was held in May 2001. A second public hearing was held in June 2001.

Goals and Objectives

Based on input from the management team/TAC, and the community, goals and objectives were defined for the TSP. These goals and objectives were used to make decisions about various potential improvement projects. They are described in Chapter 2.

Review and Inventory of Existing Plans, Policies, and Public Facilities

To begin the planning process, all applicable Sisters area transportation and land use plans and policies were reviewed and an inventory of public facilities was conducted. The purpose of these efforts was to understand the history of transportation planning in the city, including the street system improvements planned and implemented in the past, and how the city is currently managing its ongoing development. Existing plans and policies are described in Appendix A of this report.

The inventory of existing facilities catalogs the current transportation system. The results of the inventory are described in Chapter 3, while Chapter 4 describes how the system operates. Appendix B summarizes the inventory of the existing highway and road systems.

Future Transportation System Demands

The Transportation Planning Rule requires the Transportation System Plan to address a 20-year forecasting period. Future traffic volumes for the existing plus committed transportation systems were projected using ODOT's *Level 1 -- Trending Analysis* methodology. The overall travel demand forecasting process is described in Chapter 5.

Transportation System Potential Improvements

Once the travel forecasts were developed, it was possible to evaluate a series of potential transportation system improvements. The evaluation of the potential transportation improvements was based on a qualitative review of safety, environmental, socioeconomic, and land use impacts, as well as estimated cost. These improvements were developed with the help of the TAC, and they attempt to address the concerns specified in the goals and objectives (Chapter 2). After evaluating the results of the potential improvements analysis, a series of transportation system improvements were selected. These recommended improvements are described in Chapter 6.

Transportation System Plan

The Transportation System Plan addresses each mode of transportation and provides an overall implementation program. The street system plan was developed from the forecasting and potential improvements evaluation described above. The bicycle and pedestrian plans were developed based on current usage, land use patterns, and the requirements set forth by the Transportation Planning Rule. The public transportation, air, water, rail, and pipeline plans were developed based on discussions with the owners and operators of those facilities. Chapter 7 details the plan elements for each mode.

Funding Options

The City of Sisters will need to work with ODOT to finance new transportation projects over the 20-year planning period. An overview of funding and financing options that might be available to the community is described in Chapter 8.

Recommended Policies and Ordinances

Suggested Comprehensive Plan policies and zoning and subdivision ordinances are included in Chapter 9. These policies and ordinances are intended to support the TSP and satisfy the requirements of the TPR.

RELATED DOCUMENTS

The City of Sisters TSP addresses the regional transportation needs in the City. There are several other documents that address specific transportation elements or areas in the Sisters area.

Inventories and Plans

- City of Sisters Comprehensive Plan (Final Draft, November 3, 1999)
- Community Action Plan for the Greater Sisters Community (March, 31, 1999)
- Potential Development Impact Analysis: Deschutes County, Oregon (September 21, 1994)
- McKenzie-Santiam Pass Interpretive Plan, National Forest Scenic Byway (July 1993)
- Traffic Committee Report to the Sisters City Council (August 27, 1993)
- Revised Environmental Assessment & Final Section 4(f) Evaluation, West City Limits-East City Limits, City of Sisters, McKenzie Highway (March 1991)
- Sisters Transportation Study: Vehicle Origin-Destination Survey (October 1988)
- City of Sisters Traffic analysis of US 20 – ORE 126 Update (October 1985)
- Sisters: Traffic Analysis of US 20 – ORE 126 (August, 1982)
- Deschutes County Transportation Plan (August 26, 1998)

Corridor Strategies

Two corridor plans were reviewed as part of this TSP.

- Salem to Bend Corridor: Interim Corridor Strategy (September, 1998)
- Sisters to Ontario Corridor: Interim Corridor Strategy (November 1997)

Other State Plans

In addition to the ODOT corridor strategy, coordination with the following state plans is required:

- Oregon Transportation Plan
- Oregon Highway Plan
- Oregon Bicycle and Pedestrian Plan

CHAPTER 2: GOALS AND OBJECTIVES

The purpose of the TSP is to provide a guide for the City of Sisters to meet its transportation goals and objectives. The following goals and objectives were developed from information contained in the City's Comprehensive Plan and public concerns as expressed during public meetings. An overall goal was drawn from the plans, along with more specific goals and objectives. Throughout the planning process, each element of the plan was evaluated against these parameters.

OVERALL TRANSPORTATION GOAL

To provide and encourage a safe, convenient and economic transportation system.

Goal 1

Comply with the Transportation Planning Rule.

Objectives

A. Identify transportation needs relevant to the planning area and the scale of the transportation network.

B. Develop a street system plan for a network of arterial, collector, and local roadways.

C. Develop a pedestrian plan.

D. Develop a bicycle plan.

E. Develop a public transportation plan.

F. Develop air and pipeline plans.

G. Adopt policies and land use regulations for implementing the Transportation System Plan.

H. Develop a transportation funding and financing program.

Goal 2

Preserve the function, capacity, level of service, and safety of the state highways (US 20, OR 126, and OR 242).

Objectives

A. Develop access management standards that will meet the requirements of the Transportation Planning Rule and the needs of the City of Sisters.

B. Develop alternative, parallel routes for local trips.

C. Promote alternative modes of transportation for local trips.

D. Promote transportation demand management programs (e.g., rideshare and park-and-ride).

E. Promote transportation system management (e.g., cost-sharing partnerships and off-system improvements).

F. Develop regulations to provide notice to public agencies supplying transportation facilities and services regarding land use applications that could affect transportation facilities.

G. Evaluate the effects of a Special Transportation Area designation for the downtown area of Sisters.

Goal 3

Improve and enhance safety and traffic circulation and preserve the level of service on the street system.

Objectives

A. Identify the 20-year roadway system needs to accommodate developing or undeveloped areas and maintain an acceptable volume-to-capacity ratio.

B. Develop street standards that address street width, connectivity, spacing, and access management, having first considered safety, use, and economics.

C. Continue to develop the road system as the principal mode of transportation both for access to the City and within the City.

D. Identify local problem spots and recommend solutions.

E. Ensure planning coordination between the City of Sisters, Deschutes County, and the State of Oregon.

Goal 4

Increase the use of alternative modes of transportation (walking, bicycling, rideshare/carpooling, flexible work hours, telecommuting, and transit) through improved access, safety, and service.

Objectives

A. Provide bike lanes on arterial roads.

B. Provide walkways on local, collector, and arterial roads.

C. Study opportunities for off-street trails.

D. Periodically assess pedestrian and bicycle needs.

E. Promote alternative modes and rideshare/carpool programs through community awareness and education, including working with the public transit provider to improve transit services and access to transit services as community needs are identified.

F. Encourage development patterns (i.e., mixed-use and neighborhood commercial centers) that can decrease the need for automobile trips to meet daily needs.

G. Plan for future transit service by seeking City, County, State, and/or Federal support.

H. Subsidize transportation for the transportation disadvantaged as the need is demonstrated and budgetary priorities will allow.

I. Seek funding for projects that evaluate and improve the environment for alternative modes of transportation.

J. Protect lands surrounding the airport from development that is incompatible with the airport.

CHAPTER 3: TRANSPORTATION SYSTEM INVENTORY

For this Transportation System Plan, an inventory was conducted of the existing transportation system within the Sisters Urban Growth Boundary (UGB). This inventory covered the street system as well as the existing pedestrian, bikeway, public transportation, and air transportation facilities. In addition, the absence of rail, water, and pipeline facilities was noted. The inventory was initiated by examining and summarizing past plans and maps (Appendix A). The physical portion of the inventory, summarized in this chapter, consisted of walking or driving each street within the UGB, as well as completing records searches and interviews. A complete list of the facilities inventoried is located in Appendix B. Chapter 4 summarizes the existing operations data for the transportation system (i.e., volumes, collision rates, etc.).

ROADWAY SYSTEM

In the United States, the majority of transportation dollars are allocated to building, maintaining, and planning the roadway system, mainly to carry automobiles and trucks. In more urban areas, the roadway system also provides facilities for bicyclists and pedestrians. The existing roadway system inventory was reviewed for all roadways within the Sisters UGB. Inventory elements included:

- Road classification and jurisdiction;
- Road and right-of-way width;
- Number of travel lanes;
- Presence of on-street parking, sidewalks, curbs, or bikeways;
- Speed limits; and
- General pavement conditions.

Facilities for bicyclists and pedestrians were also inventoried. These are discussed under Pedestrian System and Bikeway System, below.

Appendix B lists the complete inventory for state highways, county roads, and local roads located inside the Sisters UGB. Figure 3-1 depicts the current state and local road system.

Roadway Classification and Jurisdiction

The streets within the Sisters UGB are classified as arterials, collectors, or local streets. Each street's classification is determined by operational characteristics such as existing or planned land use, traffic volume, speed, safety, and capacity. The arterials are comprised of the state highways, which are under the jurisdiction of the state. The collectors generally consist of county roads, which extend outside the City of Sisters UGB, but are under city jurisdiction inside the UGB. The local streets in the Sisters UGB are comprised of all streets not classified as either arterials or collectors. Except for two road segments that are owned and maintained by the U.S. Forest Service, the City maintains the collector and local roads that form the street grid system.

Arterials

Arterial streets connect cities and other major traffic generators. They serve both through traffic and trips of moderate length and access is usually controlled. Arterials are high-volume roadways, due to the combination of local and through traffic. Depending on adjacent land uses, speeds rang between 20 and 55 mph.

Three state highways – US 20, OR 126, and OR 242 – come together in Sisters. These constitute Sisters' arterial streets within the UGB. These highways are known as the McKenzie Highway (OR 126 and OR 242), McKenzie-Bend Highway (US 20), and Santiam Highway (US 20/OR 126), as shown in Table 3-1.

TABLE 3-1
STATE HIGHWAYS IN THE SISTERS UGB

State Highway Name	Highway Route Number	Classification
McKenzie-Bend Hwy	US 20	Statewide
McKenzie Hwy (E of Sisters)	OR 126	Statewide
McKenzie Hwy (W of Sisters)	OR 242	District
Santiam Hwy	US 20/OR 126	Statewide

The highways are part of a statewide road system that distributes traffic through and between regions, particularly between Central Oregon and the Portland area, and are important freight and tourism routes. Generally, arterial streets are high capacity roadways that carry large traffic volumes with minimal localized activity. However, in the Sisters UGB, the McKenzie-Bend Highway is called Cascade Avenue and is the City's main street, serving local as well as regional traffic.

All the state highways through the City are two lanes wide. There are no stoplights. Where US Highway 20 and OR Highway 126 both become Cascade Avenue in the downtown core, it includes parallel parking on both sides.

As discussed in greater detail in Chapter 4, congestion occurs on the McKenzie-Bend Highway through the Sisters area during special events and during the peak tourist season in the summer, particularly on weekends. On occasion, the congestion can be quite severe, backing up traffic outside of the City limits. ODOT has direct control over the state highways; however, the City of Sisters has control over adjacent development, which heavily influences local traffic patterns.

The *1999 Oregon Highway Plan* (OHP) classifies the state highway system into five categories: Interstate, Statewide, Regional, and District Highways, and Local Interest Roads. ODOT has established primary and secondary functions for each type of highway and objectives for managing the operations for each one. In Sisters, the highways are classified as either Statewide (US 20 and OR 126) or District (OR 242).

Statewide Highways are intended to provide mobility between cities and regions that are not directly served by Interstate Highways. As in Sisters, Statewide Highways are also frequently a city's arterial streets for local trips. In constrained urban areas such as Sisters, the State's management objective is to provide safe and efficient operation while minimizing interruptions to through traffic flows.

District Highways function largely as county and city arterials or collectors. They provide connections and links between smaller urbanized areas, rural centers and urban hubs, and also serve local access and traffic. The management objective is to provide for safe and efficient, moderate to low-speed operation in urban and urbanizing areas for traffic flow and for pedestrian and bicycle movements. Inside urban areas, local access is given more priority.

Three state highways, including two major ones, traverse Sisters. In chronological order of construction and by their ODOT names and numbers, they are the McKenzie Highway No. 15, the Santiam Highway No. 16, and the McKenzie-Bend Highway No. 17. The McKenzie Highway carries shields OR 126 and OR 242, the Santiam Highway carries shields OR 126 and U.S. 20, and the McKenzie-Bend carries the shield of U.S. 20.

The McKenzie-Bend Highway (U.S. Highway 20) originates in Sisters at the junction of U.S. 20 and OR 126 (McKenzie Highway) at the east edge of Sisters and ends at the junction of U.S. 20 and U.S. 97 in Bend. Besides being classified as a Statewide Highway, it is a designated Freight Route and a designated Expressway. Expressways are strategic, high-volume highways in the state transportation system whose primary function is to provide for interurban travel and connections to ports and major recreation areas. These are high volume roads. The section of U.S. 20 inside the Sisters UGB that is designated as an Expressway is the section from the intersection with OR 126 to the east UGB. U.S. 20 also is part of the federal National Highway System (NHS).

The OHP identifies the key routes needed to provide an efficient and effective system of highways linking major economic and geographic centers. Congress adopted these highway routes as a part of the NHS in the National Highway System Designation Act of 1995. Freight routes were targeted to ensure that freight is able to move more efficiently on the state's major trucking routes, and includes routes that carry significant tonnage of freight by truck. Generally, these routes have higher mobility standards than other highways, meaning that the management objective is to minimize interruptions to through traffic flow.

The Santiam Highway (US Highway 20/OR Highway 126) begins in Albany as U.S. 20 and extends eastward past Santiam Junction, where OR 126 joins it, then rises over Santiam Pass, eventually ending in Sisters at the intersection of the McKenzie Highway at the west end of town. The highway provides an important link between Central Oregon and the mid-Willamette Valley year-round. This route is also designated as an Expressway. The section of U.S. 20/OR 126 inside the Sisters UGB that is designated as an Expressway is the section from the west UGB to the alignment of the proposed Barclay Drive extension. The section of U.S. 20/OR 126 from Santiam Pass to the City of Sisters is designated as a Freight Route. West of Santiam Pass, the Freight Route designation follows OR 22 to Salem.

The McKenzie Highway (OR Highway 126/OR Highway 242) originates in Eugene and a few miles past McKenzie Bridge begins to wind its way over the Cascades via McKenzie Pass, skirting the southern edge of the Mount Washington Wilderness Area. The highway enters the west edge of Sisters, joining the McKenzie-Bend Highway, then exits the east end of sisters, ending at the intersection of US 97 in Redmond. The section extending west of Sisters under shield OR 242 is a District Highway, the rest is a Statewide Highway and Expressway. The section of OR 126 inside the Sisters UGB that is designated as an Expressway is the section form the intersection with U.S. 20 to the east UGB. West of Sisters, snowfall closes the McKenzie Highway six to eight months a year.

Collectors

Collector streets connect residential neighborhoods with the arterial system. Property access is generally a higher priority for collectors than arterials, and through traffic is served as a lower priority. Collectors are intended to carry local traffic, including limited through traffic, at design speeds of 25 to 35 mph.

The City's collectors include Locust Street (Camp Polk Road), Pine Street (Squaw Back Road), Elm Street (Three Creeks Lake Road), and Tyee Drive. These roads are under the City's jurisdiction within the Sisters UGB and under Deschutes County's jurisdiction outside the Sisters UGB.

Local Streets

Local streets provide access to parcels of land and serve travel over relatively short distances. They are designed to carry the low traffic volumes associated with the local uses abutting them.

The local streets in the Sisters UGB are comprised of all streets not classified as either arterials or collectors. Local streets in Sisters are under city jurisdiction and form most of the grid system within the UGB.

U.S. Forest Service Roads

The U.S. Forest Service currently has jurisdiction over roads located on Forest Service property both inside and outside the Sisters UGB. Within the Sisters UGB, the Forest Service owns and maintains the roads serving its District building complex located on the corner of Highway 20 and Pine Street and a roadside park located on West Hood Street (also called the Hood Street extension). There are no Forest Service Roads leading into the Sisters UGB. The Forest Service maintains its own roads.

Pavement Conditions

All Oregon state highways are surveyed and assessed annually to determine current pavement conditions. There are two methodologies used to determine the condition: 1) GFP rating method used to rate the condition of Non-National Highway System highways consisting of a subjective value from very good to very poor, and 2) the Objective Rating process which produces a single index value comprised of a collection of individual equations rating distress type, severity, and quantity. Both methods result in five pavement condition categories including: Very Good, Good, Fair, Poor, and Very Poor.

In 1998, the McKenzie-Bend and McKenzie Highways, were rated as Good. Asphalt pavements in the Good category are stable and may display minor cracking (generally hairline and hard to detect), minor patching, and possibly some minor deformation. These pavements appear dry or light colored, provide good ride quality, and display rutting less than ½ inch deep.

The Santiam Highway was rated as Very Good. Asphalt pavements in the Very Good category are stable, display no cracking, patching or deformation and provide excellent riding qualities.

Overall, city collectors and local roads are in fair condition. Exceptions to this include new subdivisions such as Pine Meadows with new streets and sidewalks, which are in Very Good or Excellent condition. Black Crater Avenue is in relatively poor condition compared with other city streets.

Bridges

Bridge information was obtained from ODOT's Bridge Maintenance Section after an April 1998 inventory. One of the most significant pieces of information gathered from the inventory is the overall sufficiency rating. This rating system determines if the bridge is structurally or functionally deficient. The scale ranges from zero to 100 with higher ratings indicating optimal conditions and lower ratings indicating insufficiency. Sufficiency ratings of 55 or less indicate an insufficiency. Bridges with ratings

under 55 may be nearing a structurally deficient condition. Table 3-2 displays the sufficiency rating for the bridges in the Sisters UGB.

The state owns and maintains two bridges inside the Sisters UGB that are included in the state bridge inspection inventory. Both bridges are on McKenzie Highway (OR 126). Bridge #806A is over Squaw Creek and has a sufficiency rating of 92.8 and a sufficiency status of Not Deficient. Bridge #833 is over Smith Ditch and its sufficiency rating and status are not available.

There is one bridge on the county road system within the Sisters UGB. It is located on Three Creeks Lake Road south of Black Crater Avenue over Squaw Creek. The State of Oregon assigned number for this bridge is #9469. As with the State Highway bridges, the overall sufficiency rating of each County bridge determines if it is structurally or functionally deficient. Bridge #9469 has a sufficiency rating of 99.9 and has a sufficiency status of Not Deficient.

Future maintenance of Bridge #9469 will most likely be under the jurisdiction of the City of Sisters Public Works Department because the City has jurisdiction over all newly annexed roads inside the Sisters UGB except for state-owned roads, private roads, and roads owned by the USFS. At this time there is no adopted bridge maintenance policy in place at the City of Sisters Public Works Department.

TABLE 3-2
BRIDGES IN THE SISTERS UGB

Bridge Number	Facility	Approximate Location	Sufficiency Rating	Sufficiency Status
806A	McKenzie Hwy (OR 126)	West of ODOT Scales over Squaw Creek	92.8	Not Deficient
833	McKenzie Hwy (OR 126)	Downtown over Smith Ditch	NA	NA
9469	Three Creeks Lake Road	South of Spruce St. over Squaw Creek	99.9	Not Deficient

Freight Movement

All freight movement through and in Sisters moves by truck. As described later in this chapter and in Chapter 7, there are no rail lines, air freight carriers, pipelines, or navigable waterways in Sisters.

As stated earlier in this chapter, the section of US 20/OR 126 through Sisters is part of the State Highway Freight System. There are no weight-restricted bridges, overlength tractor-semitrailer restrictions, or low-clearance bridges on this highway in Sisters. There are no other truck routes in the city; however, the detour used during peak summer periods (described in Chapter 6) can be used by trucks.

There are no major freight generators such as a port, an intermodal facility, or a manufacturer of bulky items in the City of Sisters; however, there are several small businesses that generate and receive freight. Freight is important to local businesses that receive freight or generate freight. Most of the businesses that receive freight are the retail businesses located along Cascade and Hood Avenues. The largest of these businesses is the Sisters Market on Cascade Avenue. The light industrial uses along Barclay Drive in the north part of the city also generate and receive freight. The connector roads between Barclay

Drive and US 20/OR 126 are Locust, Larch, and Pine Street. During the public involvement program (meetings with the Transportation Advisory Committee, public open houses, and public hearings), there were no comments received from shippers, carriers or freight stakeholders.

There is a truck weigh station on US 20/OR 126, just west of the intersection where these two highway meet. The intersection of US 20 and OR 126 was identified as unsafe in the Salem to Bend Corridor Interim Corridor Strategy (ODOT, September 1998). The intersection is sharply skewed, creating sight distance and turning constraints. Eastbound trucks pull in to the scales on the south side of the highway before the intersection. Trucks going east on to Highway 126 must then make an awkward and unsafe maneuver across US 20 to continue east on OR 126. Improvements to this intersection are included in the Statewide Transportation Improvement Program (STIP), as described in later Chapter 7.

The 1999 Motor Carrier Transportation Division's Safety Plan identifies US 20 from Sisters to Bend as one of the state's twelve truck crash corridors. The plan focuses on reducing 1) crashes due to sleepy or fatigued truck drivers statewide, 2) crashes in twelve corridors with high numbers of truck at-fault crashes, and 3) the percentage of intrastate motor carriers which are put out of service due to mechanical violations.

Truck volumes are addressed in the Freight section of Chapter 4.

Street Layout

Most of the streets in the Sisters UGB are aligned in a grid pattern north and south of Cascade Avenue (Highway 20). Cascade Avenue is the primary street extending from east to west. Several collectors run north/south into Cascade Avenue. Block sizes vary but are typically around 300 feet long in the original platted area, but blocks are much larger on the fringes of the city.

Maintenance

The City of Sisters Public Works Department maintains the portions of county roads within the Sisters UGB. Prior to annexing the UGB which occurred on July 12, 1999, Deschutes County maintained all roads inside the City with the exception of the State highways and Forest Service roads. The City of Sisters Public Works Department is now responsible for maintaining and removing snow for all roads inside the UGB with the exception of private roads, roads on Forest Service owned lands, and State highways. The City has a comprehensive snow removal plan. Implementation is on an "as needed" basis.

Identified Needs

The following needs were identified for the roadway system:

The street system capacity will need to be increased to meet the demand over the 20-year planning period. The street system is currently inadequate for local and through traffic during peak periods, especially during holidays and events. Congestion on Cascade Avenue (Highway 20) is particularly problematic. Roads in the industrial area are also inadequate for the projected traffic. The local street network is limited, providing few opportunities for local trips that do no include Cascade Avenue. There is traffic congestion around the Post Office because there is no home mail delivery in Sisters and at the intersection of Highway 20 and 242, due to the new high school. A new arterial connecting Camp Polk Road to McKinney Butte Road should be developed to divert high school traffic away from the City's core. The long-term solution to traffic congestion may be to plan for an alternative route around

the city. This may reduce Downtown truck traffic, which creates noise and air pollution in the core of Sisters and is adverse to the quality of the environment. The City should cooperate with the County and the State to identify an alternative route to Cascade Avenue (Highway 20). At the same time, the City shall minimize unnecessary road construction. One solution may be to prohibit left turns on Cascade Avenue by posting "no left turn" signs at Elm and Fir Streets. To comply with Policy 1G: Major Improvements in the Oregon Highway Plan, before adding new facilities to the highway system, a phased approach of first protecting the existing system, then improving the efficiency and capacity of the existing highway facilities, then adding capacity to the existing system must be undertaken before a new facility is added to the highway system. Those actions could include access management on the existing highway and implementing a couplet to meet capacity needs before constructing a bypass.

Improvements are needed at several intersections to increase safety. The intersection of Highway 20 and 242 should be redesigned to improve traffic flow and safety problems. Pursue access control and geometric modifications to reduce accident risk at the intersections of Highways 126 and 242 at the west end of town and Highways 20 and 126 at the east end of town. As described in more detail in Chapter 4, the intersection of Highways 126 and 242 is the intersection with the highest number of accidents recorded in the three-year period analyzed. Accident countermeasures should be planned for near-term implementation.

Establish a Special Transportation Area (STA) in the downtown core along the highway corridor. STA designation will allow lower access management and volume-to-capacity standards while maintaining acceptable operating conditions on the highway.

Re-designate Main and Jefferson Avenues as collectors. Any future improvements to these roads should include bringing these roads up to collector standards (including construction of bicycle and pedestrian facilities). As collectors, these roads will be held to a higher operating standard.

A bridge over Squaw Creek north of OR 126 is needed. City staff identified the need for a bridge over Squaw Creek in the Timber Creek subdivision.

A parking plan is needed. Public parking is currently inadequate on the blocks adjacent to Cascade Avenue. Lack of parking in the City's commercial areas creates an economic impact because drivers will not shop at downtown businesses if there is no where to park. Increasing the number of parking spaces will reduce the need for drivers to drive up and down several blocks looking for parking spaces. Downtown parking should be improved by maximizing on-street parking and creating off-street parking, particularly adjacent to Cascade Avenue.

PEDESTRIAN SYSTEM

The most basic transportation option is walking. Walking is particularly appropriate for trips of around 1/4 mile. The pedestrian transportation system is typically found as part of the roadway system, since it is usually made up of sidewalks in urban areas. In some special circumstances, such as through parks, greenways, or along rivers, separated trails are appropriate. Trails are usually shared with bicyclists, skaters, and other non-motorized modes of transportation. Other important components of a pedestrian system include safe and convenient crossing facilities, appropriate levels of lighting, and street furniture. One of the City's goals is to improve pedestrian facilities and increase walking as a mode of transportation through the provision of improved facilities.

Continuous sidewalks are found in the downtown core. The area bounded by Hood Avenue, Main Avenue, Larch Street, and Pine Street includes most of the sidewalks in town. Outside of this area,

sidewalks are uncommon except in newer housing developments such as Pine Meadow. This is partly due to the community's past desire to maintain a rural atmosphere in the city's neighborhoods. The pedestrian system inventory is shown in Figure 3-2.

A sidewalk and pedestrian improvements ordinance passed in 1999 will add more pedestrian facilities as the city builds new streets and redevelops existing streets. Sidewalks and bike lanes will both be required on new and redeveloped portions of streets in High and Standard Density Residential zones, as well as the General Commercial Zone.

Existing sidewalks are in good to poor condition, mainly relating to their age. Sidewalks constructed in the last few years include well-designed curb ramps at intersections. Older sidewalks are missing curb ramps, or have ramps that do not meet current Americans with Disabilities Act (ADA) guidelines.

Separated trails are absent except for a segment along Larch Street and Barclay Drive, north of Adams Avenue. These paths are six feet wide and are made of asphalt. Opportunities for trails that are fully separated from roads are somewhat limited within the Sisters UGB.

Pedestrian volumes are highest in the commercial core along Cascade and Hood Avenues, particularly during the peak tourist season and special events, as discussed in greater detail in Chapter 4. Sidewalks average four to six feet wide. There are painted crosswalks on Cascade Avenue between Larch and Pine Streets; on Hood Avenue between Larch Street and Oak Street, and at several intersection along Main Avenue. Good street furniture and lighting are also found in the commercial core.

Identified Needs

The following needs were identified for the pedestrian system:

A pedestrian plan is needed. Pedestrian crossings on Cascade Avenue are inadequate. The street is wide for a two-lane street (48 feet curb-to-curb), on-street parking and the lack of curb extensions reduce pedestrian visibility for drivers, and there is a lack of painted crosswalks. The intersection of Locust Street and Cascade Avenue (Highway 20) is in need of improvement. The location of marked crosswalks on downtown streets should be reviewed to make sure that there are adequate crossing opportunities. Pedestrian improvements identified in the City of Sisters Street Improvement Plan should be completed. These improvements include filling in missing sidewalks and building curb extensions.

Chapter 7 of the TSP contains a pedestrian plan. The pedestrian plan identifies gaps in the sidewalk system, recommends sidewalk in-fill projects and crossing enhancements, prioritizes the recommended projects, and provides cost estimates and timelines for completing the projects.

Sidewalks on Cascade Avenue are deficient. Sidewalks on Cascade Avenue are generally six feet wide, which is too narrow for a commercial "main street" where sidewalks should be at least ten feet wide. The sidewalks on Cascade Avenue also contain many obstacles such as posts supporting street signs and building awnings, fire hydrants, newspaper vending machines.

BIKEWAY SYSTEM

Bicycling is an efficient mode of travel, particularly for local trips of about two miles. The bicycle transportation system is mainly found as part of the roadway system, and is typically made up of bike lanes on arterials and collectors in urban areas. Often, bike lanes are forgone in a downtown commercial core where right-of-way is limited and on-street parking is critical. One of the goals of the City is to encourage the increased use of bicycles through provision of facilities.

In some special circumstances, such as through parks, greenways, or along rivers, separated trails are appropriate. Trails are usually shared with pedestrians, skaters, and other non-motorized modes of transportation. The opportunities to create trails within the Sisters UGB are somewhat limited, but include an old easement along Hood Avenue west of Pine Street and near the new Les Schwab Tire store from Hood Avenue to Highway 242.

A sidewalk and pedestrian improvements ordinance passed in 1999 will add more bicycle facilities as the city builds new streets and redevelops existing streets. Sidewalks and bike lanes will both be required on new and redeveloped portions of streets in High and Standard Density Residential zones, as well as the General Commercial Zone. New collectors and arterials in all zones are required to have bike lanes.

Highway 242 includes bike lanes from Cascade Avenue to the Sisters High School. In order to minimize the widening effect of adding shoulders and the associated increase in traffic speeds, ODOT paved these bike lanes with red asphalt. There currently are no other bike lanes within the Sisters UGB. Pine Street between Cascade Avenue and Barclay Drive, Locust Street south of Jefferson Avenue, and the Buck Run subdivision include 6-foot wide shoulders with an 8-inch stripe that are used by pedestrians and bicyclists. The bicycle system inventory is shown in Figure 3-2.

Identified Needs

A bicycle plan is needed. There are very few bicycle facilities in the City. New developments should provide bike lanes or paths, laid out to provide convenient access. Additional bicycle parking is needed in the downtown area.

Chapter 7 of the TSP contains a bicycle plan. The bicycle plan identifies potential projects, prioritizes the recommended projects, and provides cost estimates and timelines for completing the projects.

PUBLIC TRANSPORTATION

Local public transportation available in Sisters is the Dial-A-Ride service offered by Central Oregon Council on Aging. This service is provided to many communities in Central Oregon including Sisters, Madras, Redmond, Bend, and La Pine. In Sisters, the service consists of door-to-door transport to medical appointments, shopping, and Senior Centers. The service is provided every Tuesday, and does not range beyond the Sisters area. A group of volunteers provide trips from Sisters into Bend on the 1st and 3rd Thursdays of each month. The small buses are accessible to people with disabilities, and are available to senior citizens and the disabled for a suggested fee of $0.50. Ridership for the month of November 1999 was 140 riders.

Commercial bus service is available from Sisters to many different destinations by Greyhound Bus Lines and Porter Stage Lines. Other regional transit providers include People Mover and Valley Retriever.

In addition, there is a Park and Ride Lot located behind the Sisters Pumphouse at the intersection of Hood Avenue and Cedar Street.

Identified Needs

Public transit is limited to Dial-a-Ride vans. Develop support facilities for transit, carpooling, and the use of non-motorized modes.

RAIL SERVICE

There are no rail lines or services in the Sisters area.

AIR SERVICE

There are no airports within the Sisters UGB, but the privately owned Sisters Eagle Airport is less than one mile north of the city at the intersection of Camp Polk Road and Barclay Drive. This airport is not a commercial airport, but does serve recreationalists, AirLife, the smokejumper training program, and search and rescue. The airport has an unlit, paved runway that is 50 feet wide and 3,550 feet long.

The Redmond Municipal Airport, a commercial airfield, is located in Redmond approximately 20 miles east of Sisters.

PIPELINE SERVICE

Pipelines are considered along with other modes of transportation because shipping commodities via pipeline may reduce the need for commercial truck and rail service. There is currently no pipeline delivery to Sisters.

WATER TRANSPORTATION

Sisters has no water transportation services.

CHAPTER 4: CURRENT TRANSPORTATION CONDITIONS

For this chapter of the Transportation System Plan, current operating conditions for the transportation system inside the Sisters UGB were evaluated. This includes traffic volumes, pedestrian volumes, and collision data. Census data were examined to determine travel mode distributions.

TRAFFIC VOLUMES

A large base of traffic volume counts exists for the Sisters area. Extensive 24-hour counts were performed by ODOT on the state highways throughout the area prior to, and during 1999. In addition, for this study, both traffic and pedestrian counts were conducted during the peak summer season of 2000.

Average Daily Traffic Volumes

Table 4-1 lists the 1999 average daily trips (ADT) for locations along the state highways within the Sisters UGB. Table 4-1 shows both ADTs as averaged over the year and peak summer volumes (calculated by multiplying the year average by a factor of 1.49). The peak summer factor was determined by comparing the average daily traffic for the year with the highest average daily traffic during a one-month period. The peak factor is the highest month's percentage of the average daily traffic for the year (in this case the ADT in the peak month of July 1999 was 49% greater than the yearly ADT).

Summertime is the season when volumes are highest. ODOT data from permanent traffic recorder stations on the Santiam Highway seven miles north of Sisters indicate wide variations between peak summertime volumes and ADT volumes. Figure 4-1 shows average ADT volumes for 1999.

On weekends, there is a pronounced directionality pattern. Traffic volumes on Fridays and Saturdays tend to by higher in the eastbound direction, as residents of the Willamette Valley travel to Central Oregon for weekend recreational activities. On Sundays, traffic volumes are higher in the westbound direction, as residents of the Willamette Valley return home. The eastbound peak is fairly spread out over several hours on Fridays and Saturdays. The westbound peak on Sundays is more pronounced, as return trips to the Willamette Valley occur over just a few hours.

TABLE 4-1
1999 STATE HIGHWAY ADT VOLUMES IN SISTERS UGB

Highway Location	Milepoint	Average	Peak Summer (1.49 factor)
McKenzie Highway (OR 242 and OR126)			
• .01 mile East of Bailey Ditch Rd.	91.28	1,400	2,100
• West city limits of Sisters	92.20	2,300	3,400
• 0.04 miles East of Santiam Hwy.	92.32	13,400	20,000
• 0.01 miles East of Elm St.	92.51	10,900	16,200
• East city limits of Sisters	92.95	11,500	17,100
• 0.01 miles East of McKenzie-Bend Hwy.	93.08	4,600	6,900
Santiam Highway (US 20/OR 126)			
• 0.33 miles North of McKenzie Hwy.	100.03	9,500	14,200
McKenzie-Bend Highway (US 20)			
• 0.01 miles Southeast of McKenzie Hwy.	0.01	7,300	10,900

Source: ODOT 1999 Transportation Volume Tables

Through Traffic

David Evans and Associates, Inc., conducted a license plate survey in August 2000 to determine the number of trips on the state highways within Sisters which are "through trips" (trips which have neither an origin nor a destination in Sisters, but which travel through the city as part of a long distance trip) or "local trips" (trips which have either an origin, a destination, or both in Sisters). The survey was conducted at six "stations" located on the state highways and county collectors just inside the urban growth boundary of Sisters, thereby recording nearly all trips in to or out of the urban area during the survey period. Traffic was surveyed in two directions at the following locations:

- McKenzie Highway (OR 126) at the east Urban Growth Boundary
- McKenzie-Bend Highway (US 20) at the east Urban Growth Boundary
- Elm Street (Three Creeks Road) at the south Urban Growth Boundary
- McKenzie Highway (OR 242) at the west Urban Growth Boundary
- Santiam Highway (US 20 and OR 126) at the north Urban Growth Boundary
- Locust Street (Camp Polk Road) at the north Urban Growth Boundary

During the survey period, vehicle license plates were recorded as they passed each survey station. Vehicles which were recorded entering the urban area at one station and leaving the urban area at another station within 10 minutes comprised the "through trips." Vehicles which were recorded entering the urban area but which did not leave the urban area through one of the stations within 10 minutes were assumed to have the City of Sisters as their destination and comprised the "local trips." Likewise, vehicles which were recorded leaving the urban area but were not recorded entering the urban area within the previous 10 minutes were assumed to have the City of Sisters as their origin and also comprised the "local trips." Vehicles which entered and left the urban area through the same station were also counted as "local trips," assuming they made a trip to Sisters to conduct personal or professional business.

The purpose of the license plate survey was two-fold. First, the survey data was used in preparing the forecast of future traffic volumes, where a different growth rate was applied to through and local traffic. Second, the survey data was used to estimate how much traffic could potentially use a highway bypass, which is intended to serve through trips.

The survey indicated that approximately 20 percent of the highway traffic on the fringes of the urban area consists of long-distance trips passing through Sisters, stopping for less than 10 minutes if stopping at all. The remaining 80 percent of traffic surveyed either had an origin, destination, or both in the Sisters urban area. As local traffic volumes increase towards the center of town, the through traffic volume becomes a smaller portion of the overall traffic volumes. During certain hours of the survey (specifically during the afternoon and evening hours on Sunday), the through traffic comprised 45 percent of the traffic passing the survey stations. However, when all the hours of the survey were averaged, the total through traffic comprised approximately 20 percent of the total traffic that passed the survey stations during a 24-hour period.

Table 4-2 contains a summary of the highway-to-highway through trips, which does not include through trips between the highways and Locust Street or Elm Street. This information is also shown graphically in Figures 4-2 and 4-3. As shown in the figures, there are approximately 3,070 through trips on Cascade Avenue in Sisters on the typical summer weekday, and approximately 4,490 through trips on Cascade Avenue on the typical summer Sunday. These are the trips that could potentially use a highway bypass. Note that the survey was conducted during peak summer conditions. For an average day during the

year, the through traffic would be much lower for two reasons. First, the McKenzie Highway (OR 242) west of Sisters is closed due to snow for approximately six to eight months a year. Second, summer volumes are approximately 50 percent higher than average volumes for the year. Accounting for these two factors will reduce the through traffic to approximately 1,765 through trips on an average weekday and 2,700 trips on an average weekend day.

TABLE 4-2

SUMMARY OF HIGHWAY-TO-HIGHWAY THROUGH TRIPS

	Wednesday, August 16, 2000			Sunday, August 20, 2000		
Station	Total Trips[1]	Through Trips[2]	Percent Through	Total Trips[1]	Through Trips[2]	Percent Through
OR 126	5,581	960	17.2%	8,252	1,990	24.1%
US 20	11,250	2,110	18.8%	12,000	2,500	20.8%
OR 242	2,059	440	21.4%	2,052	460	22.4%
US 20/OR 126	12,989	2,630	20.2%	16,220	4,030	24.8%

Notes:

1 Total trips that passed the survey station over a 24-hour period

2 Highway-to-highway through trips (does not include through trips between survey station and Locust Street or Elm Street)

Peak Hour Traffic Volumes

Evaluation of a roadway's capacity and level of service is usually based on an analysis of peak hour volumes. The design hour volume (DHV) is the peak hour volume that is used for design. For any roadway, it represents the 30th highest hourly traffic volume recorded along the roadway segment throughout the year. For example, if the total number of vehicles in both directions at a specific roadway location was counted for every hour throughout the year, and then the hourly volumes were ranked from highest to lowest, the 30th highest hourly volume of the year would represent the DHV. Past examples have shown that the 30th highest hourly volume as a percentage of ADT fluctuates minimally each year, even in cases of significant ADT variations. Typical values for the 30th highest hourly volumes range from approximately 10 to 20 percent of the ADT.

The only locations along state highways in Oregon where hourly roadway volumes are counted on a daily basis throughout the year are at ODOT's automatic traffic recorder (ATR) stations. Information regarding ADT, 30th highest hourly volume, vehicle classification and seasonal variations, are available at the ATR stations. The nearest ATR station to the City of Sisters is on US 20/OR 126 approximately seven miles northwest of Sisters. The 1999 ADT at this ATR station was 7,900 vpd, and the 30th highest hour volume was 1,440 vph, or 18.2 percent of the ADT.

Weekday PM peak hour traffic counts were conducted on Thursday, June 1, 2000 at the four busiest intersections along US 20/OR 126 and at the three busiest intersections along Hood Avenue, the city's second-busiest street. The weekday PM peak hour traffic counts are shown in Figure 4-4. Hourly traffic volumes on Cascade Avenue (US 20/OR 126) ranged from approximately 900 to 950 vehicles per hour (vph). Hourly volumes on Hood Avenue ranged from approximately 100 to 250 vph. Side street approach volumes are generally less than 100 vph, except for the north approach of Pine Street, which had an approach volume of approximately 150 vph and the north approach of Locust Street, which had an approach volume of nearly 200 vph.

Data from the ATR station on US 20/OR 126 was used to convert the weekday PM peak hour count conducted in June 2000 to a 30th highest hour volume for the year 2000. There was no data available at the ATR station for Thursday, June 1, 2000 (the day the manual turning movement counts were conducted), so data for Thursday, June 8, 2000 was used. During the PM peak hour (4:00 to 5:00 PM) on June 8, 2000, 667 vph passed the ATR station. The 30th highest hour volume for the year 2000 was 1,341 vph. Dividing the 30th highest hour volume (1,341 vph) by the volume that passed the ATR station during the manual traffic count (667 vph) yields a factor of 2.01 for converting the manual traffic count conducted on a June weekday to a 30th highest hour volume. However, this factor should only be applied the long distance, or "through" trips that pass the ATR station and travel through downtown Sisters. In other words, the 2.01 factor should not be applied to the local traffic in Sisters, which was included in the manual traffic count, and which doesn't vary much from season to season. This "local" traffic can be calculated by subtracting the traffic that passed the ATR station during the manual traffic count (667 vph) from the traffic on US 20/OR 126 in downtown Sisters during the traffic count (977 vph), which equals 310 vph. The 30th highest hour traffic volume for downtown Sisters was calculated by factoring up the through volume (667 vph × 2.01 = 1,341 vph) and adding the local trips (977 vph – 667 vph = 310 vph), which equals 1,651 vph. Therefore, the factor used for converting the June 2000 weekday PM peak hour traffic counts to 30th highest hour volumes was 1,651 ÷ 977 = 1.69.

The 30th highest hour traffic volumes used in the capacity analysis are shown in Figure 4-5. Hourly traffic volumes on Cascade Avenue (US 20/OR 126) ranged from approximately 1,400 to 1,650 vehicles per hour (vph). Hourly volumes on Hood Avenue ranged from approximately 200 to 450 vph. Side street approach volumes are generally less than 100 vph, except for the north approach of Pine Street, which had an approach volume of approximately 250 vph and the north approach of Locust Street, which had an approach volume of nearly 300 vph.

Truck Volumes

Large trucks are a significant component on the state highways through Sisters. Truck traffic (six-tire single unit to double trailer trucks with seven axles or more) averaged 16.3% of the total 1999 ADT on Highway 20 at ODOT's permanent Automatic Traffic Recorder (ATR) located approximately seven miles northwest of Sisters. The percentage of trucks in downtown Sisters was estimated at 12 percent, which is slightly lower than at the ATR due to the increased number of automobiles making local trips in downtown Sisters. Approximately 1,300 trucks pass through Sisters each day. The most common type of truck traveling through Sisters is the single trailer 5-axle type, commonly known as 18-wheelers. There are also some double trailer trucks and triple trailer trucks that travel through town.

As described later in the Safety Analysis section of this chapter, trucks were involved in very few of the collisions in Sisters.

Roadway Capacity

Transportation engineers have established various standards for measuring traffic capacity of roadways and intersections. Each standard is associated with a particular level of service (LOS). The level of service concept requires consideration of factors that include travel speed, delay, volume-to-capacity ratio, frequency of interruptions in traffic flow, relative freedom for traffic maneuvers, driving comfort and convenience. Six standards have been established ranging from Level of Service A where traffic flow is relatively free-flowing, to Level of Service F, where the street system is totally saturated with

traffic and movement is very difficult. Table 4-3 presents the level of service criteria for arterial roadways.

TABLE 4-3
LEVEL OF SERVICE CRITERIA FOR ARTERIAL STREETS

Level of Service	Typical Traffic Flow Conditions
A	Relatively free flow of traffic with some stops at signalized or stop sign controlled intersections. Average speeds would be at least 30 miles per hour.
B	Stable traffic flow with slight delays at signalized or stop sign controlled intersections. Average speed would vary between 25 and 30 miles per hour.
C	Stable traffic flow with delays at signalized or stop sign controlled intersections. Delays are greater than at Level of Service B but still acceptable to the motorist. The average speeds would vary between 20 and 25 miles per hour.
D	Traffic flow would approach unstable operating conditions. Delays at signalized or stop sign controlled intersections would be tolerable and could include waiting through several signal cycles for some motorists. The average speed would vary between 15 and 20 miles per hour.
E	Traffic flow would be unstable with congestion and intolerable delays to motorists. The average speed would be approximately 10 to 15 miles per hour.
F	Traffic flow would be forced and jammed with stop and go operating conditions and intolerable delays. The average speed would be less than 10 miles per hour.
Source:	*Transportation Research Board, Highway Capacity Manual, Special Report 209. National Research Council, 1985.*

The 1999 Oregon Highway Plan establishes operating mobility standards for the state highway system[1]. Inside Urban Growth Boundaries, Statewide Freight Routes such as the McKenzie-Bend Highway (US Hwy 20), McKenzie Highway (OR 126), and Santiam Highway (US 20/OR 126) should operate at or below a volume-to-capacity ratio of 0.75 (roughly corresponding to Level of Service C). If these highways have Expressway designation, they should operate at or below a volume-to-capacity ratio of 0.70 (also roughly corresponding to Level of Service C). District highways, such as the McKenzie Highway (OR 242), should operate at or below a volume-to-capacity ratio of 0.85 (roughly corresponding to Level of Service D).

Level of Service for unsignalized intersections can be defined by the amount of "reserve capacity," or unused capacity of an intersection, measured in passenger cars per hour, or by the average vehicle delay. Table 4-4 presents the level of service criteria for unsignalized intersections. Level of Service D is generally considered to represent the minimum acceptable design standard.

[1] 1999 *Oregon Highway Plan*, Table 6, Maximum Volume to Capacity Ratios for Peak Hour Operating Conditions.

TABLE 4-4
LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Reserve Capacity (passenger cars per hour)	Delay Range (seconds/vehicle)	Expected Delay to Minor Street Traffic
A	>= 400	<= 10	Little or no delay
B	300 – 399	> 10 <= 15	Short traffic delays
C	200 – 299	> 15 <=25	Average traffic delays
D	100 – 199	> 25 <= 35	Long traffic delays
E	0 – 99	> 35 <= 50	Very long traffic delays
F	< 0	> 50	Extreme traffic delays

Source: Transportation Research Board, Highway Capacity Manual, Special Report 209, 1985
Transportation Research Board, Highway Capacity Manual, Special Report 209, 1998

The same operating standards (measured in volume-to-capacity ratio or v/c) described in 1999 Oregon Highway Plan that apply to highway segments also apply to highway intersections, whether signalized or unsignalized.

Intersection Operations

Traffic operating conditions at the intersections along Cascade and Hood Avenues were determined using the software package UNSIG, which was developed by ODOT for analyzing conditions at unsignalized intersections. In UNSIG, level of service is defined by the amount of reserve capacity for each movement. The results of the unsignalized intersection capacity analysis is shown in Table 4-5.

TABLE 4-5
SUMMARY OF OPERATIONS AT REPRESENTATIVE INTERSECTIONS
(30TH HIGHEST HOUR, YEAR 2000)

Intersection	Movement	Reserve Capacity (vehicles per hour)	Volume-to-Capacity Ratio	Level of Service[1]
Cascade Avenue and Pine Street	Eastbound left	525	0.15	A
	Westbound left	508	0.08	A
	Northbound left, through, right	23	0.78	E
	Southbound left, through	**(-9)**	**1.09**	**F**
	Southbound right	378	0.30	B
Cascade Avenue and Elm Street	Eastbound left	513	0.08	A
	Westbound left	427	0.11	A
	Northbound left, through, right	41	0.72	E
	Southbound left, through, right	36	0.74	E
Cascade Avenue and Larch Street	Eastbound left	501	0.06	A
	Westbound left	533	0.02	A
	Northbound left, through, right	66	0.40	E
	Southbound left, through, right	31	0.78	E
Cascade Avenue and Locust Street	Eastbound left	391	0.32	B
	Westbound left	511	0.08	A
	Northbound left, through, right	**1**	**0.99**	**E**
	Southbound left, through	**(-109)**	**3.06**	**F**
	Southbound right	350	0.33	B
Hood Avenue and Pine Street	Northbound left	1107	0.02	A
	Southbound left	1085	0.05	A
	Eastbound left, through, right	711	0.12	A
	Westbound left, through, right	687	0.19	A
Hood Avenue and Elm Street	Northbound left	1109	0.02	A
	Southbound left	1092	0.03	A
	Eastbound left, through, right	583	0.25	A
	Westbound left, through, right	554	0.29	A
Hood Avenue and Larch Street	Eastbound left	995	0.02	A
	Westbound left	966	0.00	A
	Northbound left, through, right	621	0.04	A
	Southbound left, through, right	694	0.08	A

Notes:
1 Level of Service calculated by UNSIG based on reserve capacity

As shown in Table 4-5, during the 30th highest hour conditions, ODOT's mobility standards are met at the intersections of Cascade Avenue and Elm Street and Cascade Avenue and Larch Street, but they are not met at the intersections of Cascade Avenue and Pine Street and Cascade Avenue and Locust Street. Where ODOT's mobility standards are met, all of the left turns from the Highway to the side streets operate with a v/c ratio of less than 0.75 and all of the side street approaches to the highway operate with a v/c ratio of less than 0.85. This is primarily due to the fact that the side street volumes and the left turn volumes from the highway are very low.

Two-lane Highway Operations

The operation of mainstream traffic along a two-lane highway is a function of the volume, type, speed, and directional distribution of traffic, as well as roadway features such as the percentage of no-passing zones, general terrain, and lane and shoulder widths. On two-lane rural highways with level terrain, sufficient passing zones, wide lanes and shoulders and speeds of 55 mph, the theoretical capacity of the road is 1,800 vehicles per hour per lane (vphpl). The theoretical capacity drops off quickly with the

introduction of no-passing zones or on rolling or mountainous terrain. For example, the capacity of a two-lane rural highway in a 55 mph speed zone with level terrain and 50 percent no-passing zones is approximately 1,300 to 1,400 vphpl.

Inside the city limits of Sisters, the two-lane highways have posted speeds of 20 to 50 mph, which further reduces their capacities. The 20 mph sections of highway have public street accesses spaced approximately 300 feet apart and one to two driveway accesses per block. The 50 mph sections of highway have few street and driveway accesses; however, there are still some private driveway accesses on these sections.

The capacity of the 50 mph sections of highway was estimated at 1,000 to 1,100 vphpl. In this study, the more conservative estimate of 1,000 vphpl was used to determine whether the highways in Sisters meet ODOT's minimum operating standard. The resulting two-way capacity of these highways is approximately 2,000 vph.

The capacity of the 20 mph sections of highway was initially estimated at 900 to 950 vphpl. In addition to having lower speeds, these sections of highway typically have on-street parking, which further reduces their capacity. To account for frequent pedestrian crossings, as described in the following section, the capacity used in this study was 850 vphpl. The resulting two-way capacity of these highways is approximately 1,700 vph.

Using the estimated capacities described above, volume-to-capacity (V/C) ratios were calculated for eight segments of the state highways in Sisters. For each of the eight highway segments analyzed, the 30th highest hour traffic volumes were estimated at 9.5 percent of the 24-hour volume during peak summer conditions. The estimate of 30th highest hour traffic volumes equaling 9.5 percent of 24-hour peak summer volumes came from data collected in the summer of 2000. David Evans and Associates, Inc. conducted 24-hour traffic volume counts on Sunday, August 20, 2000. During that survey, the peak hour traffic volume equaled 9.5 percent of the 24-hour volume. In addition, the peak hour on August 20, 2000 fell within the top 30 hours for the year at the ATR station seven miles northwest of Sisters. Therefore, the peak hour data collected on August 20, 2000 is representative of the 30th highest hour for the year. Table 4-6 shows the 30th highest hour traffic volumes and corresponding V/C ratios.

TABLE 4-6
1999 STATE HIGHWAY 30TH HIGHEST HOUR VOLUMES IN SISTERS UGB

Location	Highway Speed (mph)	Capacity (vph)	30th Highest Hour Volume (vph)	V/C Ratio
McKenzie Highway (OR 242 and OR 126)				
• .01 mile East of Bailey Ditch Rd.	30	1,700	200	0.12
• West city limits of Sisters	30	1,700	325	0.19
• 0.04 miles East of Santiam Hwy.	20	1,700	1,900	**1.12**
• 0.01 miles East of Elm St.	20	1,700	1,540	**0.91**
• East city limits of Sisters	20	1,700	1,625	**0.96**
• 0.01 miles East of McKenzie-Bend Hwy.	50	2,000	655	0.33
Santiam Highway (US 20/OR 126)				
• 0.33 miles North of McKenzie Hwy.	50	2,000	1,350	0.68
McKenzie-Bend Highway (US 20)				
• 0.01 miles Southeast of McKenzie Hwy.	50	2,000	1,035	0.52

As shown in Table 4-6, during the 30th highest hour, ODOT's mobility standards are not met on the section of highway downtown (roughly between Pine Street and Locust Street). That is, this section of highway does not operate with a v/c ratio of 0.75 or less.

Pedestrian Volumes

Pedestrian volumes crossing Cascade Avenue were recorded at the same time the traffic counts were conducted. Pedestrian volumes were recorded at the intersections of Pine Street, Elm Street, Larch Street, and Locust Street and US 20/OR 126. These intersections were counted because they are the intersections of the city collectors and the state highway. The intersections of Elm Street and the highway and Locust Street and the highway were identified in Chapter 3 as major pedestrian crossing locations. During the AM peak hour, pedestrian volumes were fairly low, ranging from 5 to 20 pedestrians per hour crossing the highway. During the PM peak hour, pedestrian volumes ranged from 20 to 70 pedestrians per hour crossing the highway. The highest pedestrian volumes were recorded at the intersection of Elm Street and Cascade Avenue. A midday (2:30 to 3:30 PM) pedestrian count was conducted at the intersection of Locust Street and the highway because the Sisters elementary and middle schools are located at this corner and the peak activity hours of the school don't necessarily coincide with the peak hours of adjacent street traffic. During the midday hour, 60 pedestrians, mostly students, crossed the highway at this intersection. The pedestrian volume at this intersection during the midday hour was higher than during the morning and evening hours.

Pedestrian crossings have the effect of lowering the capacity of the highway. Where a two-lane highway in a 20 mph speed zone would typically have a capacity of 900 to 950 vehicles per hour per lane (vphpl), with 60 or more pedestrians per hour crossing the highway, the capacity is reduced to approximately 850 vphpl.

During the Summer tourist season, many special events right downtown draw large numbers of tourists to the city and generate high pedestrian volumes. Some of these events, such as the Village Green Craft Show, Sisters Antique Fair, and Sisters Folk Festival take place in the Village Green Park, several

blocks south of the highway. Due to the limited amount of parking in the immediate vicinity, some visitors park north of the highway and walk several blocks to their destination, crossing the highway. By far the largest annual event in Sisters is the Quilt Show, in which the quilts are displayed along Cascade Avenue as well as several other streets. During this event, the narrow sidewalks along Cascade Avenue are inadequate to serve the demand. To address this problem, on-street parking is prohibited on Cascade Avenue and the parking lane is used to accommodate the overflow from the sidewalks. A pedestrian count at several intersections along Cascade Avenue during the Quilt Show on Saturday, July 8, 2000 indicated that 700 to nearly 1,600 pedestrians per hour cross the highway at any one intersection. This level of pedestrian activity crossing the highway restricts traffic to a bumper-to-bumper crawl. A traffic count at the intersection of Elm Street and Cascade Avenue during the Quilt Show indicated that the capacity of the highway is reduced to approximately 350 vphpl. (The highest hourly volume of traffic recorded during the event was assumed to represent the maximum capacity of the highway since the traffic was bumper-to-bumper.)

Identified Needs

Sections of Cascade Avenue (US 20/OR 126) are over capacity. Either the capacity of the highway will need to be increased, or an alternative route will need to be developed, or the demand will need to be reduced. An "alternative route" could consist of a highway couplet or a highway bypass.

Intersection improvements are needed at the intersection of Highway 20 and Locust Street. This intersection will operate with failing conditions as an unsignalized intersection. Either a traffic signal or roundabout will be needed.

TRANSPORTATION DEMAND MANAGEMENT MEASURES

Transportation Demand Management (TDM) measures consist of efforts taken to reduce the demand on an area's transportation system by diverting trips to other travel modes or to less crowded travel times. TDM measures include alternative work schedules, carpooling, and telecommuting. The appropriateness of TDM measure can be determined by examining data on departure to work, travel times, and current mode distribution.

Departure to Work Statistics

In urban areas, daily peak traffic demands can create congestion problems in the late afternoon and early evening. One way to maximize the use of the existing transportation system is to spread out the demand over several hours instead of a single hour. Statistics from the 1990 US Census show the spread of departure to work times over a 24-hour period in Sisters (see Table 4-7). Nearly 32 percent of the total employees depart for work between 7:00 and 8:00 a.m. Another 23 percent depart in either the hour before or the hour after the peak. Assuming an average nine-hour work day, the corresponding afternoon peak can be determined for work trips. Using this methodology, the peak work travel hour in Sisters would occur between 4:00 and 5:00 p.m.

Two of the largest employers in the City of Sisters are the school district and the forest service. Both employers have "start" times that coincide with the morning peak hour of travel (7:00 to 8:00 a.m.) The "end" time for most teachers is before the 4:00 to 5:00 p.m. peak hour of adjacent street traffic. Therefore, there isn't much of an opportunity for the school district to shift its start and end time outside the peak hours. The forest service may be able to shift its start and end times outside the peak travel hours.

TABLE 4-7
CITY OF SISTERS DEPARTURE TO WORK DISTRIBUTION

	1990 Census	
Departure Time	**Trips**	**Percent**
12:00 a.m. to 4:59 a.m.	25	9.6
5:00 a.m. to 5:59 a.m.	18	6.9
6:00 a.m. to 6:59 a.m.	29	11.2
7:00 a.m. to 7:59 a.m.	83	31.9
8:00 a.m. to 8:59 a.m.	30	11.5
9:00 a.m. to 9:59 a.m.	12	4.6
10:00 a.m. to 10:59 a.m.	24	9.2
11:00 a.m. to 11:59 a.m.	9	3.5
12:00 p.m. to 3:59 p.m.	22	8.5
4:00 p.m. to 11:59 p.m.	8	3.1
Total	**260**	**100.0**

Source: US Bureau of Census, 1990 Census.

Travel Mode Distribution

Although the automobile is the primary mode of travel for most residents in the City of Sisters, other modes are used as well. The 1990 Census data includes statistics for journey to work trips as shown in Table 4-8. The census data reflects the predominance of automobile use. However, it should be noted that these counts include trips to work only, and do not include trips taken for shopping, school, or recreation.

TABLE 4-8
CITY OF SISTERS JOURNEY TO WORK TRIPS

	1990 Census	
Trip Type	**Trips**	**Percent**
Private Vehicle	210	74.5
Drove Alone	*164*	*58.2*
Carpooled	*46*	*16.3*
Public Transportation	0	0.0
Motorcycle	0	0.0
Bicycle	11	3.9
Walk	39	13.8
Other	0	0.0
Work at Home	22	7.8
Total	**282**	**100.0**

Source: US Bureau of Census, 1990 Census.

Most Sisters residents travel to work by private vehicle. In 1990, 74% of all trips to work were in an auto, van, or truck. Trips in single-occupancy vehicles accounted for just about 58% of all trips and carpooling accounted for approximately 16%. The percentage of commuters who carpool to work could potentially increase if more park-and-ride lots were created. Ridesharing is addressed in the Transportation Demand Management Plan and the Public Transportation Plan in Chapter 7 of this TSP and in the Deschutes County TSP.

Approximately 14% of the trips to work were made by walking, much higher than the state average. This reflects the relatively small size and accessibility of Sisters. This is most likely also the reason for the approximately 4% of the residents commuting to work by bicycle in 1990, a rate about four times the state average. Because the census data do not include trips to school or other non-work activities, overall pedestrian and bicycle usage is likely to be higher.

Travel time also affects the mode chosen. Table 4-9 shows the 1990 Census travel time to work. Slightly more than half of commute trips in Sisters were under 10 minutes, indicating a travel distance of under five miles. With appropriate facilities such as bike lanes and sidewalks, some of these trips may be converted from automobile to walking or bicycling. Table 4-9 also shows that approximately one-fourth of commute trips by Sisters residents took between 20 and 39 minutes, which may be an indication of how many people live in Sisters and work in Bend and Redmond. If daily inter-city transit was made available, some of these trips could be converted from automobile trips to transit trips.

TABLE 4-9
CITY OF SISTERS TRAVEL TIME TO WORK DISTRIBUTION

	1990 Census	
Departure Time	**Trips**	**Percent**
Less than 5 minutes	68	24.1
5 to 9 minutes	77	27.3
10 to 14 minutes	14	5.0
15 to 19 minutes	9	3.2
20 to 29 minutes	26	9.2
30 to 39 minutes	45	16.0
40 to 59 minutes	11	3.9
60 to 89 minutes	10	3.5
More than 90 minutes	0	0.0
Worked at home	22	7.8
Total	**282**	**100.0**

Identified Needs

- Pursue transportation demand and system management strategies as a first course in addressing future needs.

SAFETY ANALYSIS

DEA reviewed collision data within the Sisters UGB to identify those locations with potential collision patterns and associated safety concerns. The two sources of data reviewed included:

- Collision-specific summaries generated by ODOT's Transportation Development Branch for 1997; and

- Collision summaries generated from the ODOT Accident Summary Database for locations along State Highways in the Sisters UGB.

ODOT's Accident Summary Database calculates two useful factors for comparison with statewide statistics based on information over the three-year period studied. The first factor is a computed average three-year collision rate, which compares the number of collisions with the average daily traffic (ADT) volume and the length of the roadway segment analyzed. The second factor is the Safety Priority Index System (SPIS) value. This factor evaluates collision frequency, severity and traffic volumes to create an index for prioritizing state highway locations with potential safety concerns.

The Safety Priority Index System (SPIS) value identifies high collision and severe accident locations to prioritize where safety money can be spent. The SPIS value is based on three factors: frequency, rate, and severity. The SPIS value weights collisions involving fatalities and severe injuries most heavily. It is therefore possible for a location with one fatal collision to have a higher SPIS value than a location with multiple minor incidents. The SPIS value is also sensitive to traffic levels, recognizing that the opportunity for collisions generally increases as traffic volumes increase. A location with a high SPIS value does not necessarily indicate that a roadway safety problem exists, but it may indicate that further examination of the collision history at this location is warranted.

Table 4-10 summarizes the collision information for the state highways in the Sisters UGB for the years of 1996 though 1998.

TABLE 4-10
COLLISION INFORMATION SUMMARIES FOR HIGHWAYS IN THE SISTERS UGB
(1996-1998)

Location	Fatalities	Injuries	Total Accidents	Accident Rate (acc/mvm)	High SPIS Value
McKenzie Highway (OR 242 and OR 126) (MP 91.0 - 93.5)	0	24	38	2.33	35.83
Santiam Highway (US 20/OR 126) (MP 99.5 – MP 100.36)	0	21	9	1.03	0.00
McKenzie-Bend Highway (US 20) (MP 0.0 – MP 0.5)	0	3	4	1.03	0.00

Source: ODOT Accident summary Database 1996-1998; information compiled by DEA.

A total of 51 collisions occurred on state highways inside the Sisters UGB within the analyzed three-year period. There were no fatalities and 48 injuries occurred during this time period. Of these injuries, 15 or 31% were considered Moderate or Most Severe, with the remaining 69% of the injuries considered Least Severe. Over half of the collisions occurred during daylight hours under dry conditions, and most occurred at intersections. As could be expected, the highest numbers of collisions occurred in the section of Sisters with the highest volumes of traffic and the greatest number of intersections. There were no recorded collisions between motorists and pedestrians or bicyclists during this period.

With the exception of the McKenzie Highway (OR 242 and OR 126), the annual collision rates for the urban highways within Sisters were consistently lower than the statewide averages for all non-freeway highways during the three-year period analyzed. The statewide 1997 collision rate per million vehicle-miles for non-freeway highways was 1.70, and the rates for the Santiam and McKenzie-Bend Highways were both 1.03. The rate for McKenzie Highway (OR 126) was higher than the state collision rate at

2.33. Statewide, between 1996 and 1997 the number of vehicle-miles traveled increased while the number of fatal collisions decreased.

The collision rate computed by ODOT is based on the ratio of a variety of data. The numerator is calculated by multiplying the number of collisions during the year by 1,000,000. The denominator is calculated by multiplying the roadway section length, the roadway ADT, and the number of days in the year. The ratio of these quantities is the collision rate.

The equation is susceptible to producing high collision rates along roadway sections with low traffic volumes. The underlying assumption is that low volume roadways are less prone to experiencing collisions. However, one collision along a low volume roadway does not necessarily indicate that a safety concern exists.

As an example, a two-mile roadway with an ADT of 500 vpd that experiences one collision during the year would result in a rate of 2.74 collisions per million vehicle miles (mvm) of travel. Doubling the ADT along this same roadway to 1,000 vpd would lower the collision rate to 1.37, while halving the ADT to only 250 vpd would increase the collision rate to nearly 5.5. Although all three scenarios involve only one incident, the rate is highly variable.

The SPIS is used to identify areas with higher or more severe collision rates. The 1999 cutoff rate was 50.11. Highway segments with a high SPIS value above the SPIS Cutoff receive special attention to reduce the frequency and severity of collisions in these areas. None of the highway segments inside the Sisters UGB had a 1999 high SPIS value above the 1999 Cutoff.

Summary

In general, the collisions along the state highways within the Sisters UGB were located at the intersections on the state highways and within the central business core. A closer examination of the locations of the collisions revealed that the intersection of the Santiam (US 20/OR 126) and McKenzie Highways (OR 242) is the one area with the most collisions inside the Sisters UGB between 1996-1998. Of the 51 total collisions on state highways inside the Sisters UGB, 11 collisions, or 22%, occurred near this intersection (MP 92.28-92.31 on McKenzie Highway (OR 242) and MP 100.36 on the Santiam Highway (US 20/OR 126)). The need for access control or geometric modifications to reduce accident risk at this intersection was identified in Chapter 3.

The majority of collisions inside the Sisters UGB were rear-end type collisions at intersections. This is a typical collision pattern for an urban arterial. Most accidents were classified as Least Severe by ODOT, and no collision related fatalities occurred on the state highways between 1996-1998 inside the Sisters UGB. Trucks were involved in very few of the collisions, and pedestrians and bicycles were not involved in collisions during the same period. The collision rates for all of the state highway segments inside the Sisters UGB are less than the collision rate for non-freeway highways in the state of Oregon.

CHAPTER 5: TRAVEL FORECASTS

The traffic volume forecasts for the City of Sisters are based on historic growth of the state highway system, historic population growth, and projected population growth.

POPULATION

Population growth plays an important part in projecting future traffic volumes. Historic trends and their relationship to historic traffic demand are the basis of those projections. The population forecasts summarized below were developed to determine future transportation needs. The amount of growth, and where it occurs, will affect traffic and transportation facilities in the study area. This report is not intended to provide a complete economic forecast or housing analysis, and it should not be used for any purpose other than that for which it is designed.

Population projections in the City of Sisters are based on historic growth rates and forecasts produced by the State of Oregon Office of Economic Analysis. Factors that will affect the future growth rate of Sisters include employment opportunities, available land area for development, and community efforts to manage growth.

Both historic and projected population for Deschutes County and its incorporated cities are summarized in Table 5-1. A more detailed description of existing and future land use projections is contained in the Population and Employment Analysis located in Appendix C.

TABLE 5-1
DESCHUTES COUNTY POPULATION TRENDS

	1960[1]	1970[1]	1980[1]	1990[1]	2000[2] Estimate	2020[2] Projected
Deschutes County*	23,100	30,442	62,140	74,958	113,231	182,353
Bend	11,937	13,710	17,263	20,447	46,607	68,776
Redmond	3,340	3,721	6,452	7,165	17,241	35,845
Sisters	602	516	696	708	1,100	1,710
Unincorporated	7,221	12,495	37,731	46,638	48,283	76,022

Sources:
1) US Census Bureau.
2) State of Oregon Office of Economic Analysis.

Notes:
County population includes the population of all the county's incorporated cities.

Historic Growth

The population of Deschutes County and its incorporated cities increased slowly during the period from 1960 to 1990, but then grew rapidly during the 1990s. This growth continues to date, and is reflected in the high annual average growth rates between 1990 and 1999. Estimated at 840 in 1999, the population of the City of Sisters has grown an average of approximately 1 percent annually since 1980, recovering from the declining trend of earlier decades.

Projected Growth

Deschutes County is expected to experience sizable population gains over the next 20 years. Population was forecast by the State of Oregon Office of Economic Analysis. Although the OEA forecasts suggest that Deschutes County is expected to grow more rapidly than the State of Oregon average, the difference between the county growth rate and the state growth rate is expected to decline over time. The estimated average population growth rate for Deschutes County between 1980 and 1999 was 2.89 percent; for the 1999 to 2020 period, the estimated population growth rate for Deschutes County is expected to slow, averaging 2.40 percent annually. The State of Oregon's average annual population growth rate is expected to remain constant at 1.20 percent.

The City of Sisters is expected to experience population gains for the next 20 years, increasing from 1,100 in 2000 to a projected population of 1,710 by the year 2020. This represents a 2.23 percent annual increase each year. This is the OEA projected rate of growth. This planning effort does not change the growth assumptions for the City of Sisters.

TRAFFIC VOLUMES

Traffic volume projections are based on historic growth trends for highway volumes and land use and on the future population projections.

Historic

Before projecting future traffic growth, it is important to examine past growth trends on the roadway system in the City of Sisters. Historic data are only available for the state highways in the city; however, these roadways carry far more traffic than any other city streets. The Oregon Department of Transportation (ODOT) collects traffic count information on the state highways (rural and urban sections) every three years at the same locations and makes estimates of traffic for the years in between. The city streets, which typically serve less than 3,000 vehicles per day, are not expected to experience any capacity deficiencies during the 20-year planning period, except where they intersect the state highways.

Historical growth trends on the state highways in Sisters were established using the average annual daily traffic (AADT) volume information presented in the ODOT Traffic Volume Tables for the years 1978 through 1998. The AADT volumes were obtained for each of these years at several locations along each highway. An average annual growth rate was determined for each location. Table 5-2 provides a summary of the historic average growth rates.

TABLE 5-2
HISTORIC TRAFFIC GROWTH RATES ON STATE HIGHWAYS

Highway Location	Milepoint	Average Annual Growth Rate (1978-1998)	Total Growth (1978-1998)
McKenzie Highway (OR 242 and OR 126)			
• .01 mile East of Bailey Ditch Rd.	91.28	6.1%	225.6%
• West city limits of Sisters	92.20	4.9%	161.9%
• 0.04 miles East of Santiam Hwy.	92.32	4.9%	160.0%
• 0.01 miles East of Elm St.	92.51	3.6%	103.8%
• East city limits of Sisters	92.95	4.0%	119.6%
• 0.01 miles East of McKenzie-Bend Hwy.	93.08	4.7%	150.0%
Santiam Highway (US 20/OR 126)			
• 0.33 miles North of McKenzie Hwy.	100.03	3.2%	85.9%
McKenzie-Bend Highway (US 20)			
• 0.01 miles Southeast of McKenzie Hwy.	0.01	5.0%	167.9%

Source: ODOT 1999 Transportation Volume Tables; information compiled by DEA

During the last 20 years, traffic volumes have increased significantly on the state highway system in Sisters. Average annual growth rates on the highways ranged from 3 to 6 percent. Those rates are higher than the average annual growth rates of population in Sisters (1 percent), Deschutes County (3 percent) and the State of Oregon (1 percent) during the same period. The historic data indicate that there are other factors besides local population growth that influence the growth in traffic on the state highways. Among these factors are increased rates of auto ownership, increases in household incomes, more women entering the workforce, and relatively constant gasoline prices (when adjusted for inflation) during the period.

Future Traffic Volumes

The traffic forecast for the state highway system in Sisters was performed using a Level 1–Trending Forecast[1] analysis. This type of forecast projects future traffic volumes based on the historical growth of the state highway system. It is important to note that using the historical growth trends assumes that future traffic patterns will remain consistent with historical patterns, without consideration of future planned developments.

As part of the 1999 Oregon Highway Plan update, the ODOT Transportation Planning and Analysis Unit conducted 20-year trend line forecasts for all state highway segments that ODOT maintains average daily traffic volume information for. ODOT forecasts have been completed up to the year 2017. Using the ODOT growth rates as given by the Transportation Planning and Analysis Unit, projections for the highway segments in Sisters have been continued through the year 2020. The forecast traffic volumes and total growth on the state highways are shown in Table 5-3.

[1] ODOT *Transportation System Planning Guidelines*, August 1995, p. 29.

TABLE 5-3
FORECAST TRAFFIC VOLUMES AND TOTAL GROWTH ON STATE HIGHWAYS

Highway Location	Milepoint	1999 ADT Volume (vehicles / day)	2020 ADT Volume (vehicles / day)	Total Growth
McKenzie Highway (OR 242 and OR 126)				
• .01 mile East of Bailey Ditch Rd.	91.28	1,400	2,400	71%
• West city limits of Sisters	92.20	2,300	3,900	70%
• 0.04 miles East of Santiam Hwy.	92.32	13,400	21,800	63%
• 0.01 miles East of Elm St.	92.51	10,900	16,400	50%
• East city limits of Sisters	92.95	11,500	15,900	38%
• 0.01 miles East of McKenzie-Bend Hwy.	93.08	4,600	6,100	33%
Santiam Highway (US 20/OR 126)				
• 0.33 miles North of McKenzie Hwy.	100.03	9,500	16,200	71%
McKenzie-Bend Highway (US 20)				
• 0.01 miles Southeast of McKenzie Hwy.	0.01	7,300	11,400	56%

Source: ODOT 1999 Transportation Volume Tables and ODOT Transportation Planning and Analysis Unit

Future average daily traffic volumes were also determined for peak summer conditions. This was done by increasing the year 2020 average daily traffic volumes by the same factor that was used in the existing conditions analysis for peak summer conditions (refer to Chapter 4).

TABLE 5-4
2020 STATE HIGHWAY ADT VOLUMES IN SISTERS UGB

Highway Location	Milepoint	Average (vehicles / day)	Peak Summer (vehicles / day)
McKenzie Highway (OR 242 and OR 126)			
• .01 mile East of Bailey Ditch Rd.	91.28	2,400	3,600
• West city limits of Sisters	92.20	3,900	5,800
• 0.04 miles East of Santiam Hwy.	92.32	21,800	32,400
• 0.01 miles East of Elm St.	92.51	16,400	24,400
• East city limits of Sisters	92.95	15,900	23,700
• 0.01 miles East of McKenzie-Bend Hwy.	93.08	6,100	9,100
Santiam Highway (US 20/OR 126)			
• 0.33 miles North of McKenzie Hwy.	100.03	16,200	24,100
McKenzie-Bend Highway (US 20)			
• 0.01 miles Southeast of McKenzie Hwy.	0.01	11,400	17,000

Source: ODOT 1999 Transportation Volume Tables and ODOT Transportation Planning and Analysis Unit

HIGHWAY SYSTEM CAPACITY

For the year 2020, capacity analyses were performed for the same intersections and highway segments for which existing conditions were analyzed. This "No Build" scenario establishes the baseline for all other analyses. This scenario assumes that no major changes will be made to the existing transportation system for the next 20 years. However, traffic volumes will increase in Sisters as population and employment increase and as through traffic increases. By comparing the future traffic demand with the unchanged transportation system, the areas where future problems are likely to occur can be determined.

Intersection Operations

An estimate was made of year 2020 30th highest hour traffic volumes. As shown in Table 5-3, year 2020 traffic volumes are expected to be approximately 50 percent higher than existing volumes in downtown Sisters. Therefore, to estimate year 2020 30th highest hour traffic volumes, the year 2000 30th highest hour traffic volumes (shown in Figure 4-5) were increased by 50 percent to arrive at the traffic volumes shown in Figure 5-1.

Future year 2020 traffic operating conditions were analyzed for the busiest intersections along Cascade and Hood Avenues. The capacity analysis was performed using the software package UNSIG, which was developed by ODOT for analyzing conditions at unsignalized intersections. In UNSIG, level of service is defined by the amount of reserve capacity for each movement. The results of the unsignalized intersection capacity analysis is shown in Table 5-5.

Future connections to the state highway (as described in Chapters 6 and 7) are planned to reduce the demand on the existing sidestreet approaches to the highway and on the highway itself. Two of these planned projects include the Barclay Drive extension to the intersection of U.S. 20/OR 126 and McKinney Butte Road and the Jefferson Avenue extension from U.S. 20/OR 126 to Timber Creek Drive.

The Barclay Drive extension will divert trips that travel between the industrial area in the north part of the city and points west of the city off of Cascade Avenue. Those trips will no longer have to travel through the intersections of Locust Street and the highway, Larch Street and the highway, and Pine Street and the highway in the center of town. When McKinney Butte Road is completed between U.S. 20/OR 126 and the high school, trips between the high school and the north part of town will also be able to avoid Cascade Avenue.

The Jefferson Avenue extension between U.S. 20/OR 126 and Timber Creek Drive will provide a new access to the highway for the residential area east of Locust Street. This will reduce the number of vehicles turning at the intersection of Locust Street and the highway.

No estimate was made of the number of trips that will be diverted off of Cascade Avenue at Locust, Larch, and Pine Streets; however, the reduction should be significant.

TABLE 5-5
SUMMARY OF OPERATIONS AT REPRESENTATIVE INTERSECTIONS (YEAR 2020)

Intersection	Movement	Reserve Capacity (vehicles per hour)	Volume-to-Capacity Ratio	Level of Service[1]
Cascade Avenue and Pine Street	Eastbound left	N/A[2]	N/A[2]	F[2]
	Westbound left	N/A[2]	N/A[2]	F[2]
	Northbound left, through, right	N/A[2]	N/A[2]	F[2]
PM Peak Hour	Southbound left, through	N/A[2]	N/A[2]	F[2]
	Southbound right	N/A[2]	N/A[2]	F[2]
Cascade Avenue and Elm Street	Eastbound left	N/A[2]	N/A[2]	F[2]
	Westbound left	N/A[2]	N/A[2]	F[2]
	Northbound left, through, right	N/A[2]	N/A[2]	F[2]
PM Peak Hour	Southbound left, through, right	N/A[2]	N/A[2]	F[2]
Cascade Avenue and Larch Street	Eastbound left	N/A[2]	N/A[2]	F[2]
	Westbound left	N/A[2]	N/A[2]	F[2]
	Northbound left, through, right	N/A[2]	N/A[2]	F[2]
PM Peak Hour	Southbound left, through, right	N/A[2]	N/A[2]	F[2]
Cascade Avenue and Locust Street	Eastbound left	N/A[2]	N/A[2]	F[2]
	Westbound left	N/A[2]	N/A[2]	F[2]
	Northbound left, through, right	N/A[2]	N/A[2]	F[2]
PM Peak Hour	Southbound left, through	N/A[2]	N/A[2]	F[2]
	Southbound right	N/A[2]	N/A[2]	F[2]
Hood Avenue and Pine Street	Northbound left	1060	0.03	A
	Southbound left	1028	0.08	A
	Eastbound left, through, right	508	0.32	A
PM Peak Hour	Westbound left, through, right	549	0.21	A
Hood Avenue and Elm Street	Northbound left	1064	0.02	A
	Southbound left	1066	0.02	A
	Eastbound left, through, right	400	0.42	B
PM Peak Hour	Westbound left, through, right	352	0.49	B
Hood Avenue and Larch Street	Eastbound left	900	0.03	A
	Westbound left	862	0.00	A
PM Peak Hour	Northbound left, through, right	449	0.07	A
	Southbound left, through, right	526	0.14	A

Notes:

1 Level of Service calculated by UNSIG based on reserve capacity

2 For the Year 2020 analysis at the intersections along Cascade Avenue, the total traffic volume entering the intersection in the 30th highest hour exceeded 2,500 vehicles per hour (vph), which exceeds the parameters of the UNSIG software.

As shown in Table 5-5, during 30th highest hour traffic conditions in the year 2020, ODOT's mobility standards will not be met on Cascade Avenue. Unsignalized intersection capacity analysis can not be performed because the traffic volumes exceed the limits of the software. The intersections on Hood Avenue will operate acceptably, at Level of Service B or better.

Two-lane Highway Operations

Using the year 2020 traffic forecasts described above, and the estimated highway capacities described in Chapter 4, volume-to-capacity (V/C) ratios were calculated for the same eight segments of the state highways for which existing conditions were analyzed. For each of the eight highway segments

analyzed, the 30th highest hour traffic was estimated at 9.5 percent of the 24-hour summer volume, as in the existing conditions. Table 5-6 shows 30th highest hour traffic volumes and corresponding V/C ratios.

TABLE 5-6
2020 STATE HIGHWAY 30TH HIGHEST HOUR VOLUMES IN SISTERS UGB

Location / Highway	Speed (mph)	Capacity (vph)	30th Highest Hour Volume (vph)	V/C Ratio
McKenzie Highway (OR 242 and OR 126)				
• .01 mile East of Bailey Ditch Rd.	30	1,700	340	0.20
• West city limits of Sisters	30	1,700	550	0.32
• 0.04 miles East of Santiam Hwy.	30	1,700	3,080	**1.81**
• 0.01 miles East of Elm St.	30	1,700	2,300	**1.35**
• East city limits of Sisters	30	1,700	2,250	**1.32**
• 0.01 miles East of McKenzie-Bend Hwy.	50	2,000	865	0.43
Santiam Highway (US 20/OR 126)				
• 0.33 miles North of McKenzie Hwy.	50	2,000	2,290	**1.15**
McKenzie-Bend Highway (US 20)				
• 0.01 miles Southeast of McKenzie Hwy.	50	2,000	1,615	**0.81**

As shown in Table 5-6, during 30th highest hour conditions in the year 2020, ODOT's mobility standards will not be met on most of the highway sections inside the Sisters UGB. That is, these sections of highway will operate with a v/c ratio higher than 0.75. During 30th highest hour conditions, most of the highway sections inside the Sisters UGB can be expected to experience severe congestion, with v/c ratios higher than 1.00.

Identified Needs

Sections of Cascade Avenue (US 20/OR 126) are over capacity. Either the capacity of the highway will need to be increased, or an alternative route will need to be developed, or the demand will need to be reduced. An "alternative route" could consist of a highway couplet or a highway bypass or completion of the local street grid system. Future connections to the state highway (as described in Chapters 6 and 7) are planned to reduce the demand on the existing sidestreet approaches to the highway and on the highway itself. A highway couplet or a highway bypass (also described in Chapters 6 and 7) will increase the capacity of the highway.

CHAPTER 6: TRANSPORTATION IMPROVEMENT OPTION EVALUATION

As required by the Oregon Transportation Planning Rule, transportation improvements were formulated and evaluated for the Sisters TSP. This chapter discusses transportation improvement options for all areas within the Sisters UGB. The potential improvements evaluated in this chapter were developed to address the concerns identified in the goals and objectives (Chapter 2), and as a result of the inventory (Chapter 3), evaluation of the operating conditions (Chapter 4) and traffic forecasts (Chapter 5), and meetings with the CAC and the public.

The following list includes all of the potential transportation system improvements considered for the Sisters TSP. The transportation system improvement options discussed for the Sisters TSP include state highway, county road and city street projects.

EVALUATION CRITERIA

The evaluation of the recommended transportation improvements was based on a quantitative review of traffic operations, including speed, delay, collision records, and congestion; and a qualitative review of effects on perceived safety and livability. In addition, costs (estimated in year 2001 dollars) were factored into the evaluation of each potential transportation improvement. Costs were estimated for construction using a typical unit cost (such as per linear foot), and do not include purchase of right-of-way, design, or other contingencies.

The recommendation of whether to include a suggested improvement in the 20-year plan was based on the potential effectiveness of the suggested improvement relative to its cost or feasibility. If a project was recommended for inclusion in the 20-year plan, it was assigned a priority based on the urgency of the improvement. Priorities are assigned as follows: High = implement in 0-5 years; Medium = implement in 5-10 years; Low = implement in 10-20 years.

The evaluation of each suggested improvement addresses the following five categories: (1) overview, (2) impacts, (3) cost, (4) recommendation, and (5) priority.

A summary of the recommendations made based on the evaluation process described in this chapter is provided in Table 6-1 at the end of the chapter.

EVALUATION OF POTENTIAL TRANSPORTATION IMPROVEMENTS

Street System Need – Reduce congestion on US 20/OR 126

Description: The City of Sisters is located at the eastern junction of US 20 and OR 126. Both highways are designated Statewide Highways. (The Oregon Department of Transportation classifies the state highway system into five categories: Interstate, Statewide, Regional and District Highways, and Local Interest Roads.) In downtown Sisters, the highways lie along Cascade Avenue, which is the City's "main street."

US 20/OR 126 is becoming increasingly congested during peak periods as both long-distance highway and local traffic volumes continue to grow. Average daily traffic (ADT) volumes on Cascade Avenue in Sisters range between 10,000 and 13,000 vehicles per day (vpd).

The high traffic volumes result in some periods of extreme congestion, difficulty in crossing Cascade Avenue as a pedestrian, safety hazards for bicyclists sharing the travel lanes with automobiles and trucks, and difficulty in parallel parking on the road.

Unlike other urban areas which experience peak traffic volumes weekday mornings and evenings as commuters travel to and from work, the City of Sisters experiences peak traffic volumes on weekends (Friday evening to Sunday evening), particularly in the summer months. These are the periods when residents of the Willamette Valley travel to and from weekend destinations in Central Oregon. For comparison, at ODOT's permanent Automatic Traffic Recorder on U.S. 20/OR 126 7 miles west of Sisters, the average annual daily traffic volume reported for 1999 was 7,900 vehicles per day. For July 1999, the average daily traffic volume was 11,700 vehicles per day. Those are primarily long distance trips between the Willamette Valley and Central Oregon. The City of Sisters is itself a destination for leisure travelers due to its western theme and abundance of antique and craft shops and special events.

Five alternatives to the "no action" or No Build Alternative are described in this section. The five alternatives to the No Build Alternative are listed in order of increasing cost and amount of new construction. They consist of: 1) no new construction and continuing the temporary control/rerouting of traffic during peak periods that occurs today; 2) expanding the local grid system to disperse cross-street traffic and provide parallel routes to the state highway for local traffic; 3) adding additional lanes to Cascade Avenue by removing on-street parking; 4) constructing a highway couplet on two parallel city streets; and 5) constructing a new highway facility to bypass downtown Sisters.

No Build Option

Overview: The No Build Alternative consists of no change to Sisters' existing street system. The purpose of a No Build Alternative is to examine future conditions without improvements to the system. The No Build Alternative would have no construction or right-of-way costs since it is based on the assumption that no new roadway construction would occur.

Impacts: The No Build Alternative, like the improvement alternatives would have several pros and cons. The pros associated with the No Build Alternative are no construction costs and no right-of-way acquisition. The cons associated with the No Build Alternative are increased traffic congestion, noise, and air pollution and decreased safety and quality of life.

Today, the highway meets ODOT's mobility standards during average weekday conditions. However, during peak summer conditions, the section of highway in downtown Sisters (roughly between Pine Street and Locust Street) does not meet ODOT's minimum operating standards. With the expected growth in through and local traffic over the 20-year planning horizon, the highway will not meet ODOT's mobility standards even during average weekday conditions.

Cost: There are no costs associated with a No Build Alternative.

Recommendation: The No Build Option is not recommended because it would result in unacceptable levels of congestion on Highway 20/126. The No Build Option does not comply with the goals of the TSP, which include preserving the function, capacity, level of service, and safety of the street system.

Priority: None.

Improvement Option 1 – Temporary Traffic Control / Rerouting Traffic During Peak Periods

Overview: The City of Sisters and the Oregon Department of Transportation (ODOT) recognize that there is an existing need for temporary traffic control and rerouting traffic during peak periods. Currently the "alternative route" for westbound traffic on Cascade Avenue is north on Larch Street, west on Main Avenue, north on Pine Street and west on Forest Service 100 spur.

This action can be maintained as a low-cost solution to the city's sporadic periods of congestion. One issue that was raised with this routing is that Forest Service 100 spur was not built to accommodate this level of use. The road is only 14 feet wide which makes it unsafe for two-way travel and the pavement overlay can not withstand the loading from heavy vehicles. Therefore, other "alternative routes" should be explored.

Currently, the City of Sisters is planning a new collector street which will extend from the intersection of McKinney Butte Road and US 20/OR 126 to the intersection of Barclay Drive and Pine Street. Once this street connection is made, there will be several "alternative routes" that can be used:

- Larch Street to Main Avenue to Pine Street to the new collector
- Larch Street to Barclay Drive to the new collector
- Locust Street to Barclay Drive to the new collector

The latter two routes will take traffic out of the downtown and will route traffic through the city's industrial area on a street that is under-utilized on weekends.

Impacts: Current overuse of Forest Service 100 Spur is causing the road to deteriorate and creates a hazard for two-way traffic due to the road's narrow width. Rerouting Cascade Avenue traffic one block north to Main Avenue is not effective in reducing the total traffic downtown, it simply spreads the burden between two streets. Once the new collector is constructed and traffic can be routed to Barclay Drive and the new collector, traffic will truly be rerouted out of the downtown.

Cost: This would be the lowest cost improvement. It requires no new street construction besides the new collector, which is already a programmed improvement. The new collector is estimated to cost $700,000, and it will be funded by a one-time local street improvement grant from ODOT. The cost for this alternative will be limited to signs and enforcement. The City of Sisters will also get two variable message signs from ODOT, which are programmed in ODOT's capital improvement program, the Statewide Transportation Improvement Program (STIP). The cost of the two moveable variable message signs is $60,000.

Recommendation: The temporary rerouting of traffic during peak periods should be continued. The best route to use is Locust Street to Barclay Drive, to the new collector.

Priority: High.

Improvement Option 2 – Expand the Local Street Grid System

Overview: Street connectivity is important because a well-connected street system provides more capacity than a disconnected one. A grid system provides alternate routes for local traffic and is more pedestrian and bicycle-friendly because it typically shortens trip distances. Ensuring that the street grid system is extended as development occurs is critical to the city's continued livability. An expanded local grid system will disperse cross-street traffic and provide parallel routes to the state highway for local traffic.

Impacts: The City of Sisters is planning a new collector street, the Barclay Drive Extension, which will extend from the intersection of McKinney Butte Road and US 20/OR 126 to the intersection of Barclay Drive and Pine Street. This street connection will reduce the demand on side street approaches to the state highway in downtown Sisters. For example, trips from the industrial area along Barclay Drive to areas west of the city will be able to access the highway at this new highway connection instead of at

Pine, Larch, or Locust Street. Similarly, trips from the residential areas along Camp Polk Road will be able to access the high school without traveling on the highway at all. This project is shown in Figure 6-1 as Street Grid Expansion Project Number 1.

Seven other street grid expansion projects were identified and are shown in Figure 6-1. These projects will be constructed by developers as development occurs. Five of these projects are local street extensions in the residential zones on the east side of Sisters. Two of these projects are local street extensions in the industrial zone on the north side of Sisters. Each of these projects is described in the following paragraphs.

The Jefferson Avenue Extension (Project Number 2 in Figure 6-1) is a local street extension, primarily intended to serve the residential uses in the Timber Creek subdivision. The Jefferson Avenue Extension will connect Timber Creek Drive in the east with US 20/OR 126 in the west. It will connect at the highway opposite a realigned section of the existing Jefferson Avenue (the realignment of the existing intersection of Jefferson Avenue and the highway is a safety project described in Chapter 7). This street will be constructed by developers as development occurs. This improvement will result in a small reduction in trips that access the highway at Locust Street, which is an intersection that was identified as having a capacity deficiency.

Creekside Road, Rope Street, and Timber Pine Drive (Project Number 3 in Figure 6-1) are new local streets that are intended to serve the residential uses in the easternmost area of Sisters. Creekside Road will include a bridge over Squaw Creek. The need for a local street bridge over Squaw Creek was identified in Chapter 3. These streets will be constructed by developers as development occurs. This improvement will result in a small reduction in trips that access the highway at Locust Street, which is an intersection that was identified as having a capacity deficiency. These new streets will provide a shorter route between the residential neighborhoods east of Locust Street and points east along Highway 126.

Coyote Springs Road (Project Number 4 in Figure 6-1) is a new local street that is intended to serve the residential uses in the Coyote Springs subdivision. Coyote Springs Road will connect Locust Street in the west with US 20 in the east. This street will be constructed by developers as development occurs. This improvement will result in a small reduction in trips that access the highway at Locust Street, which is an intersection that was identified as having a capacity deficiency. This new street will provide a shorter route between the residential uses in the Coyote Springs subdivision and points east along Highway 20.

A new local street is proposed between Tamarack Street in the west and Rope Lane in the east (Project Number 5 in Figure 6-1). This road is intended as a street connectivity project. It will help fill in the street grid system in the northeast corner of the city by connecting the end of Rope Lane, which is currently a cul-de-sac, with the rest of the grid system. This street will be constructed by the City of Sisters and developers as development occurs.

The extension of Cowboy Street (Project Number 6 in Figure 6-1) from its current terminus to the new road planned between Tamarack Street and Rope Lane is intended as a street connectivity project. It will help fill in the street grid system in the northeast corner of the city by connecting Cowboy Street, which is currently a dead end, with the rest of the grid system. This street will be constructed by developers as development occurs.

The extension of Black Butte Avenue (Project Number 7 in Figure 6-1) is a new local street that is intended to serve the industrial uses in the north area of Sisters. Black Butte Avenue will be extended

from its current terminus at Locust Street to the extension of Fir Street. This project is a logical extension of the existing street grid system. This street will be constructed by developers as development occurs.

The extension of Fir Street (Project Number 8 in Figure 6-1) is a new local street that is intended to serve the industrial uses in the north area of Sisters. Fir Street will be extended from its current terminus at Adams Avenue to the extension of Black Butte Avenue. This project is a logical extension of the existing street grid system. This street will be constructed by developers as development occurs.

Cost: ODOT may be able to provide some funding if "off-system improvements" provide relief to state facility. For example, ODOT is funding the construction of the Barclay Drive Extension with a local street improvement grant. The Barclay Drive Extension is estimated to cost $700,000.

The Jefferson Avenue Extension is estimated to cost $180,000, using a unit cost of construction of $200 per linear foot and a 900-ft. project length. The Timber Creek Subdivision streets, consisting of Creekside Road (including the bridge over Squaw Creek), Rope Street, and Timber Pine Drive, are estimated to cost $254,900. This cost estimate was provided by the developer and includes $210,000 for the bridge and $44,900 for the streets. Coyote Springs Road is estimated to cost $560,000, using a unit cost of construction of $200 per linear foot and a 2,800-ft. project length. The new road between Tamarack Street and Rope Lane is estimated to cost $330,000, using a unit cost of construction of $200 per linear foot and a 1,650-ft. project length. The extension of Cowboy Street is estimated to cost $80,000, using a unit cost of construction of $200 per linear foot and a 400-ft. project length. The extension of Black Butte Avenue is estimated to cost $264,000, using a unit cost of construction of $200 per linear foot and a 1,320-ft. project length. The extension of Fir Street is estimated to cost $132,000, using a unit cost of $200 per linear foot and a 660-ft. project length.

The total cost of all of these projects is $2,500,900 in current year (2001) dollars.

Recommendation: All of the street system expansion projects described above are recommended.

Priority: The Barclay Drive Extension is already funded and is a high priority project (to be constructed in the next 5 years). Creekside Road, Rope Street, Timber Pine Drive, and the new street between Tamarack Street and Rope Lane are also high priority projects. The other street system expansion projects will be constructed by developers as development occurs. The Jefferson Avenue Extension and Coyote Springs Road are medium priority projects (to be constructed in the next 5 to 10 years). The extension of Cowboy Street, the extension of Black Butte Avenue, and the extension of Fir Street are low priority projects (to be constructed in the next 10 to 20 years).

Improvement Option 3 – Additional Lanes on Cascade Avenue

Overview: One way to reduce congestion on Highway 20/126 is to add lanes to the highway. This can be accomplished in two ways: by widening the highway from its existing width or reallocating the existing width.

Where the highway lies along Cascade Avenue, it has a 48-ft paved width within a 60-ft. right-of-way. For the most part, the remaining right-of-way (6 feet on either side of the road) is used for sidewalks. Widening the road is impractical because to add just one lane will require the addition of up to 12 feet of asphalt, which will leave no right-of-way for sidewalks. Sidewalks are an essential component of the downtown area.

A more practical way to add capacity is to eliminate on-street parking. It will then be possible to restripe the road from two lanes with on-street parking on both sides to three lanes with no on-street parking. A three-lane cross section would consist of one 12-ft. lane in each direction with a 14-ft. center left turn refuge and 5-ft. shoulders on each side (using ODOT's lane width standard guidelines). Using narrower lane widths (11-ft. travel lanes and a 12-ft. center turn lane), more pavement will be available for shoulders, bike lanes, or sidewalk widening. Studies have shown that changing a road from two lanes to three lanes increases the capacity significantly in areas where the percentage of left turns is high. However, the left turn percentage of highway traffic is low, comprising approximately 5 percent of the highway volume. Therefore, there would not be a significant gain in capacity by adding left turn lanes.

Impacts: Removing parking from in front of Cascade Avenue businesses could have an adverse effect on the "main street" attributes of Cascade Avenue, and will undoubtedly be met with resistance from business owners. An inventory of on-street parking on Cascade Avenue indicated that approximately 90 to 100 parking spaces will be lost if parking is removed. It is possible that the loss of parking on Cascade Avenue can be mitigated by providing more on-street (or even off-street) parking on Main and Hood Avenues.

There is also some evidence that three-lane configurations typically have higher collision rates than two-lane streets.

Cost: This would be a low-cost improvement. It requires no new street construction unless additional on-street or off-street parking is created to mitigate the parking lost on Cascade Avenue. The cost for this alternative will be limited to signs and striping.

Recommendation: This alternative is not recommended because the need to retain on-street parking outweighs the need for left turn lanes.

Priority: None.

Improvement Option 4 – Highway Couplet

Overview: The highway couplet alternative is based on the premise that there is unused street capacity during peak periods on a city street that is adjacent and parallel to the existing state highway alignment. In this alternative, westbound highway traffic will be routed along one street and eastbound highway traffic will be routed along another street. This effectively provides two lanes in each direction for highway traffic without widening the existing facility or removing on-street parking.

Considering only the existing street system geometrics, the most logical street pair for a highway couplet is Hood and Cascade Avenues. With the recently-completed Hood Avenue extension at the west end of town and the angle at which Hood Avenue intersects the highway at the east end of town, it will be straight-forward for eastbound traffic to slip off the highway at the Hood Avenue extension and merge back on to the highway where Hood Avenue intersects Highway 20 near Locust Street. In the following sections, the analyses of a possible future couplet are based on the couplet consisting of Hood and Cascade Avenues.

Main Avenue was considered in both a Cascade Avenue/Main Avenue couplet and a Hood Avenue/Main Avenue couplet. Using Main Avenue would require major right-of-way purchases and roadway realignment. Without the roadway realignment, using Main Avenue will require two 90-degree turns at both the east and west ends of Main Avenue. To eliminate the 90-degree turns at the east end, a new roadway segment will have to be constructed through what is now the middle school property. To eliminate the 90-degree turns at the west end, a new roadway segment will have to be constructed

through the existing Forest Service complex. At the request of the Sisters City Council, two conceptual alternatives were developed to show how a Hood Avenue/Main Avenue couplet might look at the east end of town. Those alternatives are shown in Figures 6-2 and 6-3. A conceptual sketch of how a Hood Avenue/Main Avenue couplet might look at the west end of town is shown in Figure 6-4.

The two major obstacles to a Hood Avenue/Main Avenue couplet are the US Forest Service Compound at the west end of town and the Sisters Middle School at the east end of town. The City shall work with the Forest Service to determine how the federal agency's long-term plans could affect the Hood Avenue/Main Avenue couplet. Relocating the compound would be almost prohibitively expensive.

Federal transportation law specifies projects must avoid certain types of property if at all possible (Title 49 United States Code, Section 303). These properties are public park and recreation lands, wildlife and waterfowl refuges, and historic sites. They are analyzed under the so-called Section 4(f) criteria. (The language originally appeared in Section 4(f) of the Department of Transportation Act of 1966 and has been known as Section 4(f) ever since.) In the case of the Hood Avenue/Main Avenue couplet, ODOT would have to address Section 4(f) regarding the Sisters Middle School. Factors to consider would be is the site publicly owned, is the site used substantially by the public for recreation, is the site significant in meeting the recreation needs of the city or is just for the school, what is the site's primary purpose, etc. ODOT must determine whether the property in question is 4(f) or not. Then ODOT submits its determination to the Federal Highway Administration (FHWA) to see if they concur or not. Whether federal money is involved in a project or not, ODOT as an agency "best practice" follows federal environmental procedures. However, in the case of 4(f), that analysis is done only if Federal DOT dollars are involved. If a property is determined to be 4(f), a road or highway can only be put through the site when 1) there is no other feasible or prudent alternative and 2) all possible planning has been done to minimize harm to the site. In the case of Sisters, Cascade Avenue would offer a feasible alternate route for the couplet.

Impacts: Implementation of a highway couplet on Hood and Cascade Avenues will have a significant impact on traffic volumes on both streets. Traffic volumes on Cascade Avenue will be reduced by approximately half, as Cascade Avenue will serve only one direction of highway traffic. Traffic volumes on Hood Avenue will increase dramatically, as Hood Avenue will serve half of the highway traffic in addition to the low volume of traffic it serves today.

On an average day of the year, Cascade Avenue serves approximately 13,400 trips per day and 1,650 trips during the 30th highest hour through downtown Sisters. By the year 2020, average daily traffic volumes are expected to increase to 21,800 vehicles per day (vpd), and 30th highest hour volumes are expected to reach 2,500 vph. As shown in Chapter 4, Cascade Avenue does not meet ODOT's mobility standards for 30th highest hour conditions today. As shown in Chapter 5, prior to the year 2020, the highway will be well over capacity during 30th highest hour conditions.

In Chapters 4 and 5, the capacity of the highway in downtown Sisters was estimated at 1,700 vehicles per hour (vph). That estimate is based on the assumption that the capacity of each of the two lanes is 850 vph. With implementation of a couplet, there will be four lanes of traffic on the highway (two eastbound lanes on Hood Avenue and two westbound lanes on Cascade Avenue). The total capacity of the highway couplet will be 3,400 vph with four lanes of highway traffic.

The capacity of the highway couplet will be sufficient to meet ODOT's mobility standard for existing conditions, as demonstrated by the following example. The year 2000 30th highest hour traffic volume on the highway was estimated at 1,650 vph. Assuming a 60/40 directional split of traffic during the peak hour, the peak hour volume in the peak direction will be approximately 990 vph. The capacity of

the highway will be 1,700 vph in each direction with a couplet. The resulting volume-to-capacity (v/c) ratio will be 0.58, which meets ODOT's mobility standard of a v/c ratio of 0.75 or less.

During 30th highest hour conditions 20 years in the future, ODOT's mobility standard will not be met with a couplet. The year 2020 30th highest hour traffic volume on the highway was estimated at 2,500 vph. Assuming a 60/40 directional split of traffic during the peak hour, the peak hour volume in the peak direction will be approximately 1,500 vph. The capacity of the highway will be 1,700 vph in each direction with a couplet. The resulting v/c ratio will be 0.88, which does not meet ODOT's mobility standard of a v/c ratio of 0.75 or less. However, even though the couplet will approach a v/c ratio of 1.00, the couplet will improve the v/c ratio and appears to be a great benefit at a relatively low cost.

There are other benefits of a couplet which can not be quantified as easily. One-way couplets are typically safer than two-way roads because they provide smoother flow and higher capacity. They also result in fewer potential conflicts for vehicles and pedestrians. For example, left turns made from Cascade Avenue today sometimes block upstream traffic causing delays and the potential for rear-end accidents. With implementation of a one-way couplet, left turns will no longer have to yield to on-coming traffic because there will be no on-coming traffic on the same roadway. This will reduce delays and the potential for rear-end accidents in the general travel lanes. In addition, there will be a second travel lane in each direction, so upstream traffic can turn around vehicles that slow down to turn right or left.

Pedestrian conditions are improved because with a one-way couplet, pedestrians need only cross one direction of highway traffic at a time. However, some studies show that pedestrian safety is degraded when pedestrians have to cross two lanes of same-direction traffic versus two lanes of opposing-direction traffic. This occurs when a driver in the right (or left) lane stops to let a pedestrian cross, and the pedestrian is obscured from view for a driver in the second lane. There is some evidence that average speeds increase on a one-way couplet versus on a two-way street, which is beneficial to vehicular flow, but reduces safety for bicyclists and pedestrians.

Another benefit of a couplet is that on-street parking can remain on both Cascade and Hood Avenues, although, the diagonal parking on Hood Avenue may need to be changed to parallel parking, which will result in a loss of approximately half of the parking spaces on Hood Avenue. If a couplet is not constructed, parking along Cascade Avenue may need to be removed so that turn lanes or additional through lanes can be constructed. Removing on-street parking will adversely affect the viability of Cascade Avenue businesses.

There is the possibility that implementation of a one-way couplet could have negative impacts including negative economic impacts to businesses on Cascade Avenue. There will be concern from Cascade Avenue business owners who rely on pass-by traffic that they will lose business if the amount of pass-by traffic is reduced by half. To address this concern, an Economic Impacts Analysis Report was prepared as part of this study, and is included in Appendix D. That report found evidence that suggests that conversion of two-way streets to a one-way couplet does not have a significant adverse impact on general sales. The Economic Impacts Analysis Report summarizes the findings of other studies, including a 1989 Environmental Assessment and Economic Impact Report prepared by ODOT, which found that aggregate retail sales in Sisters will not likely be affected or will be minimally impacted by a highway couplet.

Implementing a couplet on Cascade and Hood Avenues will not *physically* increase capacity on the street system, but it will *operationally* increase capacity on the highway by using under utilized capacity on Hood Avenue.

One advantage of implementing a Cascade Avenue/Hood Avenue couplet alternative in Sisters is that if it proves unsuccessful, the streets could be returned to two-way operation.

Cost: A Hood Avenue/Cascade Avenue couplet will be a relatively low-cost improvement compared with constructing an entirely new facility. It requires no new street construction besides minor upgrades to the Hood Avenue extension (to remove the center island) and an asphalt overlay on Hood Avenue to bring it up to state highway design standards. The project length is approximately 4,950 linear feet. Using a unit cost of $200 per linear foot to reconstruct Hood Avenue to state highway standards, the cost of this improvement will be $990,000. If a pavement overlay on Hood Avenue is not needed, the cost for this improvement option will be limited to signs and striping.

If Hood and Main Avenues are used for the couplet, it is likely that both streets will need to be upgraded to state highway design standards. In this case, the total project length is approximately 9,900 linear feet. Using a unit cost of $200 per linear foot to reconstruct Hood and Main Avenues to state highway standards, the cost of this improvement will be $1,980,000. This cost does not include right-of-way acquisition, or the cost to relocate the Forest Service complex, or the cost to mitigate impacts to the middle school.

Recommendation: A one-way highway couplet is needed today to meet ODOT's mobility standards. Implementation of a couplet should be pursued as a high priority project. However, the Citizen Advisory Committee (CAC) that worked with the consultant in preparation of this Transportation System Plan (TSP) was generally against the idea of a couplet. The CAC recommended that the couplet be a low priority project (for implementation after the year 2010) in the TSP, rather than a high priority project (for implementation in the next five years). The CAC would like to pursue less drastic improvements, such as the temporary rerouting of traffic off Cascade Avenue during peak periods as described above, before making a "permanent" change in the existing street system. Therefore, at the direction of the CAC, a one-way highway couplet is recommended as a low priority project.

The City Council reviewed the recommendation from the consultant for a Cascade Avenue/Hood Avenue couplet and requested that the recommendation be changed to a Main Avenue/Hood Avenue alignment.

Priority: Low. (Implement after the year 2010.)

Improvement Option 5 – Highway Bypass

Overview: To address residents' concerns about too much traffic in downtown Sisters, a highway bypass alternative was evaluated to provide an alternate route to Cascade Avenue. Traffic on Cascade Avenue consists of through and local traffic. Through traffic has neither an origin nor a destination in the City of Sisters, but travels through the city. Local traffic has either an origin, a destination, or both in the City of Sisters. A highway bypass is generally intended to serve through traffic.

Two possible routes for a bypass around the City of Sisters were considered: a northern route and a southern route. The northern route would lie within the Urban Growth Boundary (UGB) in the west where it connects to Highway 20/126. From there, it would continue east, crossing over Pine Street/Squaw Back Road and Locust Street/Camp Polk Road. It would then cross outside the UGB, and turn to the south, crossing over Perit Huntington Road and connecting with Highway 126 and Highway

20 east of Sisters. This route would be approximately 2.0 miles long. The southern route would lie within the UGB in the west where it connects to Highway 20/126 and continue south, crossing over Highway 242 and outside the UGB. From there, it will continue south, past the residential neighborhoods in southwest Sisters, and turn east, crossing Elm Street/Three Creeks Road and connect with Highway 20 just east of the UGB. This route would be approximately 2.0 miles long. The only access to either route would be via grade separated interchanges at the east and west connections with Highways 20 and 126. Both a northern and southern conceptual alignment is shown in Figure 6-5.

It was assumed that the southern alignment would be more feasible. The southern alignment would have one less grade separated crossing, making the total cost of construction slightly lower. The northern alignment would lie within the Airport Runway Protection Zone, which may be a fatal flaw for that alignment. The northern alignment lies within some developed residential and industrial zones, which may make the right-of-way acquisition more difficult. The northern alignment would also have some topographic constraints in the east, where it would lie along a butte. The following analyses are based on the southern alignment being the more feasible alignment.

The bypass was assumed to be constructed as a four-lane, limited access highway with a 74-ft. paved section, which would include four 12-ft. travel lanes, a 10-ft. paved median, and two 8-ft. shoulders.

Impacts: Implementation of a highway bypass will have a significant impact on traffic volumes on the existing highway alignment. A highway bypass is generally intended to serve through traffic. An origin-destination survey conducted in Sisters during the summer of 2000 indicated that approximately 20 percent of the highway traffic in Sisters is "through" traffic over the course of a day, and as much as 45 percent of the traffic during the 30th highest hour is through traffic.

On an average day of the year, Cascade Avenue serves approximately 13,400 trips per day. During the 30th highest hour, Cascade Avenue serves approximately 1,650 vehicles per hour (vph) through downtown Sisters. By the year 2020, average daily traffic volumes are expected to increase to 21,800 vehicles per day (vpd), and 30th highest hour traffic volumes are expected to reach 2,500 vph. As shown in Chapter 4, Cascade Avenue does not meet ODOT's mobility standards for average conditions today. As shown in Chapter 5, prior to the year 2020, the highway will be well over capacity during 30th highest hour conditions.

In Chapters 4 and 5, the capacity of the existing highway in downtown Sisters was estimated at 1,700 vph. That estimate is based on the assumption that the capacity of each of the two lanes is 850 vph.

If a bypass is constructed, the diversion of some highway trips to the bypass will provide some congestion relief to Cascade Avenue, but only in the near term. With the background growth in traffic, and the relatively low diversion to a bypass, Cascade Avenue will once again be over-capacity within the 20-year planning horizon, even with a bypass.

As described above, during the 30th highest hour in the year 2000, there are approximately 1,650 vph on Cascade Avenue. Approximately 45 percent of the peak hour traffic is through trips. Therefore, the through traffic is approximately 745 vph (1,650 × 0.45 = 745). These are the trips that could potentially use a bypass. If all of these trips diverted to a bypass, the remaining traffic on the existing highway alignment would be 905 vph (1,650 – 745 = 905). That level of traffic is well within the road's capacity of 1,700 vph. Therefore, using year 2000 30th highest hour traffic volumes, this analysis indicates that with 45 percent traffic diversions to a bypass, the remaining traffic volumes on Cascade Avenue will be within that road's capacity.

By the year 2020, average daily traffic volumes are expected to increase to 21,800 vpd and 30th highest hour traffic volumes are expected to reach 2,500 vph. If 45 percent of the peak hour traffic diverted to a bypass, the remaining traffic on the existing highway alignment would be 1,375 vph (2,500 × 0.55 = 1,375). In that case, traffic volumes would exceed 80 percent of the road's capacity. Therefore, using year 2020 30th highest hour traffic volumes, this analysis indicates that Cascade Avenue will still experience congestion, even with a highway bypass.

The primary benefit of a bypass is travel time savings. In Sisters, it will be difficult to realize a significant time savings on such a relatively short route. For example, assuming a two-mile bypass is constructed to bypass a two-mile section of highway downtown, if the average speed on the bypass is 60 mph and the average speed on the downtown highway is 30 mph (this is an average speed for the 20 mph section and higher-speed sections), the two-mile bypass will result in only a two-minute time savings. A two-minute time savings will hardly be noticeable on a long-distance trip such as Bend to Salem. A secondary benefit of a bypass is a reduced accident rate. This is based on evidence that limited access highways typically have lower accident rates than other state highways and local roads, therefore, the diversion of trips to a bypass should result in an overall reduction in accidents in Sisters. Another benefit of a bypass around Sisters would be the diversion of large truck traffic outside of the downtown. An estimate of the dollar value of the benefits of a Sisters bypass was made in the Cost/Benefit Analysis included in Appendix E. The Cost/Benefit analysis concluded that the costs of a Sisters bypass (construction costs and maintenance costs) are higher than the dollar value of the benefits (travel time savings and accident reduction).

There is the possibility that construction of a bypass could have negative economic impacts to businesses on Cascade Avenue that serve highway travelers. There will be concern from Cascade Avenue business owners who rely on pass-by traffic that they will lose business if the amount of pass-by traffic is reduced. They could lose customers that will go around the city and be serviced at the next town on the highway. However, because of the distances between cities, some travelers may still choose to go into Sisters for services. To address this concern, an Economic Impacts Analysis Report was prepared as part of this study, and is included in Appendix D. That report found evidence that suggests that a bypass generally brings small, but statistically significant decreases to business volumes in bypassed cities. Construction of a bypass route can adversely affect all businesses, and those impacts may be felt more severely by businesses that rely on through trips. Businesses in Sisters that depend on through trips and provide similar products or services that can be found in Bend will experience greater negative impacts from a bypass route compared to other businesses. Proper signing and dissemination of travel-related information and businesses should reduce the adverse affects of a new bypass route or alternate route. One of the key findings was that cities with a population of less than 1,000 people, such as Sisters are at the greatest risk of negative economic impacts resulting from construction of a bypass.

Cost: A limited-access highway bypass is a high-cost improvement. The total estimated cost of the facility, including right-of-way acquisition is $17.2 million (in year 2001 dollars). Using a unit cost of $11 per square foot for state highway projects and a cross section consisting of two 12-ft. lanes, a 10-ft. paved median, and 8-ft. shoulders, the cost of construction will be $814 per linear foot. Using a project length of 2 miles (10,560 feet), the total cost of construction of the roadway will be $8.6 million. This cost does not include the cost of right-of-way or the cost of grade-separated crossings. It was assumed that four grade-separated crossings will be needed: one at the east interchange with Highway 20, one at the west interchange with Highway 20, one over Highway 242, and one over Three Creeks Road. Using a unit cost of $1.2 million for each grade-separated crossing, the total cost of construction for the grade-

separated crossings will be $4.8 million. The cost of the right-of-way was calculated using $3.00 per square foot and a 120-ft. right-of-way width, resulting in a total cost of $3.8 million for right-of-way.

Recommendation: A bypass is not recommended, based primarily on the following three factors.

First, a bypass is estimated to draw only 20 percent of the total traffic from the existing highway alignment. That is not enough traffic diversion to make a significant reduction in congestion downtown. By not relieving congestion downtown, it will be difficult for ODOT to justify constructing a project that will not meet the stated goals of the project.

Second, any possible bypass alignment will lie (at least in part) outside the Sisters Urban Growth Boundary (UGB). Under statewide planning goals and the Transportation Planning Rule, ODOT cannot construct new facilities outside of UGBs without goal exceptions. At a minimum, an alignment outside the UGB will need exceptions for Goal 2 (land use planning), Goal 5 (open spaces, scenic and historic areas, and natural resources), Goal 12 (transportation), and Goal 14 (urbanization). Deschutes County will also have to modify its adopted TSP to show the alignment as they are the planning authority outside Sisters' UGB.

Third, the *1999 Oregon Highway Plan* only supports improvement options that are cost-effective. Under Major Improvements Policy 1G(4), "the lowest priority is to add new transportation facilities such as a new highway or bypass." Action 1G.2 states that a major improvement to a state highway must be "a cost-effective means to achieve the objectives(s)." The Cost/Benefit analysis included in Appendix E indicated that it is unlikely that a bypass around Sisters will meet this cost-effective criteria. In addition, the *1999 Oregon Highway Plan* contains a requirement that existing facilities be protected, made more efficient, and improved before any new facilities are built. More specifically, major improvements such as a truck route or bypass should be implemented only if the need persists after the efficiency of the existing street system has been optimized through less capital-intensive transportation system management (TSM) measures. This implies that the temporary rerouting of traffic during peak periods and/or the couplet implementation should be pursued before a bypass is constructed.

Priority: None.

Street System Need – Balance pedestrian and vehicular needs

Description: Cascade Avenue (US Highway 20/OR Highway 126) is a Statewide Highway and serves as the City of Sisters' "main street." As such, it serves a high level of truck traffic, long distance "through traffic," local traffic, high levels of pedestrian traffic, and bicycle traffic. The need to balance pedestrian and vehicular needs was identified during the public involvement process. Some of the ways to balance these needs include developing access standards, developing mobility standards, and designing the highway to accommodate pedestrian and bicycle traffic as well as automobile and truck traffic. Two improvement options were developed to address these needs: establishing a Special Transportation Area and reconfiguring the existing Cascade Avenue cross section. These two improvement options are described below.

Improvement Option 1 – Establish a Special Transportation Area for Cascade Avenue through Sisters

Overview: The City of Sisters has an opportunity to manage the segment of State Highway through the downtown as a Special Transportation Area, or STA. An STA is a designation that may be applied to a highway segment where a downtown, business district, or community center straddles the state highway.

The primary management objective of an STA is to provide access to community activities, businesses, and residences along and across the highway. In other words, the point of an STA is to manage this highway segment as a main street rather than an urban highway. The STA designation does not apply to an entire city or to strip development, and STAs are not located on freeways or Expressways. In Sisters, the appropriate STA would be along Cascade Avenue from Larch to Pine Streets.

The highway segment through Sisters already has many of the characteristic appropriate for an STA designation:

- It is a compact district located on a state highway where the need for local access is balanced with highway mobility;
- There is an identified focus on pedestrian movement in the downtown;
- Land uses are relatively mixed (i.e., there is commercial, office, and residential in close proximity);
- Buildings are spaced close together and located adjacent to the street with little or no setback;
- Sidewalks are located adjacent to the highway and the buildings (although lacking in width);
- An interconnected local street network facilitates local circulation;
- There is on-street parking on the highway; and most shared or general purpose parking lots are located behind or to the side of buildings rather than in front; and
- Posted speed is 20 mph, and actual speeds typically do not exceed that speed.

An STA allows ODOT to reduce highway mobility standards in order to address downtown characteristics. Because Highway 20 is a Freight Route, ODOT's management objective currently favors through traffic. However, with an STA designation, ODOT will recognize the need to balance through traffic with local access, especially by pedestrians, encouraging slower vehicle movement and improved pedestrian crossings. For example, adding pedestrian amenities such as curb extensions are easier to get through ODOT's design review went they occur in STAs.

For example, on a Statewide Freight Route like Highway 20, the maximum allowable volume-to-capacity ratio for peak hour operating conditions would increase from 0.75 to 0.85 with the STA designation. A volume-to-capacity ratio of 0.75 is indicative of long delays (20- to 30-second delays on the side street approaches to the highway and for left turns from the highway). A volume-to-capacity ratio of 0.85 is indicative of very long delays (30- to 45-second delays on the side street approaches to the highway and for left turns from the highway). For reference, during the average weekday PM peak on Highway 20, the volume-to-capacity ratios on the Locust and Pine Street approaches to the highway are approximately 0.50 today. This means that there are typically only the briefest of delays and that the Highway currently meets or exceeds its mobility standards. On the most congested weekends, however, the volume-to-capacity ratios at the same intersections exceed 1.00, which means that a vehicle turning off of the side street would experience extreme delays.

As Sisters and the traffic on the highway grows over time, the volume-to-capacity ratios will increase. Without an STA, there will be increased pressure for ODOT to take measures to keep the volume-to-capacity ratio at or below 0.75. This could mean such actions as the permanent removal of on-street parking, reduction in number of crosswalks, and requiring the implementation of a couplet.

An STA designation also allows ODOT to reduce highway access management spacing standards in order to encourage the continuation of a downtown street grid system. For example, the side street spacing standard for approaches to a Statewide Highway in urban areas like Highway 20 in Sisters is 770 feet. With an STA designation, the minimum spacing for public road approaches will be the existing city block spacing of about 300 feet. Short blocks increase the accessibility of downtown, particularly for pedestrians and local traffic. Since Sisters already has a fully developed grid system within its downtown, an STA designation would prevent the potential closing of street accesses in the future, were the highway to fall below its mobility standards.

In summary, the STA designation would assure the City of Sisters that appropriate downtown characteristics could be maintained, such as short block lengths, frequent pedestrian crossings, lower traffic speeds, and on-street parking, even if it means a lowering of highway mobility standards.

It should be noted that ODOT will expect that the lowering of highway mobility standards within the STA will be balanced with active access management outside of the STA (as discussed below). For the City of Sisters, this will mean that some commercial areas outside of the STA will not be allowed direct access onto the highway. Frontage roads or side road access would be needed. The spacing for any new side streets would be at least 770 feet.

An STA may be particularly suitable in Sisters, because it has a relatively well-defined downtown core (from around Locust to Pine Streets), with very little strip development on the edges of the City. The STA will essentially define and protect the core of the city and discourage future strip development on the edges.

The second step is for ODOT and the City to mutually develop and agree to a management plan, within an Intergovernmental Agreement or Memorandum of Understanding. The STA management plan may include less restrictive highway mobility standards and may use flexible streetscape designs in order to improve local access and community functions. The agreement will be in effect when the STA is adopted as part of a local transportation system plan and comprehensive plan and in the corresponding corridor plan where a corridor plan exists.

The management plan for the STA in the local transportation system plan needs to include:

- Goals and objectives;
- Clearly defined STA boundaries;
- Design standards that are to be applied to the STA to improve local access and community functions, such as highway mobility standards, street spacing standards, signal spacing standards and street treatments;
- Strategies for addressing freight and through traffic including traffic speed, possible signalization, parallel or other routes, and actions in other parts of the corridor which address through traffic needs;
- Parking strategies, which address on- and off-street and shared parking;
- Provisions for a network of local traffic, transit, pedestrian, and bicycle circulation;
- An analysis of the regional and local traffic and safety impacts of the STA to determine the effects of the STA designation;

- Identification of needed improvements within the STA or improvements that will support access to the STA and designation of the party responsible for implementation, likely funding source and anticipated time frame; and
- Identification of maintenance and operational strategies to be employed.

Impacts: The immediate traffic impacts of establishing an official STA designation in downtown Sisters would be very small, since the area is currently functioning like an STA. Without other improvements, long-term, traffic congestion and delays during peak periods would continue and increase as traffic volumes grow. The City will need to institute access management techniques outside of the STA, which could limit direct access to the highway for some land currently zoned as commercial.

The overall effect of the STA would be to protect the "main street" function of the Highway through Sisters.

Cost: There are no construction costs associated with the establishment of an STA.

Recommendation: Sisters should implement an STA from Locust Street to Pine Street, with appropriate access management areas.

Priority: High.

Improvement Option 2 – Reconfigure the Existing Cascade Avenue Cross Section

Overview: During the public involvement process, the need to balance pedestrian and vehicular needs on Cascade Avenue was identified. The existing Cascade Avenue cross section consists of a 48-ft. wide roadway within a 60-ft. right-of-way. The road has two travel lanes (one in each direction) and on-street, parallel parking on both sides. The sidewalks are 6 feet wide and there are no bike lanes. The primary positive attribute of the existing street cross section is that there is on-street parking on both sides of the street. There are approximately 90 to 100 on-street parking spaces between Pine Street and Locust Street. The existing street cross section has several negative attributes. The travel lane widths are excessive. This encourages speeding and increases the crossing distance for pedestrians. Parking maneuvers cause delays to highway traffic. There are no bike lanes. Left turns from the travel lanes cause delays to highway traffic. The sidewalks are too narrow.

Three alternative street cross sections were developed in an effort to balance pedestrian and vehicular needs. The first alternative consists of retaining the on-street parking on both sides of the street, narrowing the travel lanes, and widening the sidewalks. The second alternative consists of removing parking on both sides of the street to create a three-lane cross section with wider sidewalks. The third alternative consists of removing parking on both sides of the street to create a raised center median, left turn pockets, and wider sidewalks.

Impacts: Alternative 1 consists of a 42-ft. wide roadway within a 60-ft. wide right-of-way. The road has two travel lanes (one in each direction) and on-street parallel parking on both sides. The sidewalks are 9 feet wide. There are no bike lanes. Alternative 1 is shown in Figure 6-6. The advantages and disadvantages of Alternative 1 are described below:

Advantages:

- Sidewalks will be widened from 6 feet to 9 feet.
- The pedestrian crossing distance will be reduced from 48 feet to 42 feet, and could be reduced to 30 feet if curb extensions are constructed on both sides of the street.

- The travel lanes will be narrowed from approximately 16 feet to 13 feet, which should discourage speeding.
- There is on-street parking on both sides of the street. There are approximately 90 to 100 on-street parking spaces between Pine Street and Locust Street.

Disadvantages:

- Parking maneuvers will still cause delays to highway traffic.
- Left turns from the travel lanes will still cause delays to highway traffic.
- There are no bike lanes; however, bike lanes may not be needed with effective traffic calming measures like narrower travel lanes and on-street parking.

Alternative 2 consists of a 42-ft. wide roadway within a 60-ft. wide right-of-way. The road has two travel lanes (one in each direction) and a continuous center turn lane for left turns. There is no on-street parking on either side of the street. The sidewalks are 9 feet wide. There are no bike lanes. Alternative 2 is shown in Figure 6-7. The advantages and disadvantages of Alternative 2 are described below:

Advantages:

- Left turns will be made from the center turn lane, which will reduce delays to highway traffic and increase the highway capacity.
- Sidewalks will be widened from 6 feet to 9 feet.
- Conflicts between parking maneuvers and highway traffic will be eliminated. This will result in a slight increase in capacity.
- The pedestrian crossing distance will be reduced from 48 feet to 42 feet.
- Pedestrian visibility would be improved on both sides of the street.

Disadvantages:

- There will be a loss of 90 to 100 on-street parking spaces between Pine Street and Locust Street.
- The wide open look and feel of the highway may encourage speeding.
- This alternative will not accommodate curb extensions.
- There are no bike lanes; however, bike lanes may not be needed with effective traffic calming measures like narrower travel lanes and on-street parking.

Alternative 3 consists of a 42-ft. wide roadway within a 60-ft. wide right-of-way. The road has two travel lanes (one in each direction), a raised center median, and left turn pockets at selected intersections. There is no on-street parking on either side of the street. The sidewalks are 9 feet wide. There are no bike lanes. Alternative 3 is shown in Figure 6-8. The advantages and disadvantages of Alternative 3 are described below:

Advantages:

- Left turns will be made from left turn pockets, which will reduce delays to highway traffic and increase the highway capacity.

- This alternative has a higher level of access management. The raised median will prevent mid-block left turns into driveways.
- Sidewalks will be widened from 6 feet to 9 feet.
- Conflicts between parking maneuvers and highway traffic will be eliminated. This will result in a slight increase in capacity.
- The pedestrian crossing distance will be reduced from 48 feet to 42 feet.
- Pedestrian visibility would be improved on both sides of the street.

Disadvantages:

- There will be a loss of 90 to 100 on-street parking spaces between Pine Street and Locust Street.
- This alternative will not accommodate curb extensions.
- There are no bike lanes; however, bike lanes may not be needed with effective traffic calming measures like narrower travel lanes and on-street parking.

Cost: The cost of Alternative 1 will be comprised of the cost to widen the sidewalks from 6 feet to 9 feet, the cost of constructing new curbs, and the cost to construct the curb extensions at the intersections of the side streets and Cascade Avenue. Assuming the existing sidewalk can be retained, adding 3 feet of width and new curbs will cost about $18 per linear foot. The proposed sidewalk widening would encompass about 3,300 linear feet of sidewalk, or approximately $59,400. A typical curb extension costs about $1,500 to construct. There will be a total of 20 curb extensions constructed on Cascade Avenue between Pine Street and Larch Street, for a cost of about $30,000. The total cost of constructing the curb, sidewalk, and curb extensions described in Alternative 1 will be about $89,400.

The cost of Alternative 2 will be comprised of the cost to widen the sidewalks from 6 feet to 9 feet, the cost of constructing new curbs, and the cost to restripe Cascade Avenue with a center left turn lane. Assuming the existing sidewalk can be retained, adding 3 feet of width and new curbs will cost about $18 per linear foot. The proposed sidewalk widening would encompass about 3,300 linear feet of sidewalk, or approximately $59,400. Roadway striping costs about $0.40 per linear foot. The distance between Pine Street and Locust Street is approximately 2,500 feet. To stripe the center left turn lane and to paint over the existing center stripe will require painting 7,500 linear feet of road. The cost of striping for this alternative will be approximately $3,000. It would also be beneficial to paint left turn arrows (two per block) in the center turn lane. Left turn arrows can be painted for approximately $30 each. The cost to stencil 16 left turn arrows will be $480. The total cost of constructing the curb, sidewalk, and striping described in Alternative 2 will be about $62,880.

The cost of Alternative 3 will be comprised of the cost to widen the sidewalks from 6 feet to 9 feet, the cost of constructing new curbs, and the cost to construct the center raised median. Assuming the existing sidewalk can be retained, adding 3 feet of width and new curbs will cost about $18 per linear foot. The proposed sidewalk widening would encompass about 3,300 linear feet of sidewalk, or approximately $59,400. A raised center median, one block long, will be approximately 2,100 sq. ft. Raised concrete medians can be constructed for about $2.50 per square foot. Therefore, a typical raised median will cost about $5,250 per block. Assuming the raised medians will extend over an 8-block length of Cascade Avenue, the cost of the raised medians will be $42,000. The total cost of constructing the curb, sidewalk, and raised center medians described in Alternative 3 will be about $101,400.

Recommendation: As part of the public involvement process, the Transportation Advisory Committee (TAC) recommended Alternative 3 as the preferred Cascade Avenue improvement. Of the three alternatives evaluated, Alternative 3 does the most to improve traffic flow. Alternative 3 would eliminate mid-block left turns on to and off of the highway, and will also limit left turns at some intersections. Left turns from the highway would be made from left turn pockets at selected intersections, and would not block upstream traffic as occurs today with left turns being made from the shared through lanes on the highway. Alternative 3 also benefits pedestrians by widening the sidewalks by 5 feet and by reducing the crossing distance on Cascade Avenue by 10 feet.

Both ODOT and the consultant preparing this report had some concern about recommending an alternative that included the removal of on-street parking on Cascade Avenue, the City of Sisters' "main street." To obtain input from business owners on Cascade Avenue, a special survey of business owners/managers was conducted in November 2000. In this survey, 26 business owners/managers on Cascade Avenue were shown drawings of Alternatives 1, 2, and 3, and were asked which alternative they preferred. Nineteen of the 26 business owners surveyed (73 percent) preferred Alternative 1, four business owners (15 percent) preferred Alternative 2, and three business owners (12 percent) preferred Alternative 3. Twenty-four respondents said that on-street parking on Cascade Avenue is somewhat to very important. A general comment made about Alternative 3 was that, "it may look pretty, but it is not practical/feasible for the City of Sisters."

After weighing the pros and cons of each alternative and considering the input received from the TAC, the business owner survey, and the general public at an open public meeting in December 2000, we are recommending Alternative 1 as the preferred alternative. The primary benefit of Alternative 1 is that it retains on-street parking, which is important to the vitality of a downtown. In addition, narrowing the street width and retaining on-street parking will be affective as a traffic calming measure. Alternative 1 also improves conditions for pedestrians in two ways. It benefits pedestrians by widening the sidewalks by 4 feet and by reducing the crossing distance on Cascade Avenue by 8 feet. With the addition of curb extensions at the corners, the crossing distance will be reduced even further, from 48 feet today to 30 feet. Curb extensions will also provide improved pedestrian visibility and provide an area for street furniture, such as benches, bike racks, mail boxes, newspaper stands, garbage cans, and street lights.

Priority: High

Street System Need – Improve Intersection Operations at Locust Street and Highway 20

Description: The intersection of Locust Street and Highway 20 has some of the highest traffic volumes in the City of Sisters. Locust Street is a collector that serves both residential and industrial land uses in the City. Locust Street also extends outside the Sisters Urban Growth Boundary (UGB), as Camp Polk Road, and serves a high level of residential uses outside the City of Sisters. A capacity analysis was performed for existing conditions at this intersection using year 2000 traffic volumes and unsignalized (stop sign) intersection control. As shown in Chapter 4, under existing conditions, this intersection operates at Level of Service D (LOS D), with a volume-to-capacity (v/c) ratio of 0.42 on the critical approach (southbound Locust Street) during the PM peak hour conditions. Currently, this intersection meets ODOT's mobility standard of a v/c less than or equal to 0.75 for a Statewide highway. Even though ODOT's mobility standard is met, LOS D is associated with long delays on the side street approach to the highway.

Traffic volumes on the critical southbound approach are expected to increase substantially with the proposed UGB expansion and development of industrial uses north of Barclay Drive. As shown in Chapter 5, the southbound approach to this intersection will reach failing conditions (LOS F) within the 20-year planning horizon. The Transportation Impact Study for a zone change on 30 acres north of the City of Sisters, which was prepared by David Evans and Associates, Inc. in June 1999, indicated that this intersection will be over capacity within five years with the development of industrial uses on the rezoned land. (A Transportation Impact Study for another 35-acre site was prepared by Kittelson & Associates, Inc. at the same time.) After the proposed rezonings were denied by the Deschutes County Hearings Officer in 1999, the City of Sisters, Deschutes County, and the property owners (Sisters School District and Barclay Meadows) entered into an agreement in which the property owners would fund the necessary improvements to this intersection.

Two improvement options were evaluated for this intersection: installation of a traffic signal, and construction of a roundabout. These two improvement options are discussed in the following sections.

Improvement Option 1 – Traffic Signal

Overview: The US Department of Transportation's Manual on Uniform Traffic Control Devices (MUTCD), the generally accepted industry standard for traffic control devices, outlines eleven "warrants" for traffic signals. Traffic signals are typically not installed unless one or more of the eleven warrants is met; however, satisfaction of a warrant or warrants is not in itself justification for a traffic signal. The eleven warrants for traffic signals are described in Appendix F.

An analysis of traffic signal warrants was made for the intersection of Cascade Avenue and Locust Street, assuming the existing street configuration and traffic volumes. The analysis indicated that five signal warrants are met under existing conditions and a sixth warrant will be met by the year 2005. Meeting six of the eleven warrants for a traffic signal is a very good case for signal installation. A summary of the findings from the signal warrant analysis is provided below:

- Warrant 1 – Minimum Vehicular Volume – will be met by the year 2005
- Warrant 2 – Interruption of Continuous Traffic – was met in the year 2000
- Warrant 3 – Minimum Pedestrian Volume – is not met
- Warrant 4 – School Crossing – is not met[1]
- Warrant 5 – Progressive Movement – is not met
- Warrant 6 – Accident Experience – is not met
- Warrant 7 – Systems Warrant – was met in the year 2000
- Warrant 8 – Combination of Warrants – was met in the year 2000
- Warrant 9 – Four Hour Volumes – was met in the year 2000
- Warrant 10 – Peak Hour Delay – is not met
- Warrant 11 – Peak Hour Volume – was met in the year 2000

Impacts: Installation of a traffic signal at this intersection will improve conditions for the side street traffic, by reducing delays on those approaches, and will increase delays on the Highway 20 approaches. Even with increased delays on the highway approaches, those approaches will continue to operate at

[1] Although this intersection is an established school crossing, the School Crossing Warrant is not met because there are a sufficient number of gaps in the traffic stream (see Appendix F for a full description of this warrant).

acceptable mobility levels. A capacity analysis for the year 2000 was performed assuming that a westbound left turn lane will be added to the existing lane geometry when a traffic signal is installed. The capacity analysis indicated that with a simple, two-phase traffic signal with a 90-second cycle length, this intersection will operate at LOS C-D and a v/c ratio of 0.73. With installation of a traffic signal, ODOT's mobility standards will be met.

An analysis of the year 2020 conditions also indicated that with the addition of a westbound left turn lane and a traffic signal, ODOT's mobility standard will not be met. In the year 2020, the intersection will operate at LOS F, with a v/c ratio of 1.06. If the highway is widened to five lanes (two through lanes and a left turn lane in each direction), the level of service will be improved to LOS D, with a v/c ratio of 0.75. With installation of a traffic signal and widening to five lanes on the highway, ODOT's mobility standard will be met in the year 2020.

Safety will also be improved with installation of a traffic signal. When delays are long on the side street approach to an unsignalized intersection, drivers waiting to turn on to the highway or cross the highway become frustrated and take chances by accepting smaller gaps in the through traffic. This condition will be remedied with installation of a traffic signal. In addition, pedestrian safety will be improved because pedestrians will have a dedicated "walk" phase to cross the highway. This intersection has high pedestrian volumes at certain times of the day, due to the presence of the elementary school on the northwest corner.

Cost: Traffic signals cost about $150,000. The cost of this improvement will be funded by the developers of the Sisters School District and Barclay Meadows industrial property. This cost includes the cost to add turn lanes, if needed; however, the capacity analysis indicated that this intersection will operate at acceptable conditions with a traffic signal installed on the existing lane geometry.

Recommendation: A traffic signal is recommended for the intersection of Locust Street and Highway 20. A traffic signal will ensure that this intersection continues to meet ODOT's mobility standards through the 20-year planning horizon. Six of the eleven warrants for a traffic signal will be met by the year 2005.

Priority: High

Improvement Option 2 – Roundabout

Overview: There are no warrants for roundabouts in the MUTCD the way there are for traffic signals; however, since roundabouts are used in place of traffic signals, it can be assumed that if a traffic signal is warranted, then a roundabout is also warranted. Single-lane, modern roundabouts usually operate with less delay than traffic signals at intersections with up to about 2,000 vehicles per hour. Roundabouts are also more efficient than traffic signals at intersections with high numbers of left turns, because they give left turns the same priority as through traffic and right turns.

Impacts: A capacity analysis for the year 2000 was performed assuming that a single-lane roundabout is constructed. The capacity analysis indicated that with a roundabout, this intersection will operate at LOS B and a v/c ratio of 0.59. With construction of a roundabout, ODOT's mobility standards will be met.

An analysis of the year 2020 conditions also indicated that with a single-lane roundabout, ODOT's mobility standard will not be met. In the year 2020, the intersection will operate at LOS F, with a v/c ratio of 1.13.

Safety will also be improved with construction of a roundabout, due to several characteristics or roundabout design. Crash severity is reduced because vehicles travel through roundabouts at slower speeds (about 15 mph) than through signalized or unsignalized intersections. The elimination of left turns in roundabouts also improves safety. The center medians, or "splitter islands" in roundabouts provide mid-crossing refuges for pedestrians and shorten the crossing distances.

Cost: Roundabouts cost about $250,000 to construct.

Recommendation: A roundabout is not recommended for this intersection because a roundabout will not meet ODOT's conservative interim criteria for roundabouts. Roundabouts are inappropriate where traffic flows are unbalanced, with high volumes on one or more approaches, as would be the case at this intersection. Roundabouts are also inappropriate where large combination vehicles or over-dimensional vehicles frequently use the intersection, as would be the case at this intersection. These vehicles include semi-truck traffic, RVs pulling cars, and trucks pulling trailers.

Priority: Not recommended.

Pedestrian System Need – Improve Pedestrian Conditions on Cascade Avenue

Description: Downtowns depend on a walkable environment for continued health. There are two basic concerns with pedestrian conditions on Cascade Avenue, which is the heart of downtown Sisters.

First, there is the difficulty of crossing Cascade Avenue because of traffic speeds and long crossing distances for walkers (currently, the curb-to-curb crossing distance is 48 feet. When pedestrians cannot cross a street, parking is under-used, local residents are less likely to walk, and businesses may suffer. During large events in Sisters, such as the annual quilt festival, it may actually be easier to cross Cascade Avenue than during less active periods. This is because the congested motor vehicle traffic is moving slowly, reducing the stopping distance. In addition, there are typically larger groups of pedestrians accumulating at the crosswalks, creating a greater visual awareness by motorists.

Second, Cascade Avenue's sidewalks are only 6 feet wide, which is too narrow for an effective downtown pedestrian environment – generally, the minimum functional sidewalk width in a downtown area is 10 feet. This includes a shy space from buildings and curb, a clear zone to allow two people to walk side-by-side, and space for street trees, benches, bike racks, light poles, and other important street furniture.

Improvement Option 1 – Widen Sidewalks from Larch to Pine Streets

Overview: Sidewalks along Cascade Avenue are an average of six feet wide (the width varies throughout downtown, but in general sidewalks are six feet wide). This is quite narrow for a downtown area, where sidewalks should ideally be at least twice that wide. A foot or more of shy distance from building fronts and curb reduces the easily usable portion of the sidewalk to around four feet. While this width is adequate to meet ADA requirements, it makes for crowded sidewalks during peak periods and eliminates the potential for street trees and other street furniture. The Oregon Bicycle and Pedestrian Plan (ODOT, 1995) recommends sidewalk widths of 8 feet where a sidewalk is located along a building wall. The Main Street Handbook (ODOT 1999) states that an 8-ft. sidewalk barely allows 2-way pedestrian movement and a 3-ft. street furniture area, and recommends 10-ft. sidewalks for more "breathing room" and recommends 12-ft. sidewalks for opportunities for outdoor dining, displays, planters and window shopping.

Sisters has sought to remedy its narrow sidewalks by creating public and private plazas and parks where there is space. Curb extensions at intersections (discussed below) will provide some additional feeling of spaciousness. In addition, the City could create mid-block curb extensions using one or two on-street parking spaces for "passing" and congregating during crowded times as well as space for street trees and furniture. These mid-block extensions could be on alternating sides of the street to create a vista effect from one end of town.

If Cascade Avenue was reconfigured to reduce the travel lanes to 12 feet from their current 16 feet, with 8-foot parking lanes, the excess 8 feet could be added to the sidewalks to create 10-foot wide sidewalks. This would be a 67% improvement and would make a significant difference in the pedestrian accessibility of downtown.

Impacts: Wider sidewalks compete for right-of-way space with other uses. However, travel lanes are currently 16 feet wide through Sisters. Twelve feet is the typical highway lane width, especially for slower travel. The minimum for sidewalks in a downtown along a highway is 10 feet. Wider sidewalks would have a significant beneficial effect on downtown's pedestrian traffic.

Cost: Assuming that the existing sidewalk can be retained, adding 4 feet of width and new curbs would cost about $18 per linear foot. The proposed sidewalk widening would encompass about 3,300 linear feet of sidewalk, or approximately $59,400.

If built new, 10-foot wide curbed sidewalks cost about $33 per linear foot.

Recommendation: Widen sidewalks from 6 to 10 feet on Cascade Avenue from Larch to Pine St.

Priority: High.

Improvement Option 2 – Enhance Crosswalk Appearance from Larch to Pine Streets

Overview: There are a number existing crosswalks in the downtown core of Sisters. These are repainted twice annually. The crosswalks on the State Highway portion of Cascade Avenue are maintained by the City under an agreement with ODOT. Along Cascade Avenue in downtown, there are crosswalks at every intersection from Larch to Pine Streets.

In Central Oregon, regular applications of cinder during the winter and the common use of studded tires causes paint to deteriorate quickly. One solution would be to reapply the paint more frequently. Zebra-striped crosswalk patterns are the most effective of the commonly applied paint patterns. Thermoplastic applications are brighter and longer lasting than paint if properly applied.

Many cities have begun to use other surface treatments in crosswalks, such as colored pavers, to add both color and texture to define the pedestrian crossing. This can be an attractive street element that helps to identify the downtown area and alert motorists to the pedestrian zone. However, red and other light-colored pavers are quickly darkened by tires, losing their visual contrast. In addition, many handicapped people dislike the uneven texture of some pavers. Alternatively, stamped and painted asphalt may be more acceptable to disabled people, and have the advantage of lower cost.

Both striping and texture treatments can be made more effective with the addition of curb extensions, discussed below. Raised crosswalks, also discussed below, can add to the effectiveness of critical crosswalks.

Impacts: Improving the crosswalk visibility in Sisters will have a beneficial impact for pedestrians.

Cost: Crosswalks would be 10 feet wide, 30 feet long (with curb extensions). Thermoplastic striping costs about $2.25 per linear foot for 12-inch wide tape. Pavers and stamped asphalt cost about $9.00 per square foot. Each crosswalk would cost about $800. For the 14 crosswalks that are recommended for improvement, the total cost would be around $11,200.

Recommendation: Replace painted crosswalks with thermoplastic striping in a zebra-stripe pattern along Cascade Avenue, from Larch to Pine Streets. Add a surface texture, such as pavers or stamped asphalt, to the crosswalk edges.

Priority: High.

Improvement Option 3 – Add Curb Extensions

Overview: Curb extensions are additions to the sidewalk at intersections, extending the sidewalk to the outside edge of the on-street parking, usually 8 or 9 feet for parallel parking, and around 20 for diagonal parking. This extension gives pedestrians a waiting spot, increases their visibility to motorists, and adds a traffic calming influence (through the apparent narrowing of the street). Along with surface treatment of the crosswalk such as paint or texture, regular use of curb extensions in downtown areas can increase the awareness of motorists that pedestrians can be expected. Curb extensions can also provide additional space in the downtown area, which generally has narrow sidewalks. This space can be used for pedestrian seating, bike racks, planters, waste bins, and other street furniture.

Curb extensions can increase driver safety as well, by enforcing the clear vision zone at intersections. The use of corner curb extensions does not typically remove on-street parking and under some circumstances can add on-street parking spots by lessening the needed clear distance from the corner. However, mid-block extensions may reduce parking spaces. Curb extensions must be carefully designed so that drainage is adequate, and on major intersections, the turning radius must accommodate trucks. Most snow removal equipment can be used with curb extensions.

In downtown Sisters, there are existing curb extensions on the side streets along the highway from Larch to Oak Streets. There are also curb extensions on Hood at Larch, Fir, Elm, the east side of Ash at Hood, the north side of Hood at Oak, the south side of Hood at Pine, and on the northwest corner of Hood and Pine.

Along Cascade Avenue, adding curb extensions, along with widening sidewalks to 10 feet (discussed above), would reduce crossing distances to around 30 feet from the existing 48 feet.

Impacts: Curb extensions can make it more difficult for large trucks to make right-hand turns, especially at speeds over 15-20 MPH. However, in Sisters most large trucks are travelling straight through town.

Curb extensions need to be carefully designed to avoid drainage problems. Snow removal and other maintenance can be more challenging than along straight curbs. Most cities find that maintenance personnel quickly become accustomed to working around curb extensions.

Cost: Curb extensions cost approximately $2.50 per square foot, and curbs are typically around $8.00 a linear foot. A typical curb extension would cost about $1,500 each, depending on drainage requirements. There would be a total of 20 curb extensions with the proposed project, for a total cost of about $30,000.

Recommendation: Install corner curb extensions on the Highway along Cascade Avenue at Spruce, Fir, Elm, and Oak. Streets. Install a mid-block curb extension on the north side of Cascade Avenue opposite Ash Street, and corner curb extensions into Cascade Avenue at Ash Street.

Priority: High.

Improvement Option 4 – Add Raised Crosswalks

Overview: Crosswalks can be made more obvious to motorists by elevating them to sidewalk level. This can be particularly effective in a downtown area where the desired speed is 25 MPH or lower. The crosswalk alone may be elevated, or at significant pedestrian intersections, the entire intersection may be elevated. This technique is usually combined with the use of pavers, bricks, or other contrasting surface treatment. The crosswalk is elevated with sloping ramps that are engineered to be driven at 25 MPH or lower.

Raised crosswalks are less commonly used than curb extensions. As with curb extensions, raised crosswalks must be carefully designed to prevent drainage problems. If properly ramped, raised crosswalks will not be a problem for snow removal equipment. Sometimes, the entire intersection is raised to create a town square feeling.

Impacts: Raised crosswalks are effective at reducing travel speeds. Since the posted speed through downtown is currently 20 MPH, raised crosswalks would not affect the function of the highway; however, ODOT does not typically allow raised crosswalks on highways, and may not allow them on Cascade Ave., even with the establishment of an STA.

Raised crosswalks may be appropriate at the intersections of Hood and Larch, Fir, Elm, Ash, Oak, and Pine, and would reduce travel speeds. A raised intersection could be effective at the intersection of Elm and Cascade. However, raised crosswalks are an unusual element on state highways, and may not be needed with other recommended improvements.

Cost: Raised crosswalks cost about $500 each with special striping and signs (the zebra striping and pavers described in Option 2 would be an additional $800 per crosswalk).

Recommendation: Raised crosswalks are not recommended at this time; however, if other pedestrian improvements, such as wider sidewalks, better crosswalk marking and curb extensions, are not effective in improving pedestrian crossing safety and reducing travel speeds, elevated crosswalks should be considered.

Priority: Not recommended.

Improvement Option 5 – Add a Pedestrian Signal at Locust Street

Overview: Pedestrian signals can be independent signals that are not part of a traffic signal, sometimes located at mid-block, or can be the pedestrian phase of a regular signalized intersection. Independent pedestrian signals may be needed where the expected number of people needing to cross at a particular spot is very high on a regular basis, and where there is no regular intersection or other traffic control. These types of signals can be effective in urban or suburban areas where there is a large pedestrian attraction, such as a school, and where the use is frequent enough for motorists to get used to stopping for the red light. Infrequently used signals may be ignored by motorists. There must also be good line of sight so that motorists have plenty of time to stop. Independent pedestrian signals are not typically used in a downtown, where crosswalks are located at each intersection and blocks are typically short.

In Sisters, a pedestrian signal could potentially be useful at the elementary school at the east end of town at Locust Street, depending on other improvements at this intersection, which currently warrants a regular traffic signal. However, since a traffic signal is recommended for installation at this intersection, as discussed above, then there will not be a need for a separate pedestrian signal.

Impacts: Independent pedestrian activated signals may cause traffic delays at peak periods. If they are not regularly used, motorists may not respond to them.

Cost: Approximately $100,000.

Recommendation: With the proposed intersection improvement recommended for Locust Street, an independent pedestrian signal is not recommended.

Priority: Not recommended.

Improvement Option 6 – Add Medians

Overview: Where traffic is heavy, it can be difficult for a pedestrian to cross two or more lanes of traffic. In these cases, raised medians can provide a mid-street refuge, allowing a pedestrian to cross one direction of traffic at a time. Raised medians have the added advantage of access management, traffic calming, and an opportunity for landscaping and other beautification. The raised median should

be the same width as the center turn lane, minus a foot of shy distance on either side. Where it is not possible to provide a continuous median, "island" medians can be provided, particularly where mid-block crossings are important.

Impacts: Medians can restrict traffic movement and access, and can take up space needed for other roadway uses. Medians with landscaping require maintenance.

Cost: Medians cost approximately $33 per linear foot.

Recommendation: In Sisters urban area, it would be more effective to widen sidewalks and add curb extensions than use right-of-way for a center median. In the downtown area, there is only one lane of traffic in each direction and no center turn lane, and the right-of-way is constrained. For these reasons, island medians are not currently needed.

Priority: Not recommended.

Improvement Option 7 – Build a Pedestrian Bridge or Tunnel

Overview: Pedestrian bridges and tunnels can be useful under circumstances where the crossing distance is very great and exposure to traffic speeds or other hazard is very high and continuous, such as over a limited access freeway, or an otherwise insurmountable geographic feature, such as a river. Pedestrians are very protective of the amount of energy they use; the shortest and most direct route is strongly preferred to out-of-direction travel. For a bridge or tunnel to be effective, the pedestrian must be able to clearly see that there are no other reasonable choices.

Bridges have been used in very urban settings where there are existing multi-story buildings that can accommodate "sky bridges;" however, in some circumstances the addition of sky bridges has had the unintended effect of lessening activity at street level.

Tunnels can be appropriate in similar situations to bridges; however, their design is more problematic. Tunnels must be well-lit, as short as possible, and well-drained. As with bridges, tunnels work best in situations where there is literally no other crossing opportunity.

Impacts: A disadvantage of these constructed facilities is that they need a lot of space. Both bridges and tunnels must be gently ramped in order to accommodate disabled people. Bridges are particularly space intensive, since they must be tall enough to allow truck passage. Either a bridge or a tunnel would require acquisition and conversion of developed right-of-way in downtown Sisters.

Cost: A pedestrian bridge would cost a minimum of $75,000. It is not possible to estimate the cost of a tunnel without a geotechnical analysis.

Recommendation: Neither a pedestrian tunnel nor bridge is likely to be an effective solution for pedestrian problems in Sisters over the next 20 years. This is because Sisters has a small geographic area, a relatively narrow right-of-way on the highway, numerous crossing opportunities, and no existing geographic or structural features to make such a choice logical to the pedestrian. Therefore, this option is not recommended.

Priority: Not recommended.

Pedestrian System Need – Infill Walkways on Other Streets

Overview: In the downtown core, Sisters has a fairly continuous sidewalk system. However, there are several missing gaps and sections in the downtown core area (Figure 3-2). The most striking lack of sidewalks along the highway is between Larch and Locust Streets. Other areas where sidewalks are lacking include:

- the south side of Main Avenue between Pine and Oak Streets
- the north side of Main Avenue between Oak and Ash Streets
- the north side of Main Avenue between Ash and Elm Streets
- the north side of Main Avenue between Fir and Spruce Streets
- the south side of Main Avenue between Spruce and Larch Streets
- the north and south sides of Hood Street between Pine and Oak Streets
- the south side of Hood Street between Oak and Ash Streets
- the south side of Hood Street between Fir and Spruce Streets

In addition, most older residential streets in Sisters have no walkways. As residential areas are developed or redeveloped, the City requires the addition of adequate pedestrian facilities. These can be standard sidewalks with curb (property-tight is recommended), or separated at-grade pathways where a more rural appearance is preferred.

Impacts: Safety for pedestrians is increased. The addition of curbs can require improved drainage facilities, increasing costs.

Cost: New sidewalks with curbs cost approximately $33 per linear foot; uncurbed concrete sidewalks cost approximately $25 per linear foot; asphalt paths cost approximately $15 per linear foot. The missing sections of sidewalk along the highway, Main Avenue, and Hood Avenue total approximately 2,890 linear feet, and will cost approximately $95,370.

Recommendation: The City should continue requiring walkway improvements as infill development projects arise. The section of sidewalk between Larch and Locust Streets (approximately 660 feet) along the highway should be constructed as a special project.

Priority: High priority for sidewalks on the highway, Main, and Hood Avenues.

Bicycle System Need – Create a Bicycle System

Description: Sisters is a relatively small, compact city. Most streets are residential and have relatively low traffic volumes, and cyclists can move about freely. However, access to both the elementary and middle/high schools is problematic. The following options address bicycle issues raised for Sisters.

Improvement Option 1 – Bike Lanes or Shoulders

Overview: Sisters requires bike lanes to be included on any new arterials. Retrofitting bike lanes onto existing arterials may also be appropriate where there is sufficient right-of-way. Bike lanes are typically not needed on local streets, unless there is a specific use such as a school, to warrant them.

On the existing configuration of Cascade and Hood Avenues, there is not enough right-of-way to include bike lanes. In downtown situations, on-street parking is more critical than bike lanes, and on Cascade Avenue, any extra right-of-way should go to widening sidewalks to an adequate width. However, it is important to ensure that the traffic moves slowly, at no more than 25 MPH, so that bicycles can share the lane. In Sisters, Main and Hood Avenues provide reasonable alternatives to Cascade Avenue.

If car parking were to be removed from Cascade Avenue (see discussion above), bike lanes should be added. Bike lanes can also be installed with diagonal parking where there is enough right-of-way and a strong enough need. The lanes are placed between the parking and the travel lane.

Bike lanes are important for arterials and major collectors, particularly when adjacent to high speed or high volume roadways. For this reason, it is recommended that bike lanes or shoulders be added to Larch Street north of Main Avenue, on Locust Street from Cascade Avenue to the northern city limits, to Three Creeks Road from St. Helens Avenue to the southern city limits, to Jefferson Avenue form Pine Street to US 20/OR 126, and to Pine Street form Barclay Drive to the northern city limits. These shoulder projects are intended to connect with the County trail system at the city limits.

The Barclay Drive extension will be constructed with shoulders on both sides. The cost of constructing shoulders is included in the $700,000 project cost and therefore, the shoulders on the Barclay Drive extension are not shown as a separate bicycle or pedestrian project.

Impacts: Widening roadways to add shoulders may require the acquisition of some right-of-way, and may require the disturbance of landscaping that has encroached on the public right-of-way.

Cost: Adding 4-foot shoulders costs approximately $6 per linear foot. Larch Street shoulders would cost approximately $23,700, Locust Street shoulders would cost approximately $33,600, Three Creeks Road would cost approximately $15,900, Jefferson Avenue shoulders would cost approximately $38,040, and Pine Street shoulders would cost approximately $6,300.

Recommendation: The City should continue to require bike lanes or separated paths as part of new development. The City should add 4-foot shoulders to both sides of Larch and Locust Streets from Main Avenue to the northern City limits, on Three Creeks Road from St. Helens Avenue to the southern city limits, on Jefferson Avenue from Pine Street to US 20/OR 126, and on Pine Street from Barclay Drive to the northern city limits.

Priority: The priority for adding shoulders to roads is based on the level of traffic that the roads carry. Locust Street, Jefferson Avenue, and Pine Street serve the highest levels of traffic; therefore, the shoulders on Locust Street, Jefferson Avenue and Pine Street are high priority projects. Three Creeks Road serves the next highest level of traffic. The shoulders on Three Creeks Road are a medium priority project. Larch Street serves the lowest level of traffic. The shoulders on Larch Street are a low priority project.

Improvement Option 2 – Separated Paths

Overview: Separated paths can work well where there is a linear park, extra right-of-way, or easement that is separate from a roadway. Some successful paths have been established along utility corridors, irrigation canals, and undeveloped road rights-of-way.

In addition, paths can be built within a road right-of-way, if they are well-separated from the roadway. These can be successful where there are few intersecting roads for the path to cross.

There are several opportunities to construct separated paths in Sisters:

- Along Highway 242 from Pine Street to the high/middle school
- Squaw Creek through Timber Creek Subdivision
- Along southern boundary of Phase 2 of Coyote Springs to Forest Service trails
- Along both sides of Jefferson Avenue from Pine Street to US 20/OR 126
- Along the west side of Locust Street from the current terminus of the bike lane to the southern city limits

These paths are intended to connect with the county trail system at the city limits.

Impacts: It can be difficult to connect separated trails with on-street facilities. Special care must be taken at intersections.

Cost: Separated asphalt paths, 10 feet wide, cost approximately $15 per linear foot. The Highway 242 path would be approximately one mile long, and cost approximately $80,000. Hap Taylor and Sons, Inc. has agreed to construct the path along Highway 242 as a mitigation measure for increased truck traffic on this road that is generated by their gravel pit. The Squaw Creek path would be approximately ½ mile, and cost approximately $40,000. The Coyote Springs path would be approximately ¼ mile, and cost approximately $20,000. The Jefferson Avenue separated path would be approximately 6,340 linear feet for both sides of the road and would cost approximately $95,100. The separated path along the west side of Locust Street from the current terminus of the bike lane to the southern city limits would be approximately 265 feet and would cost approximately $3,975.

Recommendation: Develop the proposed trail segments as opportunities arise.

Priority: The separated paths on Highway 242, Jefferson Avenue, and Locust Street are high priority projects. The Squaw Creek Path and the Coyote Springs Path are low priority projects.

Improvement Option 3 – Provide Directional Signs for Bicyclists

Overview: For many years, the technique of signing bike routes was used to provide for bicyclists. In the last decade, it has been realized that this may not be very effective. Simply placing bike route signs with no other improvements did not increase bicycling or provide meaningful direction to cyclists. In addition, the term “bike route” tends to mislead motorists into thinking that bicyclists belong only on signed routes.

On the other hand, there may be ways to avoid an obstacle, such as a highway, or get to a destination that may not be obvious to a cyclist, particularly visitors. For example, Main and Hood Avenues in Sisters provide an alternative to Cascade Avenue. Signs could be placed at these intersections to notify cyclists that Main and Hood provide a useable alternative to Cascade Avenue. However, care must be taken to make sure that neither cyclists nor motorists are given the impression that bicycles are not allowed on Cascade Avenue.

Impacts: Sign placement must not interfere with pedestrians or motorist line of sight.

Cost: About $100 per sign, for a total of around $400.

Recommendation: Directional signage for bicycles is appropriate for a tourist destination like Sisters.

Priority: Low.

Improvement Option 4 – Add Bicycle Parking

Overview: Adequate bicycle parking is an important component of a bicycle transportation system. Lack of good parking results in bikes locked to poles, trees, and railings, and can be a problem in crowded pedestrian areas. It also discourages overall bicycle use. In the overall downtown area, at least two bicycle parking spaces per block, on both sides of the street, should be provided. These can be shared spaces, and can be concentrated in areas that have high demand.

For other commercial and industrial uses, as well as multi-family housing, at least two bicycle parking spaces per use should be provided. The Sisters Comprehensive Plan indicates that new uses will be required to have bicycle parking.

To encourage existing businesses to retrofit with bike racks, the City can provide partial or full funding (racks typically cost about $100/bike parking space). The City may want to consider contracting with a local fabricator to build bike racks to their specifications.

Impacts: Bicycle parking needs to be properly placed and installed to be effective, and must not interfere with pedestrian movement.

Cost: About $100 per bicycle parking space. One inverted "U" rack provides two parking spaces. About 28 racks are needed in downtown, for an approximate cost of $5,600.

Recommendation: If wider sidewalks and curb extensions are installed on Cascade Avenue, bicycle racks should be installed. Bicycle racks should be added on Hood Avenue as well. Inverted "U" style racks are recommended.

Priority: High.

SUMMARY

Table 6-1 summarizes the recommendations for the transportation system based on the evaluation process described in this chapter. Chapter 7 discusses how these improvements fit into the modal plans for Sisters.

TABLE 6-1

SUMMARY OF TRANSPORTATION IMPROVEMENT OPTION EVALUATION

Improvement Options	Cost[1]	Recommendation	Priority[2]	Financial Responsibility
Reduce Congestion on Cascade Avenue				
Temporary Traffic Control	$760,000[3]	Recommended	High	ODOT
Expanded Street Grid System – Barclay Drive	$700,000[4]	Recommended	High	ODOT
Expanded Street Grid System – Timber Creek	$254,900	Recommended	High	Developers
Expanded Street Grid System – New Road	$330,000	Recommended	High	Sisters and Developers
Expanded Street Grid System – Jefferson Ave.	$180,000	Recommended	Medium	Developers
Expanded Street Grid System – Coyote Springs	$560,000	Recommended	Medium	Developers
Expanded Street Grid System – Cowboy Street	$80,000	Recommended	Low	Developers
Expanded Street Grid System – Black Butte Ave	$264,000	Recommended	Low	Developers
Expanded Street Grid System – Fir Street	$132,000	Recommended	Low	Developers
Additional Lanes on Cascade Avenue	N/A	Not Recommended	N/A	N/A
Highway Couplet	$1,980,000	Recommended	Low	ODOT
Highway Bypass	$17,200,000	Not Recommended	N/A	N/A
Balance Pedestrian and Vehicular Needs				
Establish an STA	$0	Recommended	High	ODOT
Reconfigure Cascade Avenue	$89,400[5]	Recommended	High	ODOT
Improve Intersection of Locust and Hwy 20				
Traffic Signal	$150,000	Recommended	High	Developers
Roundabout	$250,000	Not Recommended	N/A	N/A
Improve Pedestrian Conditions on Cascade				
Widen Sidewalks from Larch to Pine Streets	$59,400[6]	Recommended	High	ODOT
Enhance Crosswalk Appearance	$11,200	Recommended	High	ODOT
Add Curb Extensions	$30,000[7]	Recommended	High	ODOT
Add Raised Crosswalks	$800 Each	Not Recommended	N/A	N/A
Pedestrian Signal at Locust Street	$100,000	Not Recommended	N/A	N/A
Add Medians	N/A	Not Recommended	N/A	N/A
Build a Pedestrian Bridge or Tunnel	$75,000	Not Recommended	N/A	N/A

TABLE 6-1 (CONTINUED)

SUMMARY OF TRANSPORTATION IMPROVEMENT OPTION EVALUATION

Infill Walkways on Other Streets				
Infill Walkways on Highway 20	$43,560	Recommended	High	ODOT
Infill Walkways on Hood and Main Avenues	$51,810	Recommended	High	Sisters and Developers
Create a Bicycle System				
Add Shoulders to Locust Street	$33,600	Recommended	High	Sisters
Add Shoulders to Jefferson Avenue	$38,040	Recommended	High	Sisters
Add Shoulders to Pine Street	$6,300	Recommended	High	Sisters
Add Shoulders to Three Creeks Road	$15,900	Recommended	Medium	Sisters
Add Shoulders to Larch Street	$23,700	Recommended	Low	Sisters
Add Separated Path along Highway 242	$80,000	Recommended	High	Developer
Add Separated Path along Jefferson Avenue	$95,100	Recommended	High	Sisters
Add Separated Path along Locust Street	$3,975	Recommended	High	Sisters
Add Separated Path along Squaw Creek	$40,000	Recommended	Low	Developer
Add Separated Path Through Coyote Springs	$20,000	Recommended	Low	Developer
Provide Directional Signs for Bicyclists	$400	Recommended	Low	Sisters
Add Bicycle Parking	$5,600	Recommended	High	Sisters

Notes:

(1) Costs are not additive because there is some overlap in project descriptions for some improvement options

(2) High = implement in 0-5 years; Medium = implement in 5-10 years; Low = implement in 10-20 years

(3) The cost of $760,000 is not the cost of temporary rerouting of traffic, but the cost to construct a new collector ($700,000) and the cost of two variable message signs ($60,000). The cost of the new collector also appears in the "Expand the Local Street Grid System" improvement option.

(4) The cost of the new collector between Barclay Drive and McKinney Butte Road ($700,000) is also included in the "Temporary Traffic Control" improvement option.

(5) The cost for the "Reconfigure Cascade Avenue" improvement option ($89,400) includes the cost in the "Widen Sidewalks from Larch to Pine Streets" improvement option ($59,400) and the "Add Curb Extensions" improvement option ($30,000).

(6) The cost for the "Widen Sidewalks from Larch to Pine Streets" improvement option ($59,400) is also included in the "Reconfigure Cascade Avenue" improvement option.

(7) The cost for the "Add Curb Extensions" improvement option ($30,000) is also included in the "Reconfigure Cascade Avenue" improvement option.

CHAPTER 7: STREET STANDARDS, ACCESS MANAGEMENT, AND MODAL PLANS

The purpose of this chapter is to provide a detailed transportation system plan that will achieve the goals and objectives set forth by the Sisters community. This chapter addresses street standards, access management measures, transportation system management measures, and transportation demand management measures. Under *Modal Plans,* this chapter addresses improvements or approaches to meet the needs of all transportation modes appropriate for the City of Sisters.

STREET STANDARDS

Street standards relate the design of a roadway to its function. The function is determined by operational characteristics such as existing or planned land use, traffic volume, desired speed, safety, and capacity. Street standards are necessary to provide a community with roadways that are relatively safe, attractive, and easy to maintain. The street standards included here were developed based on experience, research, and state and local policies.

The City of Sisters has jurisdiction over the design and construction of all streets within the Urban Growth Boundary (UGB), except for state highways and US Forest Service roads. The development of the Sisters Transportation System Plan (TSP) provided the City with an opportunity to review and revise street design standards to more closely fit the roadways' intended use. The following street standards are shall be implemented in all areas within the Sisters UGB.

Arterial Streets

Arterial streets connect cities and other major traffic generators. They serve both through traffic and trips of moderate length and access is usually controlled. Arterials are high-volume roadways, due to the combination of local and through traffic. Depending on adjacent land uses, speeds rang between 20 and 55 mph. The arterials in Sisters are the McKenzie-Bend Highway (US Highway 20), The Santiam Highway (US Highway 20/OR Highway 126), and the McKenzie Highway (OR Highway 126/OR Highway 242).

Arterials with on-street parking in the CG, IL, RH, and RS zones shall consist of two 12-foot travel lanes, 5-foot bike lanes, and 7-foot parking strips. The total pavement width shall be 48 feet, inside a 60- to 80-foot right-of-way. Standard curbs shall be required along the pavement edge. Six-foot, property line-tight sidewalks shall be required. Sidewalks shall be separated from the roadway by a 0- to 10-foot planting strip, depending on the right-of-way width.

Arterials with no on-street parking in the CG, IL, RH, and RS zones shall consist of two 12-foot travel lanes, a 14-foot center turn lane, and 5-foot bike lanes. The total pavement width shall be 48 feet, inside a 60- to 80-foot right-of-way. Standard curbs shall be required along the pavement edge. Six-foot, property line-tight sidewalks shall be required. Sidewalks shall be separated from the roadway by a 0- to 10-foot planting strip, depending on the right-of-way width.

Arterials in the CH zone shall consist of two 12-foot travel lanes, 8-foot shoulders, and no on-street parking. The total pavement width shall be 40 feet, inside a 60- to 80-foot right-of-way. Standard curbs are required along the pavement edge. Six-foot, property line-tight sidewalks shall be required. Sidewalks shall be separated from the roadway by a 4- to 14-foot planting strip, depending on the right-of-way width.

The street standards for arterial streets are shown in Figure 7-1.

Collector Streets

Collector streets connect residential neighborhoods with the arterial system. Property access is generally a higher priority for collectors than arterials, and through traffic is served as a lower priority. Collectors are intended to carry local traffic, including limited through traffic, at design speeds of 25 to 35 mph. The collectors in the City of Sisters are Locust Street (Camp Polk Road), Pine Street (Squaw Back Road), Elm Street (Three Creeks Lake Road), and Tyee Drive. By adoption of this plan, Hood Avenue, Main Avenue, and Jefferson Avenue shall also be designated collectors.

Collectors with parallel on-street parking in the CG, IL, RH, and RS zones shall consist of two 11-foot travel lanes, 5-foot bike lanes, and 8-foot parking strips. The total pavement width shall be 48 feet, inside a 60- to 80-foot right-of-way. Standard curbs shall be required along the pavement edge. Six-foot, property line-tight sidewalks shall be required. Sidewalks shall be separated from the roadway by a 0- to 10-foot planting strip, depending on the right-of-way width.

Collectors with diagonal on-street parking in the CG, IL, RH, and RS zones shall consist of two 12-foot travel lanes, and 18-foot parking strips. The total pavement width shall be 60 feet, inside an 80-foot right-of-way. Standard curbs shall be required along the pavement edge. Six-foot, property line-tight sidewalks shall be required. Sidewalks shall be separated from the roadway by a 4-foot planting strip.

The street standards for collector streets are shown in Figure 7-2.

Local Streets

Local streets have property access as their main priority and through traffic movement is not encouraged. The design of a local residential street affects its operation, as well as the safety and livability of the area that road serves. Local streets should be designed to carry very small volumes of traffic at relatively slow speeds (15 to 25 mph). The local streets in Sisters consist of all streets not designated as arterials or collectors.

Local streets in the CG and IL zones shall consist of two 10-foot travel lanes and 8-foot parking strips. The total pavement width shall be 36 feet, inside a 60- to 80-foot right-of-way. Standard curbs shall be required along the pavement edge. Six-foot, property line-tight sidewalks shall be required. Sidewalks shall be separated from the roadway by a 6- to 16-foot planting strip, depending on the right-of-way width.

Local streets in the RH zone shall consist of two 10-foot travel lanes and 7-foot parking strips. The total pavement width shall be 34 feet, inside a 60- to 80-foot right-of-way. Rolled (mountable) curbs shall be

required along the pavement edge. Six-foot, property line-tight sidewalks shall be required. Sidewalks shall be separated from the roadway by a 7- to 17-foot planting strip, depending on the right-of-way width.

Local streets in the RS zone shall consist of two 12-foot travel lanes and on-street parking. The total pavement width shall be 24 feet, inside a 60- to 80-foot right-of-way. Rolled (mountable) curbs shall be required along the pavement edge. Six-foot, property line-tight sidewalks shall be required. Sidewalks shall be separated from the roadway by a 12- to 22-foot planting strip, depending on the right-of-way width.

The street standards for local streets are shown in Figure 7-3.

Alleys

Alleys can be a useful way to diminish street width by providing rear access and parking to residential areas. Including alleys in a subdivision design allows homes to be placed closer to the street and eliminates the need for garages to be the dominant architectural feature. This pattern, once common, has been recently revived as a way to build better neighborhoods. In addition, alleys can be useful in commercial and industrial areas, allowing access by delivery trucks that is off the main streets. Alleys shall be encouraged in the urban area of Sisters. Alleys shall be 16 to 20 feet wide, within a 20-foot right-of-way.

ACCESS MANAGEMENT

Access management is an important tool for maintaining a transportation system. Too many access points along arterial streets lead to an increased number of potential conflict points between vehicles entering and exiting driveways, and through vehicles on the arterial streets. This not only leads to increased vehicle delay and deterioration in the level of service on the arterial, but also leads to a reduction in safety. Research has shown a direct correlation between the number of access points and collision rates. Experience throughout the United States has also shown that a well-managed access plan for a street system can minimize local cost for transportation improvements needed to provide additional capacity and/or access improvements along unmanaged roadways. Therefore, it is essential that all levels of government maintain the efficiency of existing arterial streets through better access management.

The Transportation Planning Rule (TPR) defines access management as measures regulating access to streets, roads and highways from public roads and private driveways. The TPR also requires that new connections to arterials and state highways be consistent with designated access management categories. As Sisters continues to develop, the street system will become more heavily used and relied upon for a variety of travel needs. As such, it will become increasingly important to manage access on the existing and future street system as new development occurs.

One objective of the Sisters TSP is to develop an access management policy that maintains and enhances the integrity (capacity, safety, and level of service) of the city's streets. Too many access points along a street can contribute to a deterioration of its safety, and on some streets, can interfere with efficient traffic flow.

Access Management Techniques

The number of access points to an arterial can be restricted through the following techniques:

- Restricting spacing between access points (driveways) based on the type of development and the speed along the arterial.
- Sharing of access points between adjacent properties.
- Providing access via collector or local streets where possible.
- Constructing frontage roads to separate local traffic from through traffic.
- Providing service drives to prevent spill-over of vehicle queues onto the adjoining streets.
- Providing acceleration, deceleration, and right turn only lanes.
- Based on ODOT design and safer operational priorities, offsetting driveways to produce T-intersections to minimize the number of conflict points between traffic using the driveways and through traffic.
- Installing medians to control conflicts associated with left turn movements and cross traffic.
- Installing curbs to the property along the arterial to restrict access width to a minimum.
- Developing and adopting local ordinances that require inter-parcel circulation so traffic can go from lot to lot without traveling on the state highway system.
- Developing long-term signal system plans for the state roadways consistent with ODOT priorities for optimum signal progression performance (i.e., timing signals to achieve progression along a signalized arterial).

To summarize, access management strategies consist of managing the number of access points and providing traffic and facility improvements. Access management also includes managing the transportation system to ensure free flow and safe conditions. The solution is a balanced, comprehensive program that provides reasonable access while maintaining the safety and efficiency of traffic movement.

Access Management Standards for City Streets

Table 7-1 shows the access management standards on city streets by functional classification. New access points on city streets shall meet the access management standards shown in Table 7-1. The only arterials in Sisters are the State Highways; their access management standards are described in the following section and are shown in Table 7-2.

TABLE 7-1
ACCESS MANAGEMENT STANDARDS FOR CITY STREETS

Classification	Spacing Between Intersections of Public Streets[1]	Spacing Between Private Driveways and Alleys[1]
Arterial	See Table 7-2	See Table 7-2
Collector	300 feet	100 feet
Local	300 feet	Access to Each Lot

Notes:

[1] Measurement of the approach road spacing is from center to center on the same side of the roadway.

It should be noted that existing developments and accesses on the transportation network will not be affected by the access management standards until either a land use action is proposed, a safety or capacity deficiency is identified that requires specific mitigation, a specific access management strategy/plan is developed, redevelopment of existing properties along the roadway, or a major construction project is begun on the street.

Application

These access management restrictions are generally not intended to eliminate existing intersections or driveways. Rather, they should be applied as new development occurs. Over time, as land is developed and redeveloped, the access to roadways will meet these guidelines. However, where there is a recognized problem, such as an unusual number of collisions, these techniques and standards can be applied to retrofit existing roadways.

Access Management Standards for State Highways

Access management is important to promoting safe and efficient travel for both local and long distance users along State Highways. The 1999 *Oregon Highway Plan (OHP)* specifies an access management classification system for state facilities. The access management standards in the 1999 OHP are implemented through Oregon Administrative Rule (OAR) 734 Division 51. Future developments on state highways (zone changes, comprehensive plan amendments, redevelopment, and/or new development) shall be required to meet the 1999 OHP State Classification System and Access Management policies and standards. Although Sisters may designate state highways as arterial roadways within its transportation system, the access management categories for these facilities shall follow the guidelines of the Oregon Highway Plan.

The access management standards on state highways within Sisters are described as follows and are shown in Table 7-2.

US 20 and OR 126 are classified as Statewide Highways. Statewide Highways typically provide inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to provide

connections for intra-urban and intra-regional trips. The management objective is to provide safe and efficient, high-speed, continuous-flow operation. In constrained and urban areas, interruptions to flow should be minimal. Inside urban areas, local access may also be a priority. There are short sections of US 20 and OR 126 inside the Sisters Urban Growth Boundary that are classified as Statewide Expressways. The section of US 20/OR 126 that is designated as an expressway is from the north UGB to Barclay Drive extension alignment. The section of US 20 that is designated as an expressway is from the east UGB to the intersection of OR 126. The section of OR 126 that is designated as an expressway is from the east UGB to the intersection of US 20. Access management standards for Statewide Expressways are more restrictive than for Statewide Highways, as shown in Table 7-2.

OR 242 is classified as a District Highway. District Highways are facilities of county-wide significance and function largely as county and city arterials or collectors. They provide connections and links between small urbanized areas, rural centers and urban hubs, and also serve local access and traffic. The management objective is to provide for safe and efficient, moderate to high-speed continuous-flow operation in rural areas reflecting the surrounding environment and moderate to low-speed operation in urban and urbanizing areas for traffic flow and for pedestrian and bicycle movements. Inside urban areas, local access is given more priority.

TABLE 7-2
1999 OREGON HIGHWAY PLAN ACCESS MANAGEMENT CLASSIFICATION SYSTEM

Posted Speed	Statewide Expressway Spacing Standards[1]	Statewide Highway Spacing Standards[1]	District Highway Spacing Standards[1]	STA Spacing Standards[1]
≥ 55 mph	2,640 feet	1,320 feet	700 feet	N/A
50 mph	2,640 feet	1,100 feet	550 feet	N/A
40 & 45 mph	2,640 feet	990 feet	500 feet	N/A
30 & 35 mph	N/A	770 feet	400 feet	See Note 2
≤ 25 mph	N/A	550 feet	400 feet	See Note 2

Notes:

1 Measurement of the approach road spacing is from center to center on the same side of the roadway.

2 Minimum spacing for public road approaches is either the existing city block spacing or the city block spacing as identified in the local comprehensive plan. Public road connections are preferred over private driveways, and in STAs driveways are discouraged. However, where driveways are allowed and where land use patterns permit, the minimum spacing for driveways is 175 feet or mid-block if the current city block spacing is less than 350 feet.

Application

The existing ***legal*** driveway connections, public street intersections, and other accesses to the state highway system are not required to meet the spacing standards of the assigned category immediately upon adoption of this access management plan. However, existing permitted connections not conforming to the design goals and objectives of the roadway classification shall be upgraded as circumstances permit and during redevelopment. At any time, an approach road may need to be modified due to a safety problem or a capacity issue that exists or becomes apparent. By statute, ODOT is required to ensure all safety and capacity issues on the highway are addressed.

An approach road permit may be issued by ODOT for a single connection to a property that cannot be accessed in a manner that is consistent with the spacing standards (shown in Table 7-2). Approach road permits are issued with conditions. These conditions typically apply to properties that either have no reasonable access or cannot obtain reasonable alternative access to the public road system. The permit shall carry a condition that the access may be closed at such time that reasonable alternative access becomes available to a local public street. In addition, approval of an approach road permit might require ODOT-approved turning movement design standards to ensure safety and managed access. Under special circumstances, ODOT may be required to purchase property in order to prevent safety conflicts.

Access Control Rights

Historically, owners of property abutting public roadways have enjoyed a common law abutter's right of access to the roadway. However, in order to provide for a transportation system that will accommodate changing public needs, legislation has been passed to modify rights of access. Oregon Revised Statutes specify that the right of access can be purchased or condemned as deemed necessary for right-of-way. ODOT has purchased access control rights from many properties along state highways. The only place in the City of Sisters where ODOT has purchased access control is on the north side of US 20/OR 126 where the highway crosses over Squaw Creek.

Once the state has acquired access rights to a property, road approach permits can only be issued at locations on the property where the right of access has been reserved. A reservation of access gives the property owner the right to apply for a permit of access to the state highway only at specific locations and they must be clearly identified in the deed where the property owner sold the right-of-way to the state. If the owner wants to gain additional access rights to the highway, they must apply for a grant of access.

There may be local street connections shown in this TSP that will require modifying the existing access rights or gaining additional access rights to the state highway system. Review of this TSP by ODOT does not imply tacit approval to modify or grant additional access rights. This must be accomplished by applying to ODOT for such modification or grant.

An "Indenture of Access" is used to modify existing access rights such as moving or widening the reservation or lifting other restrictions that may have been placed on it. A "Grant of Access" is required to gain an additional access point to the highway, and, depending on circumstances, may require payment to the state for the market value of the grant. Application for both the Indenture and Grant of Access is made to the local ODOT District Office.

Special Transportation Areas (STAs)

The 1999 Oregon Highway Plan allows for the designation of "Special Transportation Areas" (STAs) as a means to "foster compact development patterns in communities." The STA designation is also ODOT's way of recognizing that the function of the state highway is different along a "main street" or in a downtown where convenient local circulation for pedestrians and vehicles is critical to the vitality and economic success of downtown.

The primary objective of managing highway facilities in an STA is to provide access to community activities, businesses, and residences and to accommodate pedestrian movement along and across the highway in downtown, business districts, and community centers. Direct street connections and shared on-street parking are encouraged. Direct property access is very limited in an STA. Local auto, pedestrian, bicycle and transit movements to the business district or community center are generally as important as the through movement of traffic. Traffic speeds are slow, generally 25 mph or less.

As defined by the Highway Plan, Action 1B.9, an STA has the following attributes:

- Mixed uses (commercial, office, residential);

- Buildings spaced close together or with continuous storefronts, located at the street with little or no setback from the sidewalk;
- Sidewalks with ample width (at least 10 feet), located next to the highway and the buildings;
- Interconnected local street network to facilitate local vehicle and pedestrian circulation; and
- On-street parking and shared off-street parking lots located behind or to the side of buildings.

The STA designation is intended primarily for downtowns, central business districts and similar areas where the state highway is also the local main street, such as in the City of Sisters. In cities such as Sisters, the STA is a section of highway where major highway improvements to add capacity are not feasible or appropriate because of the cost, the inconsistency with community goals, and potential negative impacts on the adjoining business district.

Outside an area designated as an STA, the state highway access management spacing standards shown in Table 7-2 shall be enforced. Where necessary (as determined by ODOT), access management spacing standards that are even more restrictive than those shown in Table 7-2 may be needed to maintain a highway's mobility standard and recoup travel time lost in an STA. ODOT shall work with the City of Sisters to maintain the highway mobility standards on the state highways by limiting the expansion of development along the highways through the following means:

- Developing an adequate local network of arterials, collectors, and local streets to limit the use of the state highway or interchanges for local trips;
- Reducing access to the state highways by use of shared accesses, access from side or back roads, and frontage roads and by development of local street networks as redevelopment along state highways occurs;
- Clustering development off of state highways in compact development patterns; and
- Avoiding the expansion of urban growth boundaries along the Statewide Highways and around interchanges unless ODOT and the City of Sisters agree to an interchange management plan to protect interchange operations or an access management plan for the highways.

Benefits of the STA Designation

The STA designation is a way for communities to get clear agreement from ODOT to manage the state highway as a main street. These features can include wider sidewalks, adding or retaining on-street parking, adding curb extensions, adding street trees, and other measures. There are several reasons for pursuing an STA designation:

- It gets ODOT approval about how the highway should be managed up front. Without a plan, approval of main street elements will require case-by-case review and approval. The STA designation sends the message to everyone involved that "the primary objective of managing highway facilities in the STA is to provide access to community activities, businesses, and residences, and to accommodate pedestrian movement along and across the highway." (1999 Oregon Highway Plan)
- It prescribes greater flexibility for state highway standards.
- It changes ODOT mobility and access management standards applied to that segment of the state highway.

- It may help a community's main street projects qualify for funding, like Immediate Opportunity Funds, Local Street Funding, Oregon Community Development funding, and Federal Transportation Enhancement Funding. State funding programs are emphasizing downtown redevelopment.
- It provides certainty for property owners and local officials about how the highway will be managed. It allows businesses and local governments to make planning and investment decisions along main street, knowing that any future highway improvements will support, not detract from main street development.

Steps to Implement the Sisters STA

Task 1. The City of Sisters requests an STA.

Task 2. Define the STA Boundaries.

The proposed Sisters STA is shown in Figure 7-4. The STA will extend from Larch Street on the east to Pine Street on the west. At the present, the STA will incorporate Cascade Avenue.

In the future, when a couplet consisting of Main Avenue westbound and Hood Avenue eastbound is implemented, the STA will encompass both legs of the couplet. It is important to the community that both legs of a couplet are in a main street configuration to keep the pedestrian-oriented feeling of Sisters.

Task 3. Prepare an STA Impact Analysis.

Task 3A. To meet the objectives, the analysis needs to evaluate current and future operating conditions for the proposed STA designation. A 20-year planning horizon for future operating conditions is the recommended standard. Transportation facilities are to be inventoried to identify basic deficiencies such as missing or inadequate sidewalks. Traffic operations are to be measured using v/c and queue lengths. Traffic safety is to be analyzed using crash data and measures of traffic conflict points.

✓ The inventory of the existing transportation facilities shall include the following:

☐ Vicinity map showing the proposed STA, highway and public roadways.

☐ Classification of highway and parallel and intersecting public roads.

☐ Existing roadway lane configurations and lane widths.

☐ Sidewalk widths, marked crossings and prohibited crossings.

☐ Separated bicycle and pedestrian pathways if any.

☐ Transit routes and structures (where appropriate).

☐ Existing signal locations.

☐ Railroads and railroad crossings.

☐ Location of private road approaches to highway.

☐ Special pedestrian generators in vicinity. (e.g. schools)

Task 3B. The following additional analysis must be developed in the following circumstances:

1. where v/c ratios will change from the existing highway mobility standards as defined in Tables 6 and 7 of the 1999 Oregon Highway Plan;
2. where additional signalization is proposed; or
3. where there is no existing urban form to support an STA but it is planned as part of a community plan.

✓ Develop Existing and Future Traffic Information:

- Current year design hour volumes (DHV) – use DHV, not average peak hour volumes. Note that the design hour will typically be on a weekend on recreational routes.
- Future DHV - this is for 20 years from the current date. Make sure that the ODOT Transportation Planning Analysis Unit (TPAU) agrees with the growth rates before proceeding.

✓ Evaluate current and future V/C ratios

- If the Highway Capacity Manual is used to evaluate signalized intersections, make sure a 4-second lost time is used.
- Use 1,800 vph as the ideal capacity instead of 1,900 vph (unless a study to determine capacity is included).
- Include the effects of pedestrians and on-street parking.
- If simulation or progression is used, the parameters for the progression analysis will need to be agreed upon by the Traffic Management Section prior to any progression work being done.

✓ For unsignalized intersections, the effect of pedestrians crossing the highway and stopping traffic will need to be evaluated.

✓ Where it is determined that the STA is on a freight route and will affect existing freight movements:

- Identify truck percentages and truck volumes and types on freight routes.
- Identify special freight generators and receivers in vicinity. (e.g., large warehouse).
- Identify local streets important for local freight and truck movements.
- Future DHV – this is for 20 years from the current date. Make sure TPAU agrees with the growth rates before proceeding.

✓ Inventory crashes and potential traffic conflicts:

- Report crash rates (include both vehicle and pedestrian-vehicle crash information for the past 5 years).

✓ Where it is determined that the STA will create new or magnify existing safety issues:

- Inventory the number of conflict points at intersections: distinguish between vehicle–vehicle and vehicle-pedestrian conflicts.
- Check sight distances from the side streets and accesses crossing sidewalks and or turning onto the Highway.

The proposed Sisters STA meets the basic land use qualifications described in the Highway Plan. The highway is currently the main street of Sisters, with a well-developed network of local streets, on-street parking, and small-scale commercial development.

A transportation analysis of the proposed STA was conducted for the Sisters TSP. The analysis showed that on an average day of the year, Cascade Avenue serves approximately 13,400 trips per day and 1,650 trips during the 30th highest hour through downtown Sisters. By the year 2020, average daily traffic volumes are expected to increase to 21,800 vehicles per day (vpd), and 30th highest hour volumes are expected to reach 2,500 vph. As shown in Chapter 4, Cascade Avenue does not meet ODOT's mobility standards for 30th highest hour conditions today. As shown in Chapter 5, prior to the year 2020, the highway will be well over capacity during 30th highest hour conditions.

In Chapters 4 and 5, the capacity of the highway in downtown Sisters was estimated at 1,700 vehicles per hour (vph). That estimate is based on the assumption that the capacity of each of the two lanes is 850 vph. With implementation of a couplet, there will be four lanes of traffic on the highway (two eastbound lanes on Hood Avenue and two westbound lanes on Cascade Avenue). The total capacity of the highway couplet will be 3,400 vph with four lanes of highway traffic.

The capacity of the highway couplet will be sufficient to meet ODOT's mobility standard for existing conditions, as demonstrated by the following example. The year 2000 30th highest hour traffic volume on the highway was estimated at 1,650 vph. Assuming a 60/40 directional split of traffic during the peak hour, the peak hour volume in the peak direction will be approximately 990 vph. The capacity of the highway will be 1,700 vph in each direction with a couplet. The resulting volume-to-capacity (v/c) ratio will be 0.58, which meets ODOT's mobility standard of a v/c ratio of 0.75 or less.

During 30th highest hour conditions 20 years in the future, ODOT's mobility standard will not be met with a couplet. The year 2020 30th highest hour traffic volume on the highway was estimated at 2,500 vph. Assuming a 60/40 directional split of traffic during the peak hour, the peak hour volume in the peak direction will be approximately 1,500 vph. The capacity of the highway will be 1,700 vph in each direction with a couplet. The resulting v/c ratio will be 0.88, which does not meet ODOT's mobility standard of a v/c ratio of 0.75 or less. If this section of highway is designated as an STA, a v/c ratio of 0.85 will be allowable. Again, ODOT's mobility standard will not be met, even at the lower standard for an STA. However, even though the couplet will have a v/c ratio of 0.88, it will be nearly 20 years before ODOT's mobility standard is not met.

Task 4. Develop a management plan to include the following:

Task 4A. Identify goals and objectives of management plan to guide subsequent plan development and implementation.

- ✓ Identify land use goals and community objectives of the STA to create or enhance the area within the STA.
- ✓ Identify transportation management objectives based on issues identified in Task 1.

Task 4B. Define the proposed STA boundaries consistent with the Highway Plan requirements and local needs.

- ✓ Prepare a base map of the study area, including existing rights-of-way, highway improvements, sidewalks, driveways, alleyways and street connections, and zoning designations. Also consider including property boundaries, lands in public ownership, and an inventory of occupied and vacant lands.

Task 4C. Identify design treatments and management strategies for the state highway, in coordination with ODOT, in a way that achieves the goals and objectives for the Special Transportation Area.

- ✓ Analyze available right-of-way, existing development, transportation needs, and STA objectives, and if desired, make recommendations for modification of the highway right-of-way (i.e. travel lanes, turn lanes, parking, sidewalks, etc.) that balance the need to provide for through movement of vehicles with other STA objectives.
- ✓ Specifically identify pedestrian circulation improvements within the area including:
  - Sidewalks (new, widened, reconstructed).
  - Other walkways (along alleys or through parks or parking lots).
  - Street crossing improvements such as bulb-outs and crosswalks.
  - Other pedestrian circulation improvements including removal of obstructions, provision of lighting, benches, small public plazas within the right of way, improved street lighting, etc.
- ✓ Identify measures as necessary to assure that STA treatment can continue to meet state mobility standards, safety issues, and address issues raised in Task 1.
- ✓ Develop an access management strategy for the highway segment and, where necessary, adjacent highway and roadway segments.
- Identify areas that do not meet private driveway spacing standards and/or provide a conflict with safe pedestrian movements. Look for opportunities and develop a long-term strategy to meet the standards.
- Assess current and future land use proposals both inside and outside the proposed STA. Review parcel sizes and configuration and provide analysis of how access to the highway will continue to meet standards and objectives of the STA. Look for opportunities and develop strategies as needed to meet deficiencies.
- Review ordinances and local policies to ensure that they promote necessary access management for the proposed STA.
- ✓ Where parking is identified as an issue, prepare a parking plan to ensure an adequate supply of parking to meet the needs of the area and complement objectives to promote compact, mixed-use development and pedestrian circulation.
  - Identify parking needs and problems.
  - Identify opportunities for on street parking, shared parking or public parking lots, and, where appropriate, parking structures.
  - Evaluate code requirements for off-street parking.
  - Prepare a plan to include a list of measures to provide an adequate supply of parking to meet the downtown needs and to support compact development.

- Coordinate with ODOT in the review and development of the proposed standards and strategies.

✓ Recommend highway design, mobility, operational, management and maintenance standards and plan for the right-of-way within the proposed STA. Exceptions to standards will require agreement from ODOT.

✓ Analyze access issues and compliance with the 1999 Access Management Spacing Standards. Recommend a strategy to address access for future land uses and redevelopment opportunities.

✓ Analyze parking needs and issues. Recommend a plan listing the proposed measures to provide on-street parking and public parking lots.

Task 4D. Prepare a local circulation plan that includes a network of local streets and other improvements to provide for local traffic, safe bike and pedestrian circulation and, where appropriate, transit access.

✓ Identify local street extensions and connections to provide safe local access or circulation within the proposed STA.

✓ Evaluate the cost and feasibility of extensions considering topographic constraints or existing development.

✓ Identify improvements to parallel arterial or collector streets or other street improvements that will either provide an alternative route to the center or that will provide for safe local circulation within the center off of the state highway.

✓ Identify pedestrian circulation improvements outside the area including:

- Sidewalks (new, widened, reconstructed).
- Other walkways (along alleys or through parks or parking lots).
- Street crossing improvements such as bulb-outs and crosswalks.
- Other pedestrian circulation improvements including removal of obstructions, provision of lighting, benches, small public plazas within the right of way, improved street lighting, etc.

✓ Prepare a local circulation plan itemizing proposed street improvements and pedestrian circulation improvements to be made within and around the proposed STA, including rough cost estimates, phasing, and the responsible party.

Task 4E. Refine the land use strategy for the Management Plan by developing necessary amendments to the comprehensive plan, zoning ordinance and land use regulations that further support the proposed STA area as a compact, mixed-use, pedestrian friendly community center.

✓ Review existing plans and zoning for the proposed STA area, (population and employment forecasts from the TSP, existing plan and zoning designations).

✓ Identify vacant and redevelopable properties.

✓ Establish urban design requirements for the STA (buildings oriented to streets, buildings spaced close together, with no or minimal setbacks, limiting parking lots to the sides or backs of buildings).

✓ Identify changes to plans, zoning, or development ordinances that are needed to achieve this objective.

- ✓ Evaluate existing code requirements for off-street parking to determine need in light of availability of shared, public or on-street parking in the area.
- ✓ Where land use changes are contemplated, do additional traffic analysis to meet the Transportation Planning Rule OAR 660-012-060 requirements, if needed.

Task 4F. With the agreement of ODOT, develop an operations and maintenance strategy that supports the STA.

- ✓ Identify the operational and maintenance policies and practices being used in the STA.
- ✓ Discuss needed changes with the ODOT Region.
- ✓ If traffic signals are proposed, obtain the agreement of ODOT's Technical Services Division.
- ✓ Include proposed changes in the proposed Management Plan.
- ✓ Include the parties responsible and the funding sources.

Task 4G. Develop a transportation improvement funding strategy for transportation improvements within the proposed STA area.

- ✓ Identify needed transportation improvements within the STA and improvements to support access to the STA. The plan will designate the party or parties responsible for implementation, likely funding source, and an anticipated time frame for improvements.

Task 5. Develop an intergovernmental agreement or memorandum of understanding between ODOT and the local jurisdiction designating the STA and adopting the Management Plan.

Task 6. Complete designation of the STA by adopting the Management Plan into the local TSP an/or corridor plan.

The planning cost for developing the STA Management Plan is estimated at $50,000. These costs can be shared between ODOT and the City of Sisters.

MODAL PLANS

A number of transportation improvements were developed for the City of Sisters during the inventory, forecasting, and public involvement phases of this TSP. Each of these improvements was analyzed, recommended or not recommended, and assigned a priority in Chapter 6. The following modal plans reflect the findings of Chapter 6.

The modal plans consider the transportation system needs for the City of Sisters over the next 20 years, assuming the growth projections discussed in Chapter 5. The timing for individual improvements will be guided by changes in land use patterns and population growth. This TSP should be reviewed every several years to adjust specific projects and implementation schedules to these changes.

Street System Plan

The street system plan includes a series of improvements that shall be implemented in the City of Sisters over the next 20 years. Some of these improvements were described and prioritized in Chapter 6.

Local Street Connectivity Projects

The need for several local street connectivity projects was identified by City of Sisters Staff. Most of these street projects are located in the residential zones in the eastern part of Sisters. Several other projects are located in the industrial zones in the northern part of Sisters. Good road connections to the State Highway System within these areas are limited. The following street connectivity projects were identified to expand the existing street grid system:

- Barclay Drive Extension between Pine Street and Highway 20/126
- Jefferson Avenue Extension between Highway 20/126 and Timber Creek Drive
- Timber Creek Subdivision streets between Cascade Avenue and Highway 126
- Coyote Springs Road between Locust Street and Highway 20
- New Road between Tamarack Street and Rope Lane
- Extend Cowboy Street from its current terminus to Black Butte Avenue
- Extend Black Butte Avenue from Locust Street to Fir Street
- Extend Fir Street from Adams Avenue to Black Butte Avenue

The Barclay Drive Extension shall be constructed as a City of Sisters project with funding from ODOT. All other street connectivity projects listed above shall be constructed by developers, as development occurs.

Safety Projects

The need for one safety project was identified by City of Sisters Staff. This project consists of intersection realignment to improve sight distance at the intersection of a city collector and the state highway. The following safety project shall be undertaken by the City of Sisters:

- Realign the intersection of Jefferson Avenue and US Highway 20/126

Traffic Signals

The need for two traffic signals was identified in the analysis of existing and future operating conditions. Both intersections are located at the intersection of a city collector and the state highway (US 20/OR 126). Both projects will be funded by developers of the industrial properties in the north part of Sisters. The following two traffic signals shall be installed by ODOT with funding from developers:

- Install a traffic signal at the intersection of Locust Street and Highway 20/126
- Install a traffic signal at the intersection of the Barclay Drive Extension and Highway 20/126

Statewide Transportation Improvement Program (STIP) Projects

The Oregon Department of Transportation has a comprehensive transportation improvement and maintenance program encompassing the entire state highway system. The Statewide Transportation Improvement Program (STIP) identifies all the highway improvement projects in Oregon. The STIP lists specific projects, the counties in which they are located, and their construction year. The STIP covers a four-year period; however, it is updated every two years. The final 2000-2003 STIP is a reliable data source for projects scheduled for construction during fiscal years 2000 and 2001. The draft 2002-2005 STIP is a better data source for projects scheduled for construction during fiscal years 2002 through 2005.

The final 2000-2003 STIP identifies two safety projects and one Transportation System Management (TSM) project for the City of Sisters. Both safety projects consist of intersection realignment to improve sight distance and reduce vehicle conflicts at the intersections of two state highways. The following safety projects shall be undertaken by ODOT:

- Realign the intersection of OR Highway 242 and US Highway 20/126
- Realign the intersection of OR Highway 126 and US Highway 20

The TSM project consists of the following "region-wide travel information" service:

- Fixed variable message sign on US Highway 20 at milepost 99.9

The draft 2002-2005 STIP identifies one pavement preservation project for the City of Sisters:

- Pavement overlay on OR Highway 126 between Edgington Road and Squaw Creek (mileposts 91.39 and 97.00

Other State Highway Projects

The need for the following capacity improvement on Cascade Avenue (US Highway 20/OR Highway 126) was identified in the analysis of existing and future operating conditions:

- Implement a one-way highway couplet on US Highway 20/ OR Highway 126

The alignment shall be Hood Avenue for eastbound traffic and Main Avenue for westbound traffic.

A one-way highway couplet is needed today to meet ODOT's mobility standards during peak summer traffic conditions. Implementation of a couplet should be pursued as a high priority project. However, the Citizen Advisory Committee (CAC) that worked with the consultant in preparation of this Transportation System Plan (TSP) was generally against the idea of a couplet. The CAC recommended that the couplet be a low priority project (for implementation after the year 2010) in the TSP, rather than a high priority project (for implementation in the next five years).

Other Transportation System Management Projects

The City of Sisters identified the need for one other TSM project:

- two moveable variable message signs

The two moveable variable message signs will be used to direct highway traffic to alternate routes (divert eastbound traffic to Hood Avenue and divert westbound traffic to Locust Street and Barclay Drive) during peak periods of congestion. This TSM project is estimated to cost $50,000 to $90,000, depending on whether the City of Sisters has to purchase land for the signs, which would only be needed if they can not place the signs on ODOT's existing highway right-of-way. The City of Sisters applied for a $50,000 Regional Investment Plan Grant for the signs through the Central Oregon Intergovernmental Council's Community Block Grant Program, which requires a $10,000 local match.

Bridge Projects

There are no bridges in the City of Sisters that require repair or replacement. ODOT's Bridge Maintenance Section maintains an inventory of bridges on the State and local roadway system. ODOT's inventory indicated that there are no structurally deficient or functionally obsolete bridges in the City of Sisters.

City staff identified the need for a bridge over Squaw Creek in the Timber Creek subdivision. This need will be met with a bridge over Squaw Creek on Creekside Road (a local road in the Timber Creek subdivision). This project is being constructed by the developer of the Timber Creek subdivision.

Prioritized Street System Plan

Table 7-3 summarizes the local street and highway improvement projects that are included in the Street System Plan. Their locations are shown in Figure 7-5. The projects are listed as high priority (construction in the next 0 to 5 years), medium priority (construction expected in the next 5 to 10 years) and low priority (construction expected in the next 10 to 20 years). As either state of city or other sources of funding become available, the street system projects shall be constructed in the order of priority shown in Table 7-3. It should be noted that not all of the projects have identified funding and, therefore, are not committed and are subject to the City's and ODOT's abilities to meet these needs financially.

TABLE 7-3
STREET SYSTEM IMPROVEMENT PROJECTS

	Project	Priority	Cost (year 2001 dollars)	Financial Responsibility
1.	Locust St. Traffic Signal	High	$150,000	Developers
2.	Barclay Drive Extension	High	$700,000	ODOT
3.	Barclay Dr. Traffic Signal	High	$150,000	Developers
4.	Realign Hwy 242/20	High	$155,000	ODOT
5.	Moveable Message Signs	High	$60,000	ODOT
6.	Fixed Message Sign	High	$120,000	ODOT
7.	Timber Creek Streets	High	$254,900	Developers
8.	New Road	High	$330,000	Sisters and Developers
9.	Realign Hwy 126/20	High	$220,000	ODOT
10.	Repave OR 126	High	$1,227,000	ODOT
11.	Realign Jefferson Avenue	Medium	$30,000	City of Sisters
12.	Jefferson Avenue Extension	Medium	$180,000	Developers
13.	Coyote Springs Road	Medium	$560,000	Developers
14.	Extend Cowboy Street	Low	$80,000	Developers
15.	Extend Black Butte Avenue	Low	$264,000	Developers
16.	Extend Fir Street	Low	$132,000	Developers
17.	Highway Couplet	Low	$990,000	ODOT

Pedestrian System Plan

The pedestrian system shall provide direct and safe access to all areas of the city and to every land use. Properly configured, the system encourages walking and enables neighbors to know each other and to enjoy their community. The primary reason for providing sidewalks separated from the roadway, is to improve pedestrian safety; however, a separate pedestrian system has several qualitative benefits as well. Providing adequate pedestrian facilities increases the livability of a city. When pedestrians can walk on a sidewalk, separated from vehicular street traffic, it makes the walking experience more enjoyable and may encourage walking, rather than driving, for short trips.

Every paved street within the urban area of Sisters shall have sidewalks on both sides of the street, meeting the requirements set forth in the street standards. Ordinances specifying these requirements are

included in Chapter 9. Sidewalks shall be added as new streets are constructed and existing streets are reconstructed. New sidewalks shall be constructed with curb cuts for wheelchairs at every crosswalk to comply with the Americans with Disabilities Act (ADA). Sidewalk and other pedestrian facilities may also be added as stand-alone projects as discussed below. Cul-de-sacs and dead-end streets shall be discouraged; however, where cul-de-sacs and dead-end streets are part of a development plan, reasonably direct pedestrian access to the nearest through street shall be provided.

The pedestrian system plan includes a series of improvements that shall be implemented in the City of Sisters over the next 5 years. These improvements were described and prioritized in Chapter 6. The following pedestrian system projects were identified to improve the existing system:

- Add curb extensions to Cascade Avenue at the intersections of Spruce, Fir, Elm, Ash, and Oak Streets.
- Widen the sidewalks on Cascade Avenue from 6 ft. to 10 ft. between Larch and Pine Streets.
- Construct new sidewalks on Cascade Avenue (Highway 20/126) where they are missing between Larch and Locust Streets.
- Infill missing sidewalk sections on Hood and Main Avenues
- Enhance crosswalks on Cascade Avenue by replacing painted crosswalks with Durastripe, and by adding texture to the edges.

Prioritized Pedestrian System Plan

Table 7-4 summarizes the improvement projects that are included in the Pedestrian System Plan. Their locations are shown in Figure 7-6. All of the projects are listed as high priority projects (for construction in the next 0 to 5 years). As either state of city or other sources of funding become available, the pedestrian system projects shall be constructed in the order of priority shown in Table 7-4. It should be noted that none of these projects has identified funding and, therefore, are not committed and are subject to the City's and ODOT's abilities to meet these needs financially.

TABLE 7-4
PEDESTRIAN SYSTEM IMPROVEMENT PROJECTS

	Project	Priority	Cost (year 2001 dollars)	Financial Responsibility
1.	Add Curb Extensions	High	$30,000	ODOT
2.	Widen Cascade Sidewalks	High	$59,400	ODOT
3.	Add Cascade Sidewalks	High	$43,560	ODOT
4.	Hood and Main Sidewalks	High	$51,810	Sisters/Developers
5.	Enhance Crosswalks	High	$11,200	City of Sisters

Bicycle System Plan

The bicycle system plan aims to provide direct and safe access to all areas of the city. Properly configured, the system encourages bicycling and enables people of average skill to reach most destinations comfortably.

Every arterial street shall include bikeways, typically bike lanes in urban areas and shoulders in more rural areas. All bikeways shall meet the requirements set forth in the street standards and in the Oregon Bicycle and Pedestrian Plan (ODOT, 1995). For example, bike lanes shall be one-way, and marked in the same direction as the adjacent travel lane.

Four-foot wide shoulders are adequate on rural collectors. Six-foot bike lanes shall be included on arterials. Bikeways shall be added as new collectors and arterials are constructed and as existing collectors and arterials are reconstructed. Cul-de-sacs and dead-end streets shall be discouraged; however, where cul-de-sacs and dead-end streets are part of a development plan, reasonably direct bicycle access to the nearest through street shall be provided.

Multi-use paths and public accessways are typically used by pedestrians, cyclists, skaters, and joggers. These facilities shall be constructed to meet the standards set forth in the Oregon Bicycle and Pedestrian Plan. Paths may be paved or unpaved (constructed with packed gravel or asphalt grindings), if they are smooth and firm enough to meet ADA requirements. The standard width for a multi-use path is 10 feet. Where a path is parallel and adjacent to a roadway, there shall be a 5-foot or greater width separating the path from the edge of the roadway.

The bicycle system plan includes a series of improvements that shall be implemented in the City of Sisters over the next 20 years. These improvements were described and prioritized in Chapter 6. The following bicycle system projects were identified to improve the existing system:

- Construct a separated multi-use path on Highway 242 from Pine Street to the high and middle schools.
- Construct 4-ft. shoulders on Locust Street between Highway 20 and Barclay Drive.

- Add bicycle parking on Cascade and Hood Avenues.
- Install directional signs for bicyclists on Main and Hood Avenues.
- Construct 4-ft. shoulders on Jefferson Avenue from Pine Street to US 20/OR 126.
- Construct a separated multi-use path on both sides of Jefferson Avenue from Pine Street to US 20/OR 126.
- Construct 4-ft. shoulders on Pine Street from Barclay Drive to the northern city limits.
- Construct a separated multi-use path on the west side of Locust Street from the current terminus of the bike lane to the southern city limits.
- Construct 4-ft. shoulders on Three Creeks Road between St. Helens Avenue and S. Tyee Drive.
- Construct a separated multi-use path along Squaw Creek in the Timber Creek Subdivision.
- Construct a separated multi-use path to the Forest Service trails in the Coyote Springs Subdivision.
- Construct 4-ft. shoulders on Larch Street between Highway 20 and Barclay Drive.

Prioritized Bicycle System Plan

Table 7-5 summarizes the improvement projects that are included in the Bicycle System Plan. Their locations are shown in Figure 7-7. The projects are listed as high priority (construction in the next 0 to 5 years), medium priority (construction in the next 5 to 10 years), and low priority (construction in the next 10 to 20 years). As either state of city or other sources of funding become available, the bicycle system projects shall be constructed in the order of priority shown in Table 7-5. It should be noted that only one of these projects has identified funding (the Highway 242 multi-use path) and, therefore, the others are not committed and are subject to the City's ability to meet these needs financially.

TABLE 7-5
BICYCLE SYSTEM IMPROVEMENT PROJECTS

	Project	Priority	Cost (year 2001 dollars)	Financial Responsibility
1.	Highway 242 multi-use path	High	$80,000	Developers
2.	Locust Street Shoulders	High	$33,600	City of Sisters
3.	Add Bicycle Parking	High	$5,600	City of Sisters
4.	Directional Signs	High	$400	City of Sisters
5.	Jefferson Avenue Shoulders	High	$38,040	City of Sisters
6.	Jefferson Ave. multi-use path	High	$95,100	City of Sisters
7.	Pine Street Shoulders	High	$6,300	City of Sisters
8.	Locust Street multi-use path	High	$3,975	Developers
9.	Three Creeks Rd. Shoulders	Medium	$15,900	City of Sisters
10.	Squaw Creek multi-use path	Low	$40,000	Developers
11.	Coyote Springs multi-use path	Low	$20,000	Developers
12.	Larch Street Shoulders	Low	$23,700	City of Sisters

Transportation Demand Management Plan

Transportation Demand Management (TDM) is aimed at altering driver behavior and more efficient use of the entire transportation system. This can 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. The City of Sisters can work toward implementation of TDM measures through coordination with major employers, the Sisters Chamber of Commerce, employees, and citizens. Successful implementation includes public support, industry involvement, quantifiable goals, and employer/employee incentives.

Through transportation demand management, the peak travel demands can be reduced or spread to more efficiently use the transportation system, rather than building new or wider roadways. Techniques that have been successful and can be initiated to help alleviate some traffic congestion include alternative work schedules, carpooling and vanpooling, improved bicycle and pedestrian facilities, telecommuting, high-density employment areas, and participation in the Central Oregon Commute Options Program.

Alternative Work Schedules

Alternative work schedules (such as flex-time or staggered work hours), especially with large employers, can help spread the peak period traffic volumes over a longer time period, thus providing

greater service out of a fixed capacity roadway. Staggered work schedules shall continue to be encouraged with new industries.

Carpooling and Vanpooling

The City of Sisters can work with large employers to establish a carpool and vanpool program. These programs, especially oriented to workers living in other neighboring cities, will help to reduce the travel and parking requirements, and to reduce air pollution. Employers can encourage ridesharing by providing matching services, subsidizing vanpools, establishing preferential car and vanpool parking and convenient drop-off sites, and through other promotional incentives.

Improved Bicycle and Pedestrian Facilities

Implementing strategies discussed earlier in this plan could increase the bicycle and pedestrian mode shares. Providing bicycle parking, showers, and locker facilities helps to encourage bicycle commuting and walking to work.

Telecommuting

The ability for people to work at home with the telecommuting technology is likely to continue to grow during the next two decades. It is estimated that 2 to 3 percent of the work force could stay home and work, thus reducing peak hour journey-to-work trips.

High Density Employment Areas

TDM measures work best in areas of high density employment and are most successful when applied to firms with more than 50 employees. Potential target areas for TDM measures in Sisters include the central business district and the industrial area along Barclay Drive.

Central Oregon Commute Options Program

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 Central Oregon. 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 the City of Sisters comes from people who are currently not contributing to road capacity. These are people who are "transportation disadvantaged". Some citizens of Sisters are physically challenged, without a drivers license, elderly, or too young to drive. The City of Sisters 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. For a city the size of Sisters, only the "Level A" TDM measures may be appropriate.

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 (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 insuring 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 telecommute. This coordinator shall establish a TDM program for City employees, which will serve as a model for the community. The City shall:
    - 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 telecommuting.
    - 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 Deschutes County 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 Sisters faces and discuss options for Sisters. 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 Level B 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 will help accomplish the trip reduction goals.
4. Coordinate efforts and provide educational opportunities with the Sisters School District to reduce student and staff trips. This could be accomplished by:
   - Providing trail access to schools and priority bicycle parking for students and staff.
   - Working with the schools on a student parking management plan.
   - Working with administrators and students to develop incentives and disincentives.
   - Ensuring new schools are sited convenient for walking and bicycling within the neighborhood and that the schools contribute to land cost for locating adjacent paths.
   - Working 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.
5. Work with developers to create more bicycle and pedestrian friendly developments by:
   - Encouraging bicycle and pedestrian friendly developments (e.g. property-tight side walks on both sides of neighborhood streets, narrow streets, grid system, trails and access ways).
   - 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.
   - Separating sidewalks from roadways with appropriate landscaping.
6. Coordinate efforts with the Sisters Chamber of Commerce 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 Sisters.
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 and Redmond.
2. Support and coordinate with shuttle systems within the City of Sisters.
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 CIP:
    - Work with the Deschutes County 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.

Benchmarks

The following benchmarks were identified to measure the effectiveness of the TDM measures that the City of Sisters implements:

- 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 Sisters 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 employees will be contacted by June of 2005.
- TDM Coordinator will make a yearly presentation to the City Council.

Funding

The estimated program cost to implement all of Level A is $5,000 per year. The estimated program cost to implement all of Levels A and B is $75,000 per year. The estimated program cost to implement all of Levels A, B, and C is $100,000. As stated earlier, for a city the size of Sisters, only the Level A measures may be appropriate.

Public Transportation Plan

Local public transportation available in Sisters is the Dial-A-Ride service offered by Central Oregon Council on Aging (COCA). This service is operated and coordinated by COCA, and is also provided in Madras, Redmond, Bend, and La Pine. In Sisters, the service consists of door-to-door transport for senior citizens to medical appointments, shopping, and the senior meal site at the Sisters Community

Church. The service is provided every Tuesday from 8:30 a.m. to approximately 4:00 p.m., and does not range beyond the Sisters area. This service does serve outlying subdivisions such as Indian Ford and Tollgate, and is provided for a suggested donation of $3 per round trip. Every first and third Tuesday of the month a volunteer driver from the Interfaith Volunteer Caregivers provides door-to-door service from Sisters into Bend for shopping and other necessary services.

The Central Oregon Intergovernmental Council (COIC) has been working with COCA and other special needs transit providers and the City of Redmond to coordinate, link, and expand transit services within and between the cities of Bend, Redmond, Sisters, La Pine, Madras, and Prineville. This group, the Redmond Work Group, has established an intra-city coordination model and guidelines to expand transit services in Central Oregon. The long-term goals of the Redmond Work Group are to expand and improve inter and intra-city transit by linking existing services, forming new intra-agency relationships, securing funding, and educating the public.

A proposal expected to be implemented by 2001 is for the City of Redmond to operate and maintain a van owned by COCA that will provide three shuttle trips per day between the cities of Redmond and Bend. This service would be provided for a small fee and be available to all citizens. This proposal is titled Redmond Community Transportation. The exact routes have not been determined, but may include service from the Redmond Senior Center to the Mountain View Mall or St. Charles Medical Center in Bend.

Once this link is in place, other communities, such as Sisters, could provide connections from Sisters to the Redmond Community Transportation system, thereby facilitating transit from Sisters to Bend. Since the Dial-A-Ride program administered in Sisters is operated by COCA in Redmond, this proposal is likely to be implemented as the Redmond Community Transportation system matures.

A representative from the City of Sisters has been coordinating with the Redmond Work Group, and should continue to work with this and other transit interests, to develop and improve future transit programs. The City of Sisters is not supporting any other transit programs or proposals at this time. Proposals such as fixed route or city shuttle systems are too costly for the City to support in the immediate and near future. Other agencies and non-profit groups involved in transit issues that may be possible resources to develop transit in the future include other cities and school districts within Central Oregon, the Opportunity Foundation of Central Oregon, other Dial-A-Ride programs in Central Oregon, Prineville Soroptomists, Confederated Tribes of Warm Springs, Central Oregon Resources for Independent Living, Residential Assistance Program, Central Oregon Intergovernmental Council, Adult and Family Services, Head Start, Disabled American Veterans, SOAR, the Boys and Girls Club, local churches and civic groups, and fraternal organizations such as the Rotary Club.

The adopted Deschutes County Transportation System Plan (TSP) contains several goals and policies relating to public transportation. The Deschutes County TSP also has a roster of service providers in the Sisters area, both for local service and connection to longer distance carriers.

Section 5.3 of the Deschutes County TSP is the Deschutes County Public Transportation Plan. The plan recognizes the need for some form of rural transit, although the plan primarily focuses on north-south connections between Bend-Redmond and Bend-La Pine/Wickiup Junction. Goals #15-18 of the public transportation plan stress the need to enhance intermodal mobility, increase special services, establish rural transit in the county, and lower barriers to existing services. Policies #37-38 state Deschutes

County shall work with ODOT and the cities of Bend, Redmond, and Sisters as well as local transit service providers. Such work shall include exploring public transit opportunities and adding rideshare lots. The county, state, and cities shall strive to secure additional funding for special transit services and promote their availability. The county shall also monitor the needs of those who either due to age, medical conditions, mental or physical disability, income, etc., must rely on public transportation.

The following service providers offer local demand-response transportation. These services typically are not available to the general public and some require advance scheduling for pick-ups and drop-offs.

- City of Bend Dial-A-Ride
- Central Oregon Council on Aging (COCOA) Dial-A-Ride
- Opportunity Foundation of Central Oregon
- Residential Assistance Program (RAP)
- Volunteer Services
- Central Oregon Resources for Independent Living
- Access Express

While these provide local service, there are private-sector providers of long-distance public transportation in the county. These businesses offer linkages both east and west as well as connections to the north and south.

- Greyhound
- CAC Transportation
- The People Mover
- Porter Stage Lines
- Valley Retriever

Of these, Valley Retriever has a flagstop in Sisters. Both Valley Retriever and Porter Stage Line offer rail connections with Amtrak; Valley Retriever reaches the Salem and Albany depots and Porter Stage Line reaches the Eugene depot.

The Central Oregon Intergovernmental Council (COIC) wrote a June 1999 white paper titled *Regional Job Access: Welfare-to-Work Transportation Plan for Crook, Deschutes, Jefferson Counties.* Several aspects of the document are relevant to the City of Sisters. Of current firms that employ Adult and Family Services (AFS) clients, 182 are in Bend, 37 are in Redmond, and 11 are in Sisters. The numbers for potential employers of AFS clients are 946 in Bend, 271 in Redmond, and 65 in Sisters. This pattern exists for day care, medical care, and other social services.

Those without a personal automobile currently have a difficult time getting from Sisters to Bend or Redmond. Service for the elderly and disabled is only offered on Tuesdays during the day. Other providers offer two trips per month to Bend. The report does have several suggestions to make it easier for those without access to a personal vehicle to travel to/from Bend. These include contracting with Central Oregon Dial-A-Ride to allow Welfare to Work clients to use Dial-A-Ride, provide a Guaranteed Ride home service for commuters, and a "Wheels to Work" program for those in the Sisters area.

Rail Service Plan

The City of Sisters has no rail service.

Air Service Plan

There are no airports within the Sisters UGB, but the privately owned Sisters Eagle Airport is less than one mile north of the city at the intersection of Camp Polk Road and Barclay Drive. This airport is not a commercial airport, but does serve recreationalists, AirLife, the smokejumper training program, and search and rescue.

The Redmond Municipal Airport, a commercial airfield, is located in Redmond approximately 20 miles east of Sisters.

Pipeline Service Plan

The City of Sisters has no pipeline service.

Water Transportation Plan

The City of Sisters has no water transportation service.

TRANSPORTATION SYSTEM PLAN IMPLEMENTATION PROGRAM

Implementation of the Sisters Transportation System Plan will require both changes to the Comprehensive Plan, Subdivision Ordinance, and Zoning Ordinance and preparation of a 20-year Capital Improvement Plan. These actions will enable the City of Sisters to address both existing and emerging transportation issues throughout the city in a timely and cost-effective manner. This implementation program is geared towards providing the City of Sisters with the tools to amend the Comprehensive Plan, Subdivision Ordinance and Zoning Ordinance to conform with the Oregon Transportation Planning Rule and to fund and schedule transportation system improvements.

One part of the implementation program is the formulation of a 20-year Capital Improvement Plan (CIP). The purpose of the CIP is to detail what transportation system improvements will be needed as the City of Sisters grows and provide a process to fund and schedule the identified transportation system improvements. It is expected that the Transportation System Plan Capital Improvement Plan can be integrated into the existing City CIP and the ODOT STIP. This integration is important since the Transportation System Plan proposes that both governmental agencies will fund some of the transportation improvement projects.

Policy and ordinance language that conforms with the requirements of the Transportation Planning Rule is included in Chapter 9. The proposed ordinance amendments will require approval by the Planning Commission.

20-Year Capital Improvement Program

The CIP is shown with the following priorities:

- High Priority (implement in the next 0 to 5 years)
- Medium Priority (implement in 5 to 10 years)
- Low Priority (implement in 10 to 20 years)

These priorities are based on current need, the relationship between transportation service needs, and the expected growth of the City. The following schedule indicates priorities and may be modified to reflect the availability of finances or the actual growth in population and employment.

The CIP is summarized in Table 7-6.

The cost of each project as listed in the CIP is shown in year 2001 dollars. These costs include design, construction, and some contingency costs. They are preliminary estimates and do not include right-of-way acquisition, water or sewer facilities, or detailed intersection design.

The City of Sisters has identified transportation needs totaling $7.2 million. The needs which are footnoted as being STIP projects have identified funding. It should be noted that not all of the high priority needs have identified funding and, therefore, are not committed and are subject to the City's and ODOT's abilities to meet these needs financially.

TABLE 7-6
PRIORITIZED CAPITAL IMPROVEMENT PROGRAM

Project Description	City of Sisters Costs	ODOT Costs	Developer Costs	Total Costs (Year 2001 $)
High Priority				
Locust Street Traffic Signal	$0	$0	$150,000[1]	$150,000[1]
Barclay Drive Extension	$0	$700,000[2]	$0	$700,000[2]
Barclay Drive Traffic Signal	$0	$0	$150,000[3]	$150,000[3]
Realign Intersection of Highways 242/20	$0	$155,000[4]	$0	$155,000[4]
Realign Intersection of Highways 20/126	$0	$220,000[5]	$0	$220,000[5]
Moveable Variable Message Signs (two)	$60,000[6]	$0	$0	$60,000[6]
Fixed Variable Message Sign	$0	$120,000[7]	$0	$120,000[7]
Pavement Overlay on OR Highway 126	$0	$1,227,000[8]	$0	$1,227,000[8]
Timber Creek Subdivision Streets	$0	$0	$254,900	$254,900
New Road between Tamarack and Rope	$165,000	$0	$165,000	$330,000
Add Curb Extensions on Cascade Avenue	$0	$30,000	$0	$30,000
Widen Cascade Avenue Sidewalks	$0	$59,400	$0	$59,400
Add Cascade Avenue Sidewalks	$0	$43,560	$0	$43,560
Add Hood and Main Avenue Sidewalks	$51,810	$0	$0	$51,810
Enhance Crosswalks	$11,200	$0	$0	$11,200
Highway 242 Multi-use Path	$0	$0	$80,000	$80,000
Locust Street Shoulders	$33,600	$0	$0	$33,600
Add Bicycle Parking	$5,600	$0	$0	$5,600
Install Directional Signs for Bicyclists	$400	$0	$0	$400
Jefferson Avenue Shoulders	$38,040	$0	$0	$38,040
Jefferson Avenue Multi-use Path	$95,100	$0	$0	$95,100
Pine Street Shoulders	$6,300	$0	$0	$6,300
Locust Street Multi-use Path	$0	$0	$3,975	$3,975
Implement "Level A" TDM Measures	$25,000[9]	$0	$0	$25,000[9]
Total High Priority	***$492,050***	***$2,554,960***	***$803,875***	***$3,850,885***
Medium Priority				
Realign Jefferson Ave. and Hwy 20/126	$30,000	$0	$0	$30,000
Jefferson Avenue Extension	$0	$0	$180,000	$180,000
Coyote Springs Road	$0	$0	$560,000	$560,000
Three Creeks Road Shoulders	$15,900	$0	$0	$15,900
Implement "Level A" TDM Measures	$25,000[9]	$0	$0	$25,000[9]
Total Medium Priority	***$70,900***	***$0***	***$740,000***	***$810,900***
Low Priority				
Extend Cowboy Street	$0	$0	$80,000	$80,000
Extend Black Butte Avenue	$0	$0	$264,000	$264,000
Extend Fir Street	$0	$0	$132,000	$132,000
Highway Couplet	$0	$1,980,000	$0	$1,980,000
Squaw Creek Multi-use Path	$0	$0	$40,000	$40,000
Coyote Springs Multi-use Path	$0	$0	$20,000	$20,000
Larch Street Shoulders	$23,700	$0	$0	$23,700
Implement "Level A" TDM Measures	$50,000[9]	$0	$0	$50,000[9]
Total Low Priority	***$73,700***	***$1,980,000***	***$536,000***	***$2,589,700***
TOTAL OF ALL PROJECTS	**$636,650**	**$4,534,960**	**$2,079,875**	**$7,251,485**

Notes on Table 7-6 are shown on the following page

Notes on Table 7-6:

(1) $150,000 is funded through agreements with developers.
(2) $700,000 is funded by an ODOT local street improvement grant.
(3) $150,000 is funded through agreements with developers.
(4) $155,000 is funded in the Final 2000-2003 STIP.
(5) $220,000 is funded in the Final 2000-2003 STIP.
(6) A grant for $50,000 was applied for.
(7) $120,000 is funded in the Final 2000-2003 STIP.
(8) $1,227,000 is funded in the Draft 2002-2005 STIP.
(9) "Level A" TDM measures are expected to cost $5,000 per year.

CHAPTER 8: FINANCIAL PLAN

The Transportation Planning Rule requires Transportation System Plans to include an evaluation of the funding environment for recommended improvements. This evaluation must include a listing of all recommended transportation improvement projects, estimated costs to implement those improvements, and a review of potential funding mechanisms. The City of Sisters TSP identifies specific capital improvement projects and strategic management practices over the next 20 years. This section of this TSP provides an overview of some funding and financing options that may be available to Sisters to fund these improvements.

Pressures from increasing growth throughout much of Oregon have created an environment of planned improvements that remain unfunded. Sisters will need to work with ODOT to finance the proposed new transportation projects over the 20-year planning horizon. The actual timing of these projects will be determined by the rate of population and employment growth actually experienced by the community. This TSP assumes Sisters will grow at the rate forecast by the State of Oregon Office of Economic Analysis over the next 20 years. If population growth exceeds this rate, the improvements may need to be accelerated. Slower than expected growth will relax the improvement schedule.

HISTORIC STREET IMPROVEMENT FUNDING SOURCES

In Oregon, state, county, and city jurisdictions work together to coordinate transportation improvements. Table 8-1 shows the distribution of road revenues for the different levels of government within the state by jurisdiction level. Although these numbers were collected and tallied in 1991, ODOT estimates that these figures accurately represent the current revenue structure for transportation-related needs.

TABLE 8-1

SOURCES OF ROAD REVENUES BY JURISDICTION LEVEL

	Jurisdictions			Statewide Total
Revenue Source	State	County	City	
Federal Road	34%	40%	4%	30%
State Road Trust	58%	38%	41%	48%
Local	0%	22%	55%	17%
Other	9%	0%	0%	4%

At the statewide level, nearly half (48 percent in Fiscal Year 1991) of all road-related revenues are attributable to the State Highway Fund, whose sources of revenue include fuel taxes, weight-mile taxes on trucks, and vehicle registration fees. As shown in Table 8-1, the State Road Trust is a considerable source of revenue for all levels of government. Federal sources (generally the Federal Highway Trust account and Federal Forest Revenues) comprise another 30 percent of all road-related revenue. The remaining sources of road-related revenues are generated locally, including property taxes, LIDs, bonds, traffic impact fees, road user taxes, general fund transfers, receipts from other local governments, and other sources.

As a state, Oregon generates 94 percent of its highway revenues from user fees, compared to an average of 78 percent among all states. This fee system, including fuel taxes, weight distance charges, and

registration fees, is regarded as equitable because it places the greatest financial burden upon those who create the greatest need for road maintenance and improvements. Unlike many states that have indexed user fees to inflation, Oregon has static road-revenue sources. For example, rather than assessing fuel taxes as a **percentage** of price per gallon, Oregon's fuel tax is a fixed amount (currently 24 cents) per gallon.

This chapter describes existing sources of transportation funding in Sisters, the outlook for revenue from those funding sources, and potential sources of additional transportation revenue.

EXISTING TRANSPORTATION FUNDING IN SISTERS

Federal, state, and local revenue sources contribute funding for transportation improvements in Sisters. These funds are tracked in budgets and documents at the state and local level. The description of existing funding sources begins with the Street Fund from the City's budget. The Street Fund tracks funds that flow through the City of Sisters from local, state, and federal sources. These funds are spent to maintain and improve the City's transportation system.

Street Fund

Table 8-2 shows revenues in the City's Street Fund for the current year and previous three years. Total annual revenue in the Street Fund has fluctuated between $63,177 and $98,289 over the past three years. Revenue is expected to increase by over $1 million in 2000-01 due to funding from state and local sources for Barclay Way improvements. Based on the 2000-01 proposed budget, the major sources of revenue in the Street Fund are the:

- *ODOT Local Street Improvement Grant* (62% of current revenue), for the construction of Barclay Way.
- *Barclay Meadows Improvement* (14% of current revenue), to be contributed by a developer for intersection improvements related to the Barclay Meadows development.
- *Sisters School Improvement* (14% of current revenue), to be contributed by the Sisters School District for improvements related to development of school-owned land north of Barclay Drive.

These three revenue sources, all of which relate to the Barclay Way development, make up 92% of the city's proposed budget for 2000-01. This project dwarfs the typical budget of the Street Fund in preceding years. If revenue related to the Barclay Way development is not considered, the primary revenue sources are as follows:

- *State Highway Fund* (42% of current revenue), which are gas tax and weight-mile fee revenues that are distributed by ODOT to cities and counties based on population and vehicle registrations. Revenue from this source increased 18%, from $33,530 to $39,590, from 1997-98 to 2000-01.
- *Deschutes County Public Works* (27% of current revenue), paid by Deschutes County in exchange for the city's maintenance of county roads within the city's boundaries.
- *Small County Allotment Grant* (27% of current revenue), which is paid from the state to Deschutes County, and then transferred to Sisters.

Together, these three revenue sources contribute 96% of current revenue that is not related to the Barclay Way project in the 2000-01 proposed Street Fund budget.

TABLE 8-2
CITY OF SISTERS STREET FUND REVENUES (CURRENT DOLLARS)

	97-98	*98-99*	*99-00*	*00-01 (proposed)*
Revenues				
interest earned	$3,353.00	$2,246.00	$5,352.61	$4,000.00
bike/footpath-gas tax	$339.00	$360.00	$392.42	$400.00
added hwy tax measure 82				$9,035.00
miscellaneous	$955.00		$465.89	
county lottery grant				
old fashioned street lights			$4,401.67	$5,000.00
transfers from other funds				
highway gas tax	$33,530.00	$35,683.00	$38,845.80	$39,590.00
deschutes county public works		$60,000.00	$25,000.00	$25,000.00
sca grant	$25,000.00			$25,000.00
odot grant barclay way				$700,000.00
barclay meadows improvement				$152,295.00
sisters school improvement				$158,345.00
carry forward cash balance		$44,440.00		$99,705.00
bike/footpath reserve		$1,790.00		$2,509.00
total revenues	$63,177.00	$144,519.00	$74,458.39	$1,220,879.00

Expenditures from the Street Fund are shown in Table 8-3. The proposed 2000-01 budget, excluding capital improvements related to Barclay Way, distributes expenditures as follows:

- *Operating Contingency* (46% of proposed expenditures).
- *Personal Services* (16%). This line item has increased from $23,271 to $33,851 from 1997-98 to 2000-01.
- *Materials and Supplies* (17%). This line item has fluctuated between $19,406 in 1998-99 and $34,882 in 2000-01.
- *Capital Improvements* (16%). Not including the proposed Barclay Way improvements, capital improvements have fluctuated between $1,567 in 1998-99 and $54,075 in 1997-98.

TABLE 8-3
CITY OF SISTERS STREET FUND EXPENDITURES (CURRENT DOLLARS)

EXPENDITURES	97-98	98-99	99-00	00-01(proposed)
personal services	$23,281.00	$23,446.00	$28,033.50	$33,851.00
materials & supplies	$22,710.00	$19,406.00	$24,754.80	$34,882.00
capital improvements	$54,075.00	$1,567.00	$2,271.10	$1,044,149.00
transfers	$3,500.00	$4,000.00	$10,000.00	$10,000.00
operating contingency	$0.00	$0.00	$0.00	$97,997.00
total expenditures	*$103,566.00*	*$48,419.00*	*$65,059.40*	*$1,220,879.00*

OUTLOOK FOR CAPITAL IMPROVEMENT FUNDING

State Highway Fund

Sisters, like many Oregon cities, is highly dependent on state funding for road maintenance and capital improvements. A significant source of state funding is the State Highway Fund, which consists of gas taxes, vehicle registration fees, overweight/overheight fines and weight/mile taxes collected by ODOT, and which is then partially returned to cities and counties through an allocation formula. The revenue share to cities is divided among all incorporated cities based on population.

Sisters has received a small share of State Highway Fund revenues in the past couple years – around $35,000 annually – because of its small population. Consequently, it must rely on other state sources (for example, the upcoming grant for the Barclay improvements) for capital funding of large projects. Sisters has, in the past two years, spent only a small amount of its State Highway Fund dollars on capital funding. Sisters' capital outlay is about 4% of its state highway fund allocation.

ODOT's Financial Services section has projected revenue for the State Highway Fund through the fiscal year 2006-07. This projection is based on current laws and holds fees and taxes constant. The revenue projection is presented in Table 8-4.

TABLE 8-4

STATE HIGHWAY FUND REVENUE (CURRENT DOLLARS)

	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07
				Millions $				
Weight Mile & Truck Reg.	$239.2	$226.6	$222.8	$228.9	$234.6	$242.0	$250.0	$257.2
Motor Fuels Tax	$394.3	$396.1	$402.0	$406.9	$411.6	$416.0	$420.5	$424.6
Registrations/Licensing/DMV	$88.6	$91.2	$92.0	$94.5	$96.0	$97.9	$98.1	$98.7
Driver Licenses	$180.0	$23.4	$25.7	$25.8	$26.2	$25.4	$25.6	$25.8
Road use Assessment Fees	$0.8	$0.7	$0.7	$0.7	$0.7	$0.7	$0.7	$0.7
Total Gross Hwy Fund	*$741.0*	*$738.1*	*$743.2*	*$756.8*	*$769.2*	*$782.0*	*$794.8*	*$807.4*
Collection, Programs & Transfers	(110.9)	(118.0)	(112.9)	(115.0)	(115.8)	(112.4)	(122.4)	(126.8)
Net Revenue to HWY Fund	*$630.1*	*$620.0*	*$630.3*	*$641.9*	*$653.4*	*$659.5*	*$672.5*	*$680.2*

Source: Oregon Department of Transportation

It is difficult to project revenue beyond 2007. The last projection to 2020 was done by ODOT in May 1998. In its Financial Assumptions document prepared at that time, ODOT considered not only the continuation of current law, but also the following set of assumptions about how fees and taxes might increase:

- Fuel tax will increase 1 cent per gallon per year (beginning in year 2002), with an additional 1 cent per gallon every fourth year;
- Vehicle registration fees will be increased by $10 per year in 2002, and by $15 per year in year 2012;
- Revenues will fall halfway between the revenue-level generated without TPR and the revenue level if TPR goals were fully met. TPR is the state goal of a ten-percent reduction in per-capita vehicle miles of travel (VMT) in MPO planning areas by year 2015, and a 20-percent reduction by year 2025);
- Revenue from new funding mechanisms will be shared among the state, counties, and cities on a "50-30-20 percent" basis rather than the previous "60.05-24.38-15.17 percent" basis;
- Inflation occurs at an average annual rate of 3.6 percent (since lowered to 3.1% in a revision of federal aid estimates by ODOT in April 2000).

The projection based on the above assumptions causes the State Highway Fund to increase more slowly than inflation early in the planning horizon until fuel-tax and vehicle-registration fee increases occur in year 2002, then increase somewhat faster than inflation through year 2015, then (again) more slowly than inflation. Without fee increases, in contrast, revenues will still grow due to increases in the vehicle fleet and miles traveled, but may not keep pace with inflation.

Based on these projections of State Highway Fund revenue, and assuming that Sisters grows at approximately the same rate as other Oregon cities, estimated resources available from the State Highway Fund to Sisters for all operations, maintenance, and capital outlay purposes will remain at about $35,000 annually (in 2000 dollars). If fees and taxes are not increased, the amount may not keep pace with inflation and may be less in 2001 dollars.

As mentioned above, Sisters has tended to spend only a small amount of its highway fund dollars on capital funding, about 4% of its state highway fund allocation. If this percentage remains stable, Sisters can expect to have around $1,900 (in 2000 dollars) available annually from the state highway fund for capital improvements.

Outlook For Other Capital Funding Sources

Because of its small population, Sisters must look beyond State Highway Fund allocations for capital funding of large projects. Other state programs are described later in this chapter. The outlook for state funding programs is expected to be stable.

Sisters does not, unlike some other cities in Oregon, fund capital transportation improvements with local sources, such as system development charges (SDCs), franchise fees, or utility fees. As such, no prognosis of revenue growth can be given. The next section of this chapter shows how the capital improvement projects included in the TSP stack up against the small amount of funding expected from the State Highway Fund. The implications are that Sisters will need to continue to obtain state funds other than its State Highway Fund allocation, and possibly develop some new local sources of funding, to pay for the capital improvements in its TSP.

PROJECT COSTS IN THE TSP

Table 8-5 shows the total project costs in the Sisters TSP by project phase and by financial responsibility. (The detailed cost for each specific project is shown in Table 7-6.) Project costs are estimated by what it would cost to construct them this year, so the project costs are in year 2001 dollars. Total project costs in the TSP for the twenty-year planning period are almost $6 million. Most of the costs have been assigned to ODOT and developers. The City of Sisters will be responsible for less than 6 percent of the total costs.

TABLE 8-5

SUMMARY OF TOTAL PROJECT COSTS IN THE SISTERS TSP (2001 DOLLARS)

Project Priority	City of Sisters Costs	ODOT Costs	Developer Costs	Total Costs (Year 2001 $)
High Priority	$187,610	$2,334,960	$380,000	$2,902,570
Medium Priority	$70,900	$0	$1,000,000	$1,070,900
Low Priority	$73,700	$990,000	$866,000	$1,929,700
Total	**$332,210**	**$3,324,960**	**$2,246,000**	**$5,903,170**

Some of the High Priority projects included in Table 8-5 have identified funding. Those are projects that are either funded in ODOT's STIP, are funded by agreements between the City and developers, or by grants that the City has been awarded. (Table 7-6 shows the specifics of which projects are funded.) A summary of the unfunded projects is shown in Table 8-6, which indicates that the City of Sisters faces a funding shortfall.

In order to finance the recommended transportation system improvements, it will be necessary to consider a range of funding sources. The alternative revenue sources described in the following section may not all be appropriate in Sisters; however, the information is provided to illustrate the range of options currently available to finance transportation improvements during the next 20 years.

TABLE 8-6

SUMMARY OF UNFUNDED PROJECT COSTS IN THE SISTERS TSP (2001 DOLLARS)

Project Priority	City of Sisters Costs	ODOT Costs	Developer Costs	Total Costs (Year 2001 $)
High Priority	$127,610	$132,960	$80,000	$340,570
Medium Priority	$70,900	$0	$1,000,000	$1,070,900
Low Priority	$73,700	$990,000	$866,000	$1,929,700
Total	**$272,210**	**$1,122,960**	**$1,946,000**	**$3,341,170**

POTENTIAL SOURCES OF ADDITIONAL REVENUE

Criteria For Choosing Potential Funding Sources

Transportation improvements are funded by a wide variety of programs and sources at the state and local levels. Potential funding sources are evaluated by two primary criteria: *financial capacity* (can the source pay for the improvements?) and *political acceptability* (is the source politically acceptable to the citizens of Sisters?). A critical issue for political acceptability is who pays for the funding source – in general, citizens of Sisters will prefer federal and state funding for improvements over local sources. If local sources must be used, a basic principle of public finance is that the people should pay based on either the costs they impose or the benefits they receive, unless they belong to some group that deserves special treatment. The public is much more likely to support programs such as System Development Charges or assessments that place the financial burden on those who benefit most from an improvement. If charging people who benefit from an improvement is not feasible or the benefits are widespread, funding sources that spread the cost out among a large number of people may be acceptable because of the low cost to individuals.

The standard criteria for evaluating potential funding sources also include legal authority, stability, and administrative costs. The legal authority and administrative feasibility criteria are addressed by considering only funding sources currently used in Oregon, and assessing the *financial capacity* of funding sources in this section.

Given the consideration of who pays and the perspective of citizens in the City of Sisters, it is expected that the City will pursue funding sources for transportation improvements in the following order:

- Use federal, state, or county funds first. Try to get more projects or funds from ODOT (which distributes state and federal funds), or tie what might otherwise be local projects (e.g., sidewalks and bike paths) to federal or state highway projects.

- For the remaining projects that primarily benefit specific areas, charge property owners (through local improvement districts or special assessments) or new development (through land use requirements and System Development Charges) where possible and appropriate.
- For remaining projects that do not directly benefit property owners or new development that is willing to pay for the project, make sure that they are needed and that the design options have considered lower-cost alternatives.
- Pay for remaining projects out of existing revenue sources if possible.
- If additional revenue is needed beyond existing revenue sources, implement new funding mechanisms, based on a consideration of financial capacity, who pays, and the other criteria described above. Some new fees or taxes (such as tolls, vehicle registration fees, street utility fees, and fuel taxes) are based on use of the transportation system, while others (such as property taxes) charge residents regardless of their use of the transportation system. Some funding sources (such as tolls and fuel taxes) spread some of the cost to non-residents. Many new funding mechanisms would need voter approval.
- If raising additional revenue is not politically acceptable, scale back or eliminate the proposed improvements.

Local Revenue Sources

Property Taxes

Property taxes have historically been the primary revenue source for local governments. Most counties and cities in Oregon avoid using general property tax revenues to fund transportation maintenance, but occasionally use property tax revenue to fund capital improvements for transportation. Capital improvements are typically funded by a serial levy that implements additional property taxes for a set period of time, often for a specified set of projects. Serial levies must be approved by voters. In Oregon, Washington County has been relatively successful with serial levies for specific transportation improvements (in contrast to other jurisdictions that have been unsuccessful with levies for unspecified projects).

Property taxes can be levied through: 1) tax base levies, 2) serial levies, and 3) bond levies. The most common method uses tax base levies which do not expire and are allowed to increase annually. Serial levies are limited by the amount and time they can be imposed. Bond levies are for specific projects and are limited by time based on the debt load of the local government or the project.

The dependence of local governments on property taxes for non-transportation revenue is partly due to the fact that property taxes are easy to implement and enforce. Property taxes are based on real property (i.e., land and buildings) which has a predictable value and appreciation to base taxes upon. This contrasts with income or sales taxes, which can fluctuate with economic trends or unforeseen events.

The historic dependence on property taxes is changing with the passage of Ballot Measure 5 in the early 1990s. Ballot Measure 5 limits the property tax rate for purposes other than payment of certain voter-approved general obligation indebtedness. Under full implementation, the tax rate for all local taxing authorities is limited to $15 per $1,000 of assessed valuation. As a group, all non-school taxing authorities are limited to $10 per $1,000 of assessed valuation. All tax base, serial, and special levies are subject to the tax rate limitation. Ballot Measure 5 requires that all non-school taxing districts' property

tax rate be reduced if together they exceed $10 per $1,000 per assessed valuation by the county. If the non-debt tax rate exceeds the constitutional limit of $10 per $1,000 of assessed valuation, then all of the taxing districts' tax rates are reduced on a proportional basis. The proportional reduction in the tax rate is commonly referred to as compression of the tax rate.

Measure 47, an initiative petition, was passed by Oregon voters in November 1996. It is a constitutional amendment that reduces and limits property taxes and limits local revenues and replacement fees. The measure limits 1997-98 property taxes to the lesser of the 1995-96 tax minus 10 percent, or the 1994-95 tax. It limits future annual property tax increases to three percent, with exceptions. Local governments' lost revenue may be replaced only with state income tax, unless voters approve replacement fees or charges. Tax levy approvals in certain elections require 50 percent voter participation.

The state legislature created Measure 50, which retains the tax relief of Measure 47 but clarifies some legal issues. This revised tax measure was approved by voters in May 1997.

Measure 50 adds another layer of restrictions to those which govern the adoption of tax bases and levies outside the tax base, as well as Measure 5's tax rate limits for schools and non-schools and tax rate exceptions for voter approved debt. Each new levy and the imposition of a property tax must be tested against a longer series of criteria before the collectible tax amount on a parcel of property can be determined.

Franchise Fees

These are annual fees paid by TV cable, electricity, and telephone utilities for the use of the City right-of-way. Ashland is an example of a city that imposes these fees; in Ashland, they total approximately $350,000 annually.

Utility Fees

A street utility fee would charge businesses and residences in Sisters a fee for use of streets, based on the amount of use typically generated by each type of land use. This fee is similar to those charged for water and sewer utility service, and it would not be subject to the limits of Measure 5. Cities in Oregon that charge a street utility fee include Ashland and Medford, and a typical fee is $2/month for a single-family residence. Revenue from this source can only be used for maintenance of streets, but this would free up other funds to use for capital improvements such as the projects in the TSP.

System Development Charges

System Development Charges (SDCs) are becoming increasingly popular for funding public works infrastructure needed for new local development. Generally, the purpose of a System Development Charge is to allocate portions of the costs associated with capital improvements on the developments, which increase demands on transportation, sewer or other infrastructure systems.

Local governments have the legal authority to charge property owners and/or developers fees for improving local public works infrastructure to meet the projected demand resulting from their developments. Charges are most often targeted toward improving community water, sewer, or transportation systems. In order to collect SDCs, cities and counties must have specific infrastructure plans in place that comply with state guidelines.

Typically, an SDC is collected when new building permits are issued. Transportation SDCs are based on trip generation of the proposed development. Residential calculations would be based on the assumption that a typical household will generate a given number of vehicle trips per day. Nonresidential use calculations are based on employee ratios for the type of business or industrial uses. SDC revenues would help fund the construction of transportation facilities necessitated by new development. A key legislative requirement for charging SDCs is the link between the need for the improvements and the developments being charged.

Some economists have criticized the prevalent SDC methodology, which charges property owners rather than road users. The road users, as the argument goes, are the ones who receive the benefit of traveling by road and therefore ought to be the ones who pay for the roads, rather than the property owners whose activities generate or attract traffic.

Local Gas Taxes

The Oregon Constitution permits counties and incorporated cities to levy additional local gas taxes with the stipulation that the money generated from the taxes will be dedicated to street-related improvements and maintenance within the jurisdiction. At present, only a few local governments (including the cities of Woodburn, Tillamook, and The Dalles; and Multnomah and Washington Counties) levy a local gas tax. An increase in the cost differential between gas purchased in Sisters and gas purchased in neighboring areas may encourage drivers to seek less expensive fuel elsewhere. Local option gas taxes require citywide voter approval under current state statutes. These taxes are often strongly opposed by area gasoline retailers who fear the tax will reduce sales. Most local option gas taxes proposed in Oregon have not been approved by voters.

Local gas taxes typically range from $.01 to $.03 per gallon (compared to $0.183 per gallon federal and $0.24 state). Revenues from a gas tax are typically substantial and relatively stable. A $0.01 tax in the City of Woodburn generates over $97,000/year; a $0.01 tax in the City of Sisters would generate less due to the smaller population and less through-traffic. A portion of this funding, possibly a very high proportion in Sisters, would be paid by non-residents passing through the City.

Vehicle Registration Fees

The Oregon Vehicle Registration Fee is allocated to the state, counties and cities for road funding. Oregon counties are granted authority to impose a vehicle registration fee covering the entire county. The Oregon Revised Statutes allow Deschutes County to impose a biannual registration fee for all passenger cars licensed within the county. Although both counties and special districts have this legal authority, vehicle registration fees have not been imposed by local jurisdictions. In order for a local vehicle registration fee program to be viable in Deschutes County, all the incorporated cities and the county would need to formulate an agreement which details how the fees will be spent on future street construction and maintenance.

Local Improvement Districts

The Oregon Revised Statutes allow local governments to form Local Improvement Districts (LIDs) to construct public improvements. LIDs are most often used by cities to construct localized projects such as streets, sidewalks or bikeways. The statutes allow formation of a district by either the local

government or property owners. Cities that use LIDs are required to have a local LID ordinance that provides a process for district formation and payback provisions. Through the LID process, the cost of local improvements are generally spread out among a group of property owners within a specified area. The cost can be allocated based on property frontage or other methods such as trip generation. The types of allocation methods are only limited by the Local Improvement Ordinance. The cost of LID participation is considered an assessment against the property which is a lien equivalent to a tax lien. Individual property owners typically have the option of paying the assessment in cash or applying for assessment financing through the local government. Since the passage of Ballot Measure 5, cities have most often funded local improvement districts through the sale of special assessment bonds.

State and Federal Funding

There is a variety of state and federal grant and loan programs available, most with specific requirements related to economic development or specific transportation issues, rather than for the general construction of new streets. Many programs require a match from the local jurisdiction as a condition of approval. Because grant and loan programs are subject to change as well as statewide competition, they should not be considered a secure long-term funding source for Sisters. Most of the programs available for transportation projects are funded and administered through ODOT and/or the Oregon Economic and Community Development Department (OECDD). Some programs that may be appropriate for Sisters are described below.

STIP Program

Projects on state highways in Sisters may be funded directly by ODOT through the *Statewide Transportation Improvement Program* (STIP). The STIP outlines the schedule for ODOT projects throughout the state. The STIP, which identifies projects for a three-year funding cycle, is updated on an annual basis. In developing this funding program, ODOT must verify that the identified projects comply with the Oregon Transportation Plan (OTP), ODOT Modal Plans, Corridor Plans, local comprehensive plans, and TEA-21 Planning Requirements. The STIP must fulfill TEA-21 planning requirements for a staged, multi-year, statewide, intermodal program of transportation projects. Specific transportation projects are prioritized based on a review of the TEA-21 planning requirements and the different state plans. ODOT consults with local jurisdictions before highway related projects are added to the STIP.

The highway-related projects identified in Sisters' TSP will be considered for future inclusion on the STIP. The timing of including specific projects will be determined by ODOT based on an analysis of all the project needs within Region 4. Sisters and ODOT will need to communicate on an annual basis to review the status of the STIP and the prioritization of individual projects within the project area. Ongoing communication will be important for the city, county, and ODOT to coordinate the construction of both local and state transportation projects.

ODOT also has the option of carrying out some highway improvements as part of its ongoing highway maintenance program. Types of road construction projects that can be included within the ODOT maintenance programs are intersection realignments, additional turn lanes, and striping for bike lanes. Maintenance-related construction projects are usually conducted by ODOT field crews using state equipment. The maintenance crews do not have the staff or specialized road equipment needed for large construction projects. There is a legislative limit on the amount of money ODOT maintenance crews can spend to do highway improvements. The size of a public improvement that the local ODOT district

office can do outright with ODOT staff is $125,000. Projects exceeding $125,000 in cost are subject to the rules in ORS 279.023, "Least Cost Policy for Public Improvements."

An important change that occurred with the passage of ISTEA and TEA-21 was the widening of criteria for federal funding. ODOT now has the authority and ability to use federal dollars for transportation projects that are located outside the boundaries of the highway corridors. Many programs can now be used to fund local system improvements that reduce traffic on state highways or reduce the number of access points for future development along state highways.

Local Street Improvement Grants

This program was created by the 1999 state legislature and makes a one-time sum of $30 million available for local street improvements. Sisters has applied for a $700,000 grant for the Barclay Way improvements under this program for FY 2000-01.

Bike-Pedestrian Grants

By law (ORS 366.514), all road, street or highway construction or reconstruction projects must include facilities for pedestrians and bicyclists, with some exceptions. ODOT's Bike and Pedestrian Program assists in the development of walking and bicycling improvements. Cities and counties with projects on local streets or urban state highways are eligible for local grant funds. A 20% local match is not required but is looked upon favorably. Eligible projects include curb extensions, pedestrian crossings and intersection improvements, widening shoulders and restriping existing roads for bike lanes. The program is limited to projects costing up to $100,000. Projects that cost more than $100,000, require right-of-way acquisition, or generate environmental impacts should be submitted to ODOT for inclusion in the STIP.

Transportation Enhancement Program

This federally funded program earmarks 10% of state Surface Transportation Program (STP) funds, up to $8 million annually in Oregon, for projects that relate to 12 categories in the Transportation Equity Act for the 21st Century (TEA-21). Projects must demonstrate a link to the intermodal transportation system, compatibility with approved plans, and local financial support. About $5 million of Oregon's $8 million annually is transferred by ODOT to local governments.

A 10.27 percent local match is required for eligibility, and each proposed project is evaluated against all other proposed projects in its region. Within the five Oregon regions, the funds are distributed on a formula based on population, vehicle miles traveled, number of vehicles registered and other transportation-related criteria.

January 29, 1999 was the application deadline for projects to be included in the 2000-02 funding cycle. The next round of applications will occur in February-May 2002 for projects beginning in fiscal year 2004.

Highway Bridge Rehabilitation or Replacement Program

The Highway Bridge Rehabilitation or Replacement Program (HBRR) provides federal funding for the replacement and rehabilitation of bridges of all functional classifications. A portion of the HBRR

funding is allocated for the improvement of bridges under local jurisdiction. A quantitative ranking system is applied to the proposed projects based on their sufficiency rating, cost factor, and load capacity. They are ranked against other projects statewide, and require state and local matches of 10 percent each. The HBRR includes the Local Bridge Inspection Program and the Bridge Load Rating Program.

Transportation Safety Grant Program

Managed by ODOT's Transportation Safety Section (TSS), this program's objective is to reduce the number of transportation-related accidents and fatalities by coordinating a number of statewide programs. These funds are intended to be used as seed money, funding a program for three years. Eligible programs include those relating to impaired driving, occupant protection, youth, pedestrians, speed, enforcement, and bicycle and motorcycle safety. Capital construction is not considered for funding.

Every year, TSS produces a Highway Safety Plan that identifies the major safety programs, suggests countermeasures, and lists successful projects selected for funding, rather than granting funds through an application process. The program totals $6 million annually, and requires a sliding scale local match.

Special Transportation Fund

The Special Transportation Fund (STF) awards funds to maintain, develop, and improve transportation services for people with disabilities and people over 60 years of age. The funds are awarded to mass transit districts, transportation districts, and where no such districts exist, to counties. Three-quarters of these funds are distributed on a per-capita formula, and the remaining funds are distributed on a discretionary and competitive basis.

Sisters is eligible for STF funding. Since the funds are distributed by the County, the City of Sisters would have to bring a project proposal to the County. The County disburses the funds and meets with a county-wide committee to prioritize and evaluate projects. The City of Sisters could make an argument that they should get some of the county funds because the City is a service center for several thousand people living outside the UGB.

The STIP process could provide a vehicle for the community to use for general public transit. The Special Transportation Fund can be used for operating expenses in an amount equal to the percentage of its eligible population that uses the service, and general public money could be used for general public operations. A vanpool or shuttle could leave at the peak commute time from the park and ride lot and travel to Bend. The shuttle could go to the hospital, the shopping malls, and downtown. There would then be three options for returning: either in the evening with the shuttle or later in the morning or early afternoon on one of the other intercity carriers.

Financed by a two-cent tax on each pack of cigarettes sold in the state, the annual distribution of funds is approximately $10 million.

Special City Allotment Program

The Special City allotment is a grant program available to cities with a population less than 5,000. The funds are only available for maintenance, repair, and improvement of existing roads. Cities must submit specific projects to ODOT for consideration. Projects are reviewed annually and ranked on a statewide

basis by a committee of regional representatives; funds are distributed based on this ranking. ODOT distributes a total of $1 million annually through this program – individual projects are eligible for a maximum of $25,000 each. Sisters received this $25,000 grant in 1997-98 and included $25,000 in the proposed budget for 2000-01.

Immediate Opportunity Grant Program

OECDD and ODOT collaborate to administer this grant program, designed to assist local and regional economic development efforts. The program is funded to a level of approximately $7 million per year through state gas tax revenues. The following are primary factors in determining eligible projects:

- Improvement of public roads;
- Inclusion of an economic development-related project of regional significance;
- Creation or retention of primary employment; and
- Ability to provide local funds (50/50) to match grant.

The maximum amount of any grant under the program is $500,000. Local governments, which have received grants under the program, include Washington County, Multnomah County, Douglas County, the City of Hermiston, the Port of St. Helens, and the City of Newport.

Oregon Special Public Works Fund

The Special Public Works Fund (SPWF) program was created by the 1995 state legislature as one of several programs for the distribution of funds from the Oregon Lottery to economic development projects in communities throughout the state. The program, administered by OECDD, provides grant and loan assistance to eligible municipalities primarily for the construction of public infrastructure, which supports commercial and industrial development and results in permanent job creation or job retention. To be awarded funds, each infrastructure project must support businesses wishing to locate, expand, or remain in Oregon. SPWF awards can be used for improvement, expansion, and new construction of public sewage treatment plants, water supply works, public roads, and transportation facilities.

While SPWF program assistance is provided in the form of both loans and grants, the program emphasizes loans in order to assure that funds will return to the state over time for reinvestment in local economic development infrastructure projects. Jurisdictions that have received SPWF funding for projects that include some type of transportation-related improvement include the Cities of Baker City, Bend, Cornelius, Forest Grove, Madras, Portland, Redmond, Reedsport, Toledo, Wilsonville, Woodburn, and Douglas County.

The state legislature has recently added a new component to this program, which allows loans for "community facility projects." The criteria are less stringent, and projects that are not necessarily economic development-related may be awarded loans.

Oregon Transportation Infrastructure Bank

The Oregon Transportation Infrastructure Bank (OTIB) program is a revolving loan fund administered by ODOT to provide loans to local jurisdictions, including cities, counties, special districts, transit

districts, tribal governments, ports, and state agencies. Eligible projects include construction of highways, bridges, roads, streets, bikeways, pedestrian accesses, and right-of-way costs for all federal-aid (Title 23) projects (major collector or higher roads). Capital outlays such as buses, light-rail cars and lines, maintenance yards, and passenger facilities (under Title 49) are also eligible. This funding source may not be available in the future, as this program is being phased-out.

FINANCING TOOLS

In addition to funding options, the recommended improvements listed in this plan may benefit from a variety of financing options. Although often used interchangeably, the words financing and funding are not the same. Funding is the actual generation of revenue by which a jurisdiction pays for improvements. Some examples of funding include the sources discussed above: property taxes, SDCs, fuel taxes, vehicle registration fees, LIDs, and various grant programs. In contrast, financing refers to the collecting of funds through debt obligations.

There is a number of debt financing options available to Sisters. The use of debt to finance capital improvements must be balanced with the ability to make future debt service payments and to deal with the impact on its overall debt capacity and underlying credit rating. Again, debt financing should be viewed not as a source of funding, but as a time shifting of funds. The use of debt to finance these transportation-system improvements is appropriate since the benefits from the transportation improvements will extend over a period of years. If such improvements were to be tax financed immediately, a large short-term increase in the tax rate would be required. By utilizing debt financing, local governments spread the burden of the costs of these improvements to more of the people who are likely to benefit from the improvements and lower immediate payments.

General Obligation Bonds

General obligation (GO) bonds are voter-approved bond issues which represent the least expensive borrowing mechanism available to municipalities. GO bonds are typically supported by a separate property tax levy specifically approved for the purposes of retiring debt. The levy does not terminate until all debt is paid off. The property tax levy is distributed equally throughout the taxing jurisdiction according to assessed value of property. General obligation debts are typically used to make public improvement projects that will benefit the entire community.

State statutes require that the general obligation indebtedness of a jurisdiction not exceed three percent of the real market value of all taxable property in its boundary. Since general obligation bonds are issued subsequent to voter approval, they are not restricted to the limitations set forth in Ballot Measures 5, 47, and 50.

Ballot Measure 50, approved in 1997 by Oregon voters, allows local taxing districts to seek voter approval of a local option property tax levy that exceeds the district's permanent limit but is within the limits of Measure 5. Except in general elections in even-numbered years, approval of a local option property tax levy requires a "double majority": 50% of registered voters participating in the election, and a majority of those who vote approving the levy.

Limited Tax Bonds

Limited tax general obligation bonds (LTGOs) are similar to general obligation bonds in that they represent an obligation of the municipality. However, a municipality's obligation is limited to its

current revenue sources and is not secured by the public entity's ability to raise taxes. As a result, LTGOs do not require voter approval. However, since the LTGOs are not secured by the full taxing power of the issuer, the limited tax bond represents a higher borrowing cost than general obligation bonds. The municipality must pledge to levy the maximum amount under constitutional and statutory limits, but not the unlimited taxing authority pledged with GO bonds. Because LTGOs are not voter approved, they are subject to the limitations of Ballot Measures 5, 47, and 50.

Bancroft Bonds

Under Oregon Statute, municipalities are allowed to issue Bancroft bonds, which pledge the city's full faith and credit to assessment bonds. The bonds become general obligations of the city but are paid with assessments. Historically, these bonds provided cities with the ability to pledge their full faith and credit in order to obtain a lower borrowing cost without requiring voter approval. However, since Bancroft bonds are not voter approved, taxes levied to pay debt service on them are subject to the limitations of Ballot Measures 5, 47, and 50. As a result, since 1991, municipalities that were required to compress their tax rates have not used Bancroft bonds.

MATCHING CITY OF SISTERS PROJECTS WITH FUNDING SOURCES

Table 8-7 contains the list of prioritized capital improvement projects for the City of Sisters from Chapter 7, matched with potential funding sources. The projects may or may not be eligible for all sources listed, and further research will need to be conducted by the City of Sisters to seek the most appropriate funding.

TABLE 8-7
PRIORITIZED CAPITAL IMPROVEMENT PROJECTS AND POTENTIAL FUNDING SOURCES

PROJECT DESCRIPTION	Total Costs (Year 2001 $)	Potential Sources of Funding
Locust Street Traffic Signal	$150,000	• Statewide Transportation Improvement Program
Barclay Drive Extension	$700,000	• Local Street Improvement Grants • Oregon Transportation Infrastructure Bank
Barclay Drive Traffic Signal	$150,000	• Local Street Improvement Grants • Statewide Transportation Improvement Program
Realign Intersection of Highways 242/20	$155,000	• Statewide Transportation Improvement Program Oregon Transportation Infrastructure Bank
Realign Intersection of Highways 20/126	$220,000	• Statewide Transportation Improvement Program • Oregon Transportation Infrastructure Bank
Moveable Variable Message Signs (two)	$60,000	• Statewide Transportation Improvement Program • Transportation Safety Grant Program
Fixed Variable Message Sign	$120,000	• Statewide Transportation Improvement Program

Pavement Overlay on OR Highway 126	$1,227,000	• Statewide Transportation Improvement Program
Timber Creek Subdivision Streets	$254,900	• Immediate Opportunity Grant Program • Oregon Transportation Infrastructure Bank
New Road between Tamarack and Rope	$330,000	• Immediate Opportunity Grant Program • Oregon Transportation Infrastructure Bank
Add Curb Extensions on Cascade Avenue	$30,000	• Statewide Transportation Improvement Program • Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Widen Cascade Avenue Sidewalks	$59,400	• Statewide Transportation Improvement Program • Oregon Transportation Infrastructure Bank • Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Add Cascade Avenue Sidewalks	$43,560	• Statewide Transportation Improvement Program • Oregon Transportation Infrastructure Bank • Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Add Hood and Main Avenue Sidewalks	$51,810	• Oregon Transportation Infrastructure Bank • Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Enhance Crosswalks	$11,200	• Statewide Transportation Improvement Program • Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Highway 242 Multi-use Path	$80,000	• Statewide Transportation Improvement Program • Bike-Pedestrian Grants • Transportation Enhancement Program • Oregon Transportation Infrastructure Bank
Locust Street Shoulders	$33,600	• Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Add Bicycle Parking	$5,600	• Bike-Pedestrian Grants

Jefferson Avenue Shoulders	$38,040	• Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Jefferson Avenue Multi-use Path	$95,100	• Bike-Pedestrian Grants • Transportation Enhancement Program • Oregon Transportation Infrastructure Bank
Pine Street Shoulders	$6,300	• Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Locust Street Multi-use Path	$3,975	• Bike-Pedestrian Grants • Transportation Enhancement Program • Oregon Transportation Infrastructure Bank
Install Directional Signs for Bicyclists	$400	• Bike-Pedestrian Grants
Implement "Level A" TDM Measures	$25,000	• Transportation Enhancement Program
Realign Jefferson Ave. and Hwy 20/126	$30,000	• Statewide Transportation Improvement Program
Jefferson Avenue Extension	$180,000	• Immediate Opportunity Grant Program • Oregon Transportation Infrastructure Bank
Coyote Springs Road	$560,000	• Immediate Opportunity Grant Program • Oregon Transportation Infrastructure Bank
Three Creeks Road Shoulders	$15,900	• Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program
Extend Cowboy Street	$80,000	• Immediate Opportunity Grant Program • Oregon Transportation Infrastructure Bank
Extend Black Butte Avenue	$264,000	• Immediate Opportunity Grant Program • Oregon Transportation Infrastructure Bank
Extend Fir Street	$132,000	• Immediate Opportunity Grant Program • Oregon Transportation Infrastructure Bank
Highway Couplet	$1,980,000	• Statewide Transportation Improvement Program • Oregon Transportation Infrastructure Bank
Squaw Creek Multi-use Path	$40,000	• Bike-Pedestrian Grants • Transportation Enhancement Program • Oregon Transportation Infrastructure Bank
Coyote Springs Multi-use Path	$20,000	• Bike-Pedestrian Grants

		• Transportation Enhancement Program • Oregon Transportation Infrastructure Bank
Larch Street Shoulders	$23,700	• Bike-Pedestrian Grants • Transportation Enhancement Program • Special City Allotment Program

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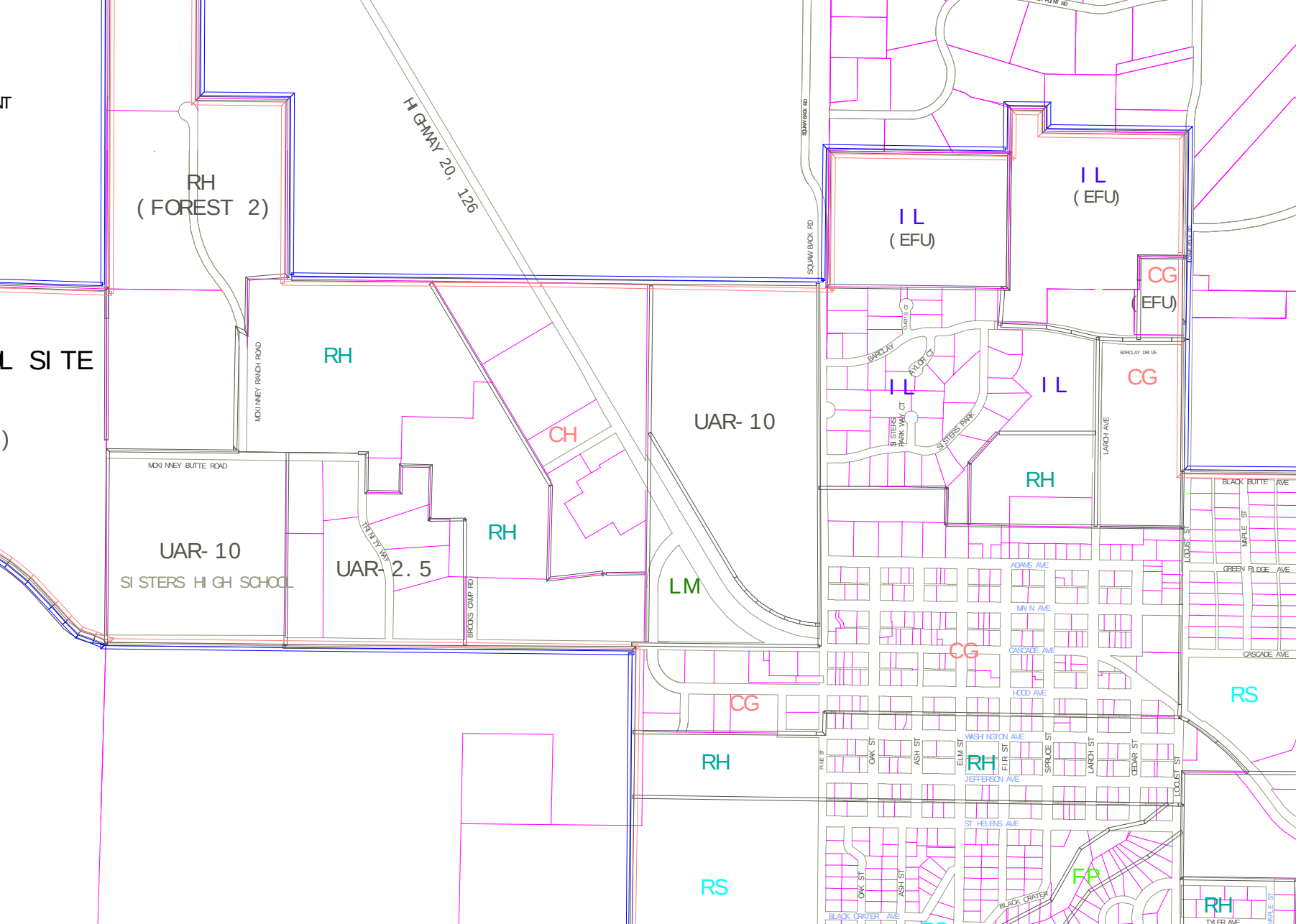
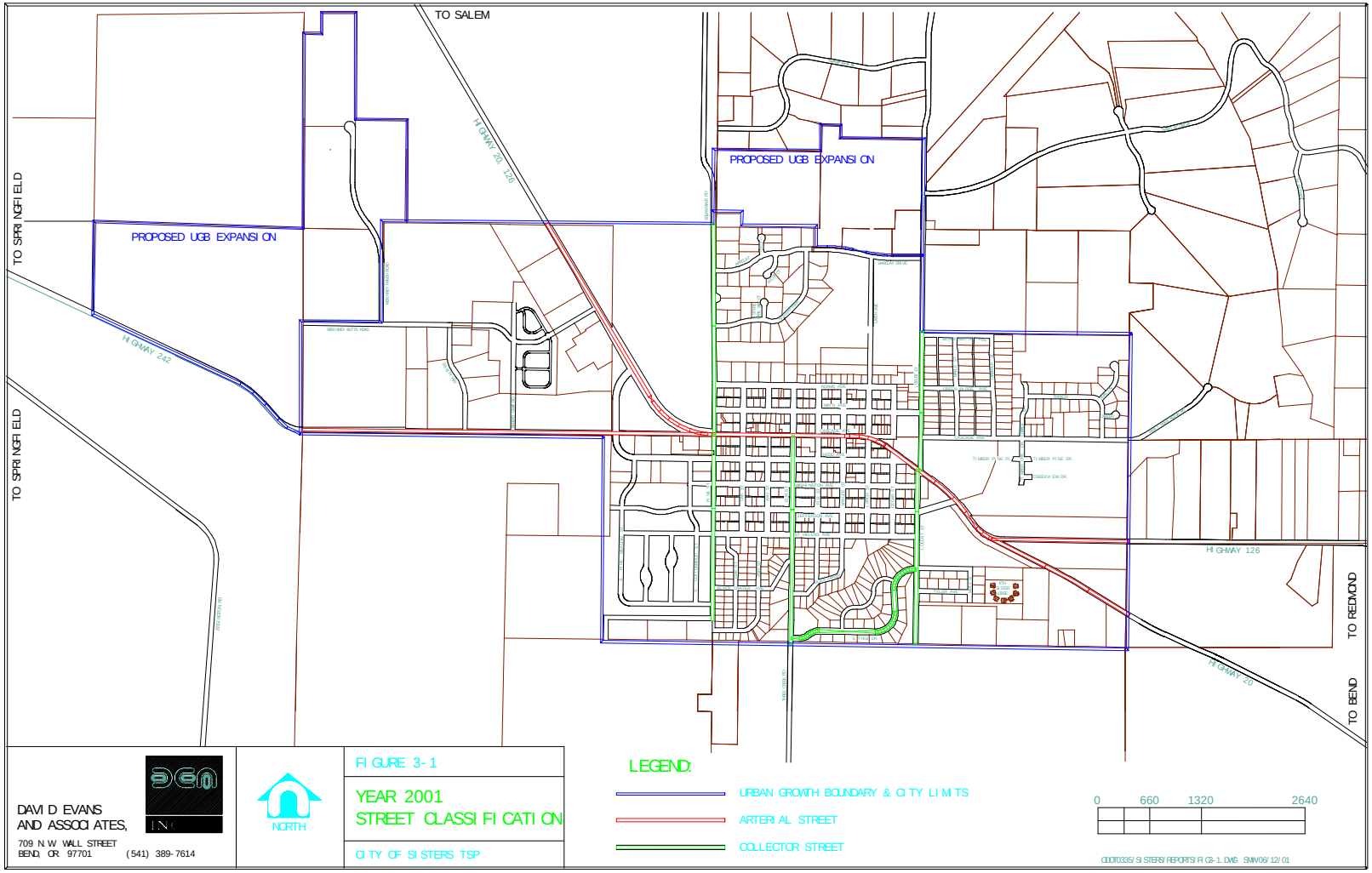
FIGURE D-1

BLOCK NUMBERS FOR SISTERS BUSINESS INVENTORY

CITY OF SISTERS TSP

0 250 500 1000


RH
(FOREST 2)
HIGHWAY 20, 126
SQUAW BACK RD
I L
(EFU)
I L
(EFU)
CG
(EFU)
MCKINNEY RANCH ROAD
RH
CH
UAR- 10
MCKINNEY BUTTE ROAD
UAR- 10
SISTERS HIGH SCHOOL
UAR- 2. 5
BROOKS CAMP RD
RH
LM
BARCLAY
TAYLOR CT
I L
I L
CG
BARCLAY DRIVE
SISTERS PARK WAY CT
SISTERS PARK
LARCH AVE
RH
BLACK BUTTE AVE
MAPLE ST
LOCUST ST
GREEN RIDGE AVE
ADAMS AVE
MAIN AVE
CG
CASCADE AVE
CASCADE AVE
RS
CG
HOOD AVE
RH
WASHINGTON AVE
OAK ST
ASH ST
ELM ST
RH
FIR ST
SPRUCE ST
LARCH ST
CEDAR ST
LOCUST ST
JEFFERSON AVE
ST HELENS AVE
RS
OAK ST
ASH ST
FP
BLACK CRATER
BLACK CRATER AVE
RH
TYLER AVE


TO SALEM
TO SPRINGFIELD
TO SPRINGFIELD
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
HIGHWAY 20
HIGHWAY 242
HIGHWAY 126
HIGHWAY 20
TO REDMOND
TO BEND
FIGURE 3-1
YEAR 2001
STREET CLASSIFICATION
CITY OF SISTERS TSP
LEGEND:
URBAN GROWTH BOUNDARY & CITY LIMITS
ARTERIAL STREET
COLLECTOR STREET
0
660
1320
2640
NORTH
DAVID EVANS
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BEND, OR 97701
(541) 389-7614
C:\DOT\0335\SISTERS\REPORTS\FIG2-1.DWG SMW09/12/01

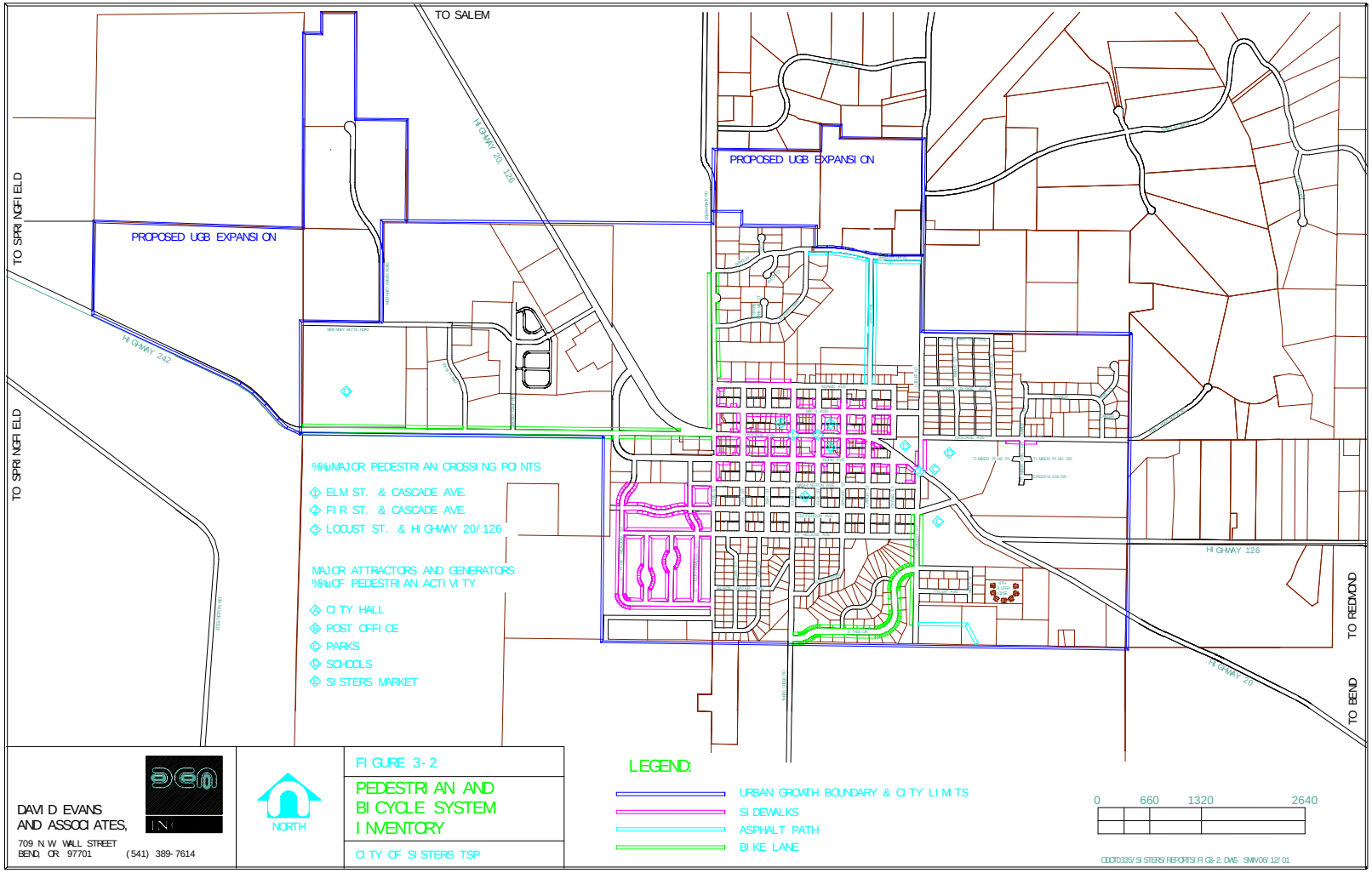

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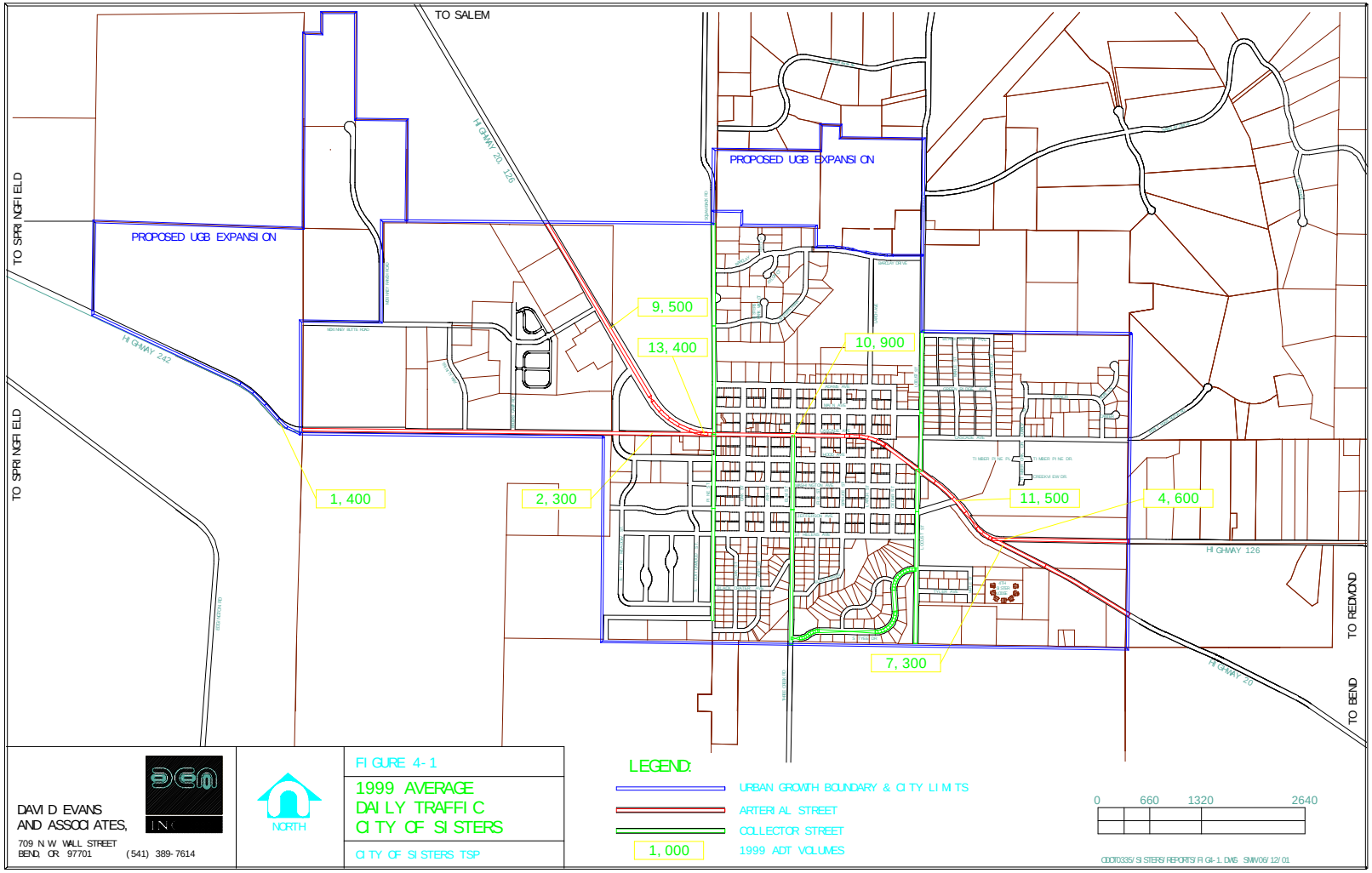
FIGURE 3-2
PEDESTRIAN AND BICYCLE SYSTEM INVENTORY
CITY OF SISTERS TSP


TO SALEM
TO SPRINGFIELD
TO SPRINGFIELD
TO REDMOND
TO BEND
HIGHWAY 20
HIGHWAY 126
HIGHWAY 242
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
9, 500
13, 400
10, 900
1, 400
2, 300
11, 500
4, 600
7, 300
LEGEND:
URBAN GROWTH BOUNDARY & CITY LIMITS
ARTERIAL STREET
COLLECTOR STREET
1, 000
1999 ADT VOLUMES
0
660
1320
2640
NORTH
FIGURE 4-1
1999 AVERAGE
DAILY TRAFFIC
CITY OF SISTERS
CITY OF SISTERS TSP
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CDOT0335/SISTERS/REPORTS/FIG4-1.DWG SMW09/12/01

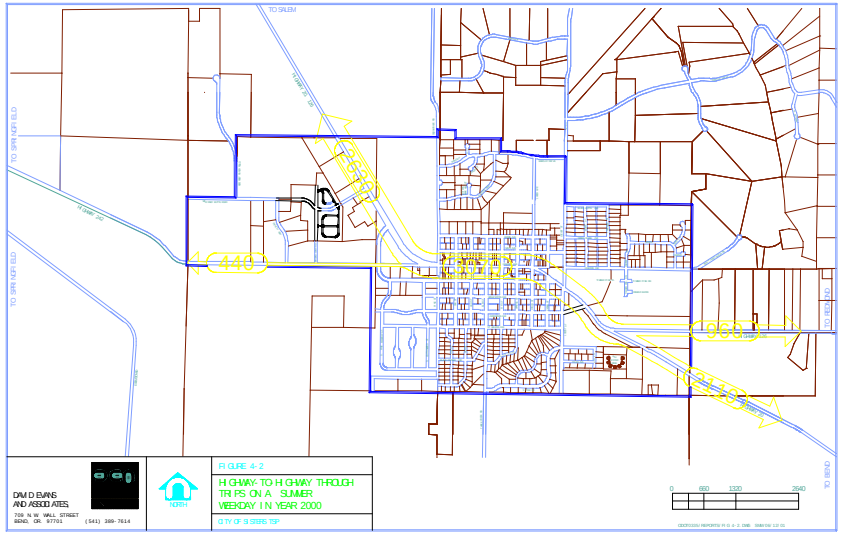

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FIGURE 4-2
HIGHWAY-TO-HIGHWAY THROUGH TRIPS ON A SUMMER WEEKDAY IN YEAR 2000
CITY OF REDMOND TSP

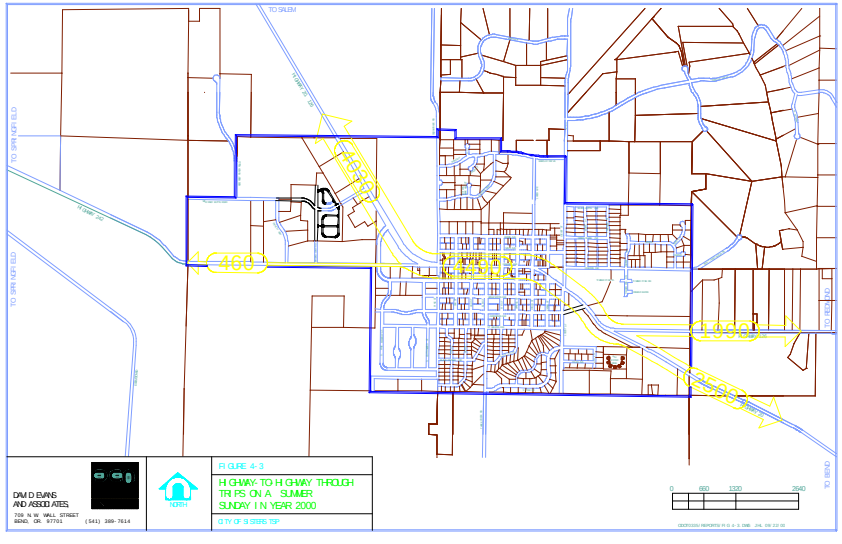

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FIGURE 4-3

HIGHWAY 20 TO HIGHWAY 20 THROUGH
TRIPS ON A SUMMER
SUNDAY IN YEAR 2000

CITY OF REDMOND TSP

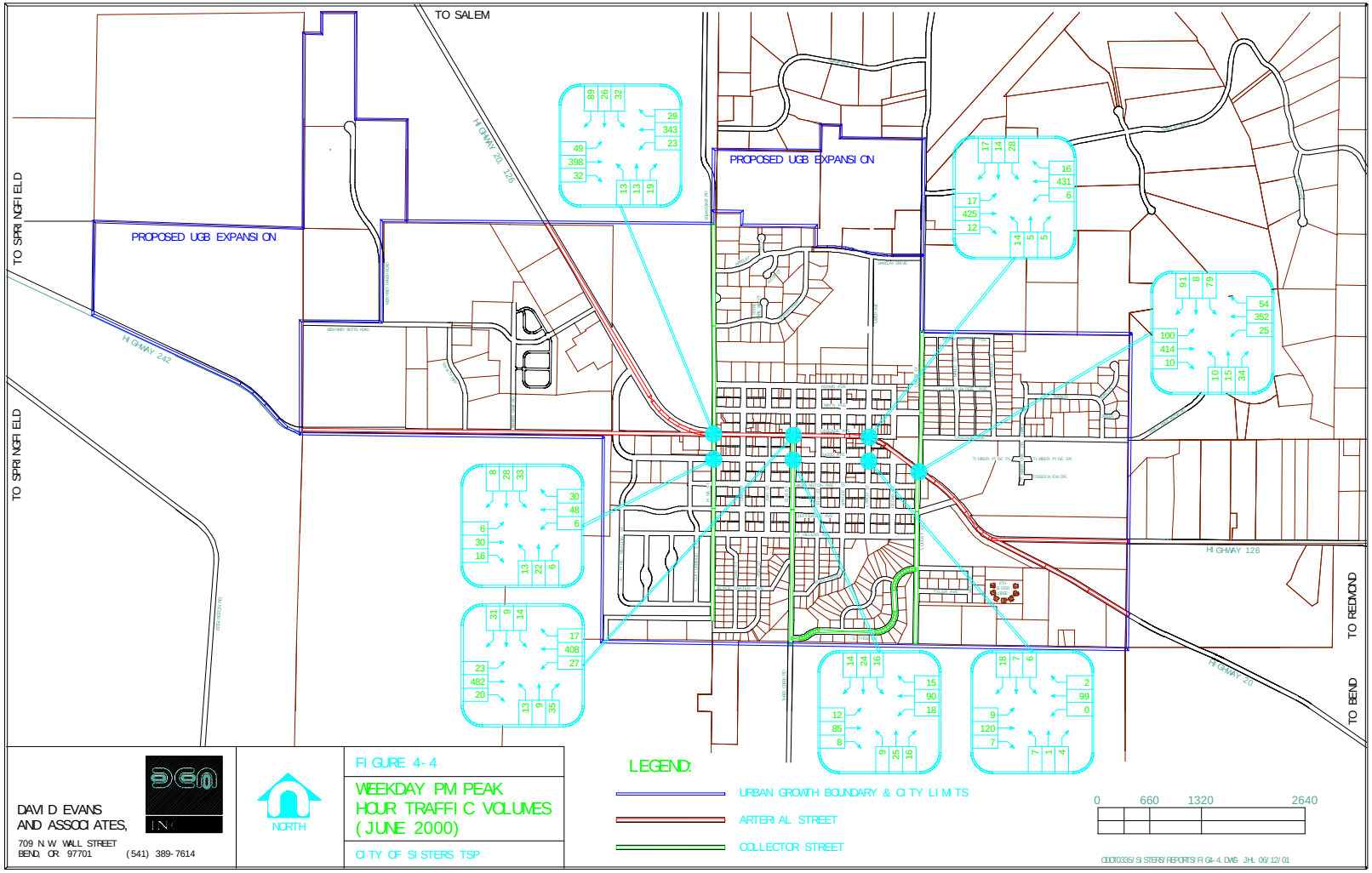

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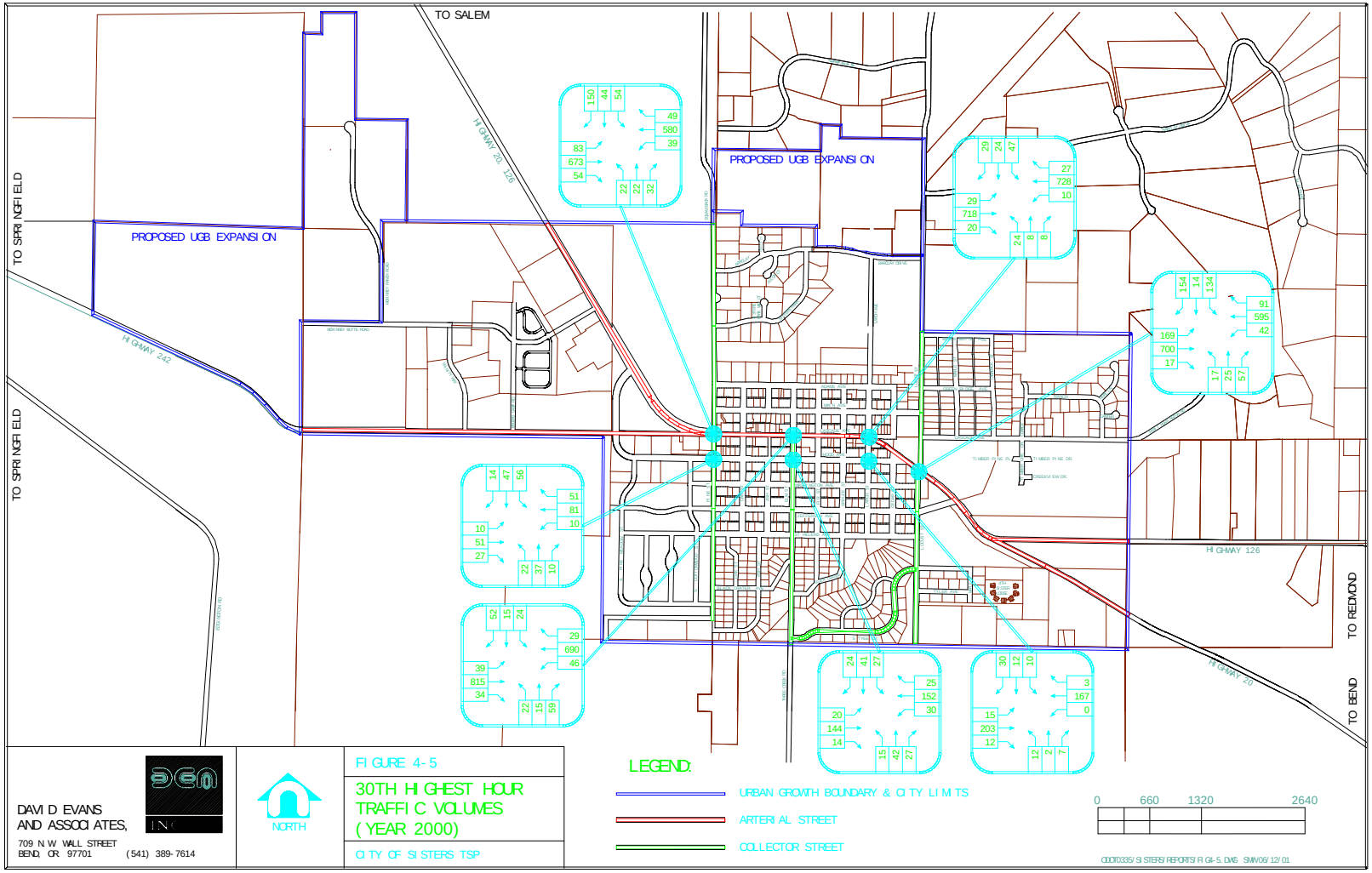
FIGURE 4-4
WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES (JUNE 2000)
CITY OF SISTERS TSP

CDOT0335/SISTERS/REPORTS/FIG4-4.DWG JHL 09/12/01


TO SALEM
TO SPRINGFIELD
TO SPRINGFIELD
TO REDMOND
TO BEND
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
HIGHWAY 20
HIGHWAY 242
HIGHWAY 126
HIGHWAY 20
150 44 54 49 580 39 83 673 54 22 22 32
29 24 47 27 728 10 29 718 20 24 8 8
154 14 134 91 595 42 169 700 17 17 25 57
14 47 56 51 81 10 10 51 27 22 37 10
52 15 24 29 690 46 39 815 34 22 15 59
24 41 27 25 152 30 20 144 14 15 42 27
30 12 10 3 167 0 15 203 12 12 2 7
LEGEND:
URBAN GROWTH BOUNDARY & CITY LIMITS
ARTERIAL STREET
COLLECTOR STREET
0 660 1320 2640
NORTH
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BEND, OR 97701 (541) 389-7614
FIGURE 4-5
30TH HIGHEST HOUR TRAFFIC VOLUMES (YEAR 2000)
CITY OF SISTERS TSP
CDD\0335\SISTERS\REPORTS\FIG4-5.DWG SMW09/12/01

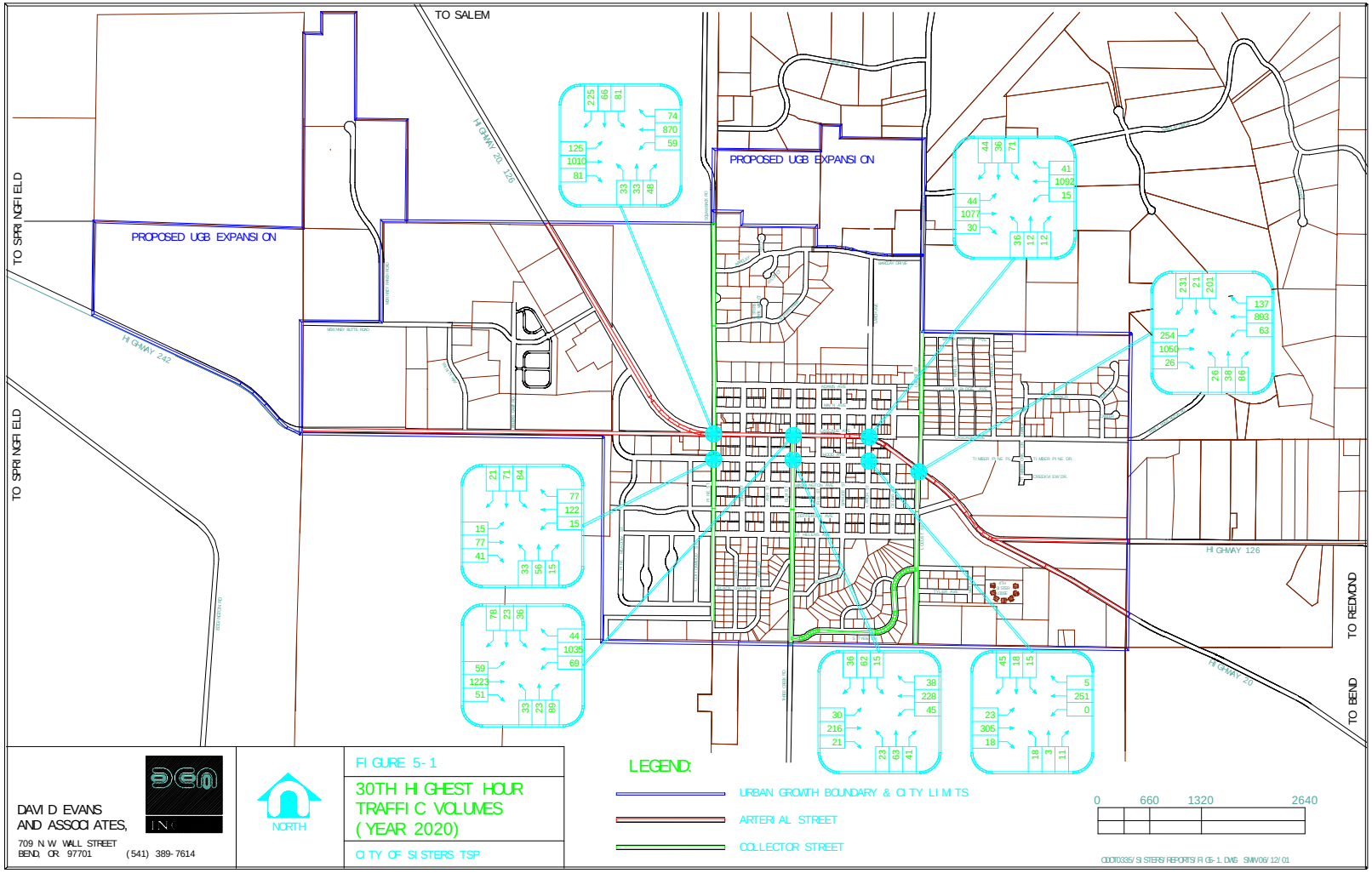
TO SALEM
TO SPRINGFIELD
TO SPRINGFIELD
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
HIGHWAY 242
HIGHWAY 126
HIGHWAY 20
TO REDMOND
TO BEND
225 66 81
74 870 59
125 1010 81
33 33 48
44 36 71
41 1092 15
44 1077 30
36 12 12
231 21 201
137 893 63
254 1050 26
26 38 86
21 71 84
77 122 15
15 77 41
33 56 15
78 23 36
44 1035 69
59 1223 51
33 23 89
36 62 15
38 228 45
30 216 21
23 63 41
45 18 15
5 251 0
23 305 18
18 3 11
LEGEND:
URBAN GROWTH BOUNDARY & CITY LIMITS
ARTERIAL STREET
COLLECTOR STREET
0 660 1320 2640
DAVID EVANS AND ASSOCIATES, INC.
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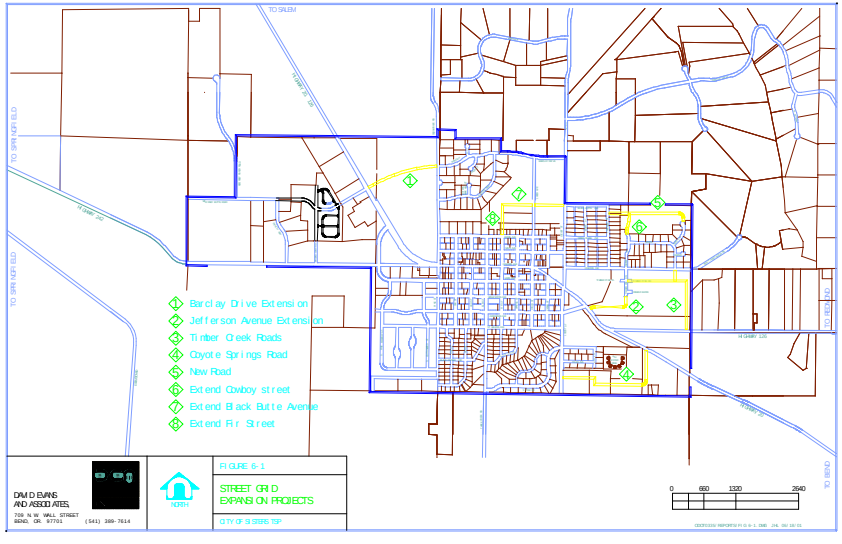
FIGURE 5-1
30TH HIGHEST HOUR TRAFFIC VOLUMES (YEAR 2020)
CITY OF SISTERS TSP
CDOT0335/SISTERS/REPORTS/FIG5-1.DWG SMW09/12/01


TO SALEM
TO SPRINGFIELD
TO SPRINGFIELD
TO BEND
TO BEND
1 Barclay Drive Extension
2 Jefferson Avenue Extension
3 Timber Creek Roads
4 Coyote Springs Road
5 New Road
6 Extend Cowboy street
7 Extend Black Butte Avenue
8 Extend Fir Street
DAVID EVANS AND ASSOCIATES,
709 N.W. WALL STREET
BEND, OR 97701
(541) 389-7614
NORTH
FIGURE 6-1
STREET GRID EXPANSION PROJECTS
CITY OF REDMOND
0
660
1320
2640

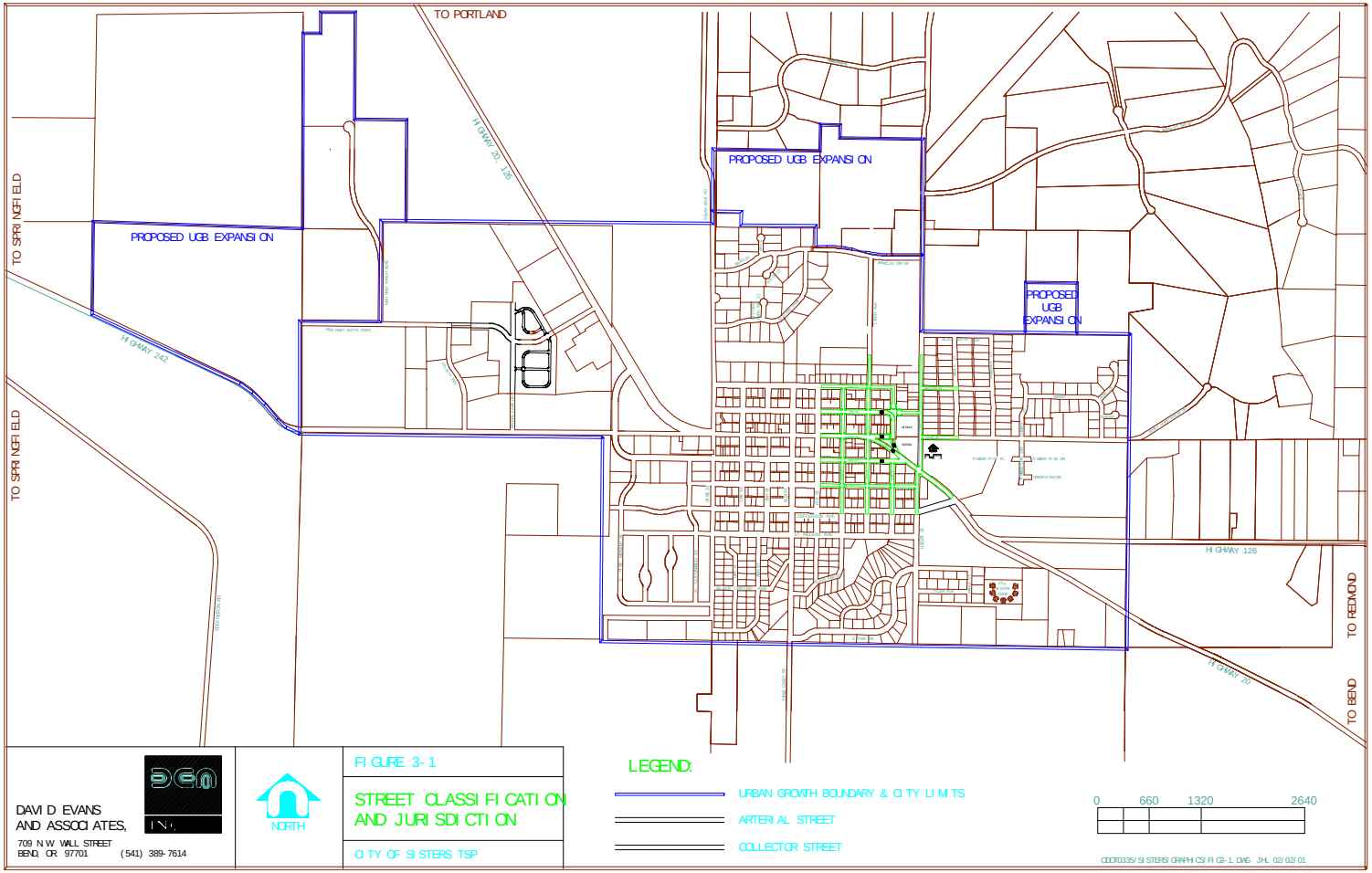


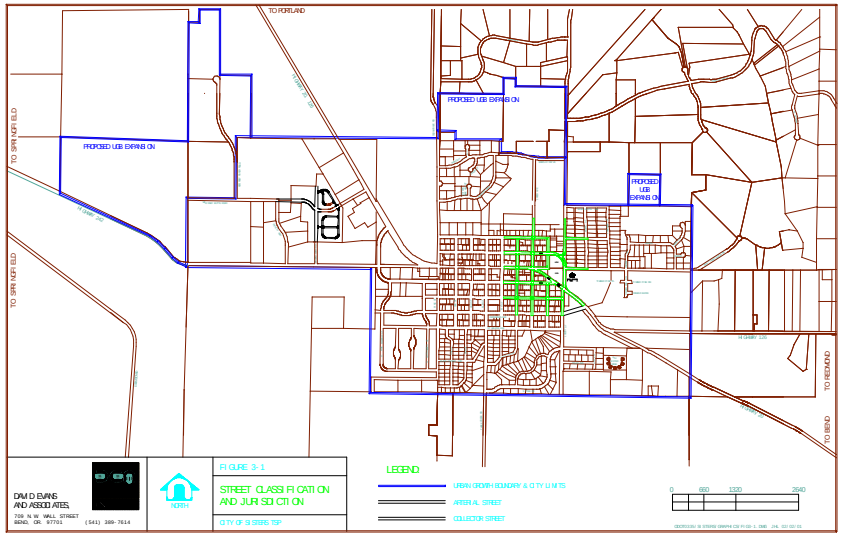
FIGURE 3-1

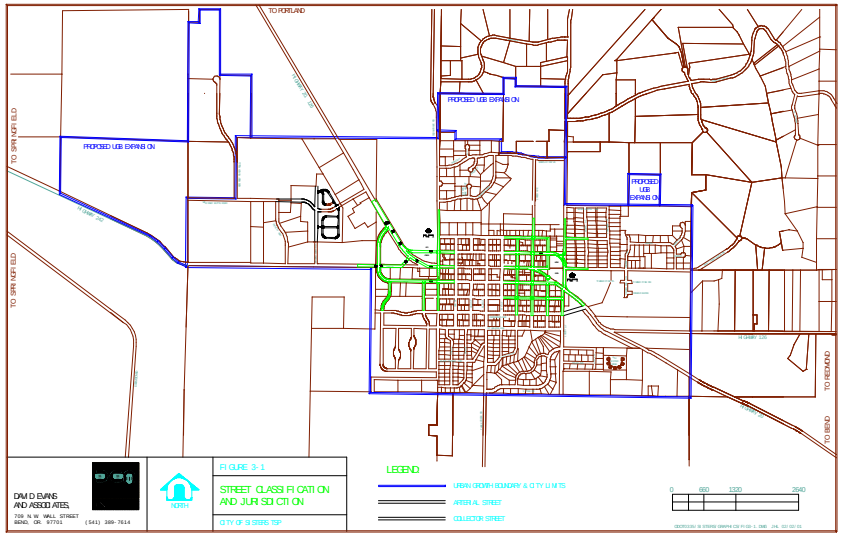
STREET CLASSIFICATION AND JURISDICTION

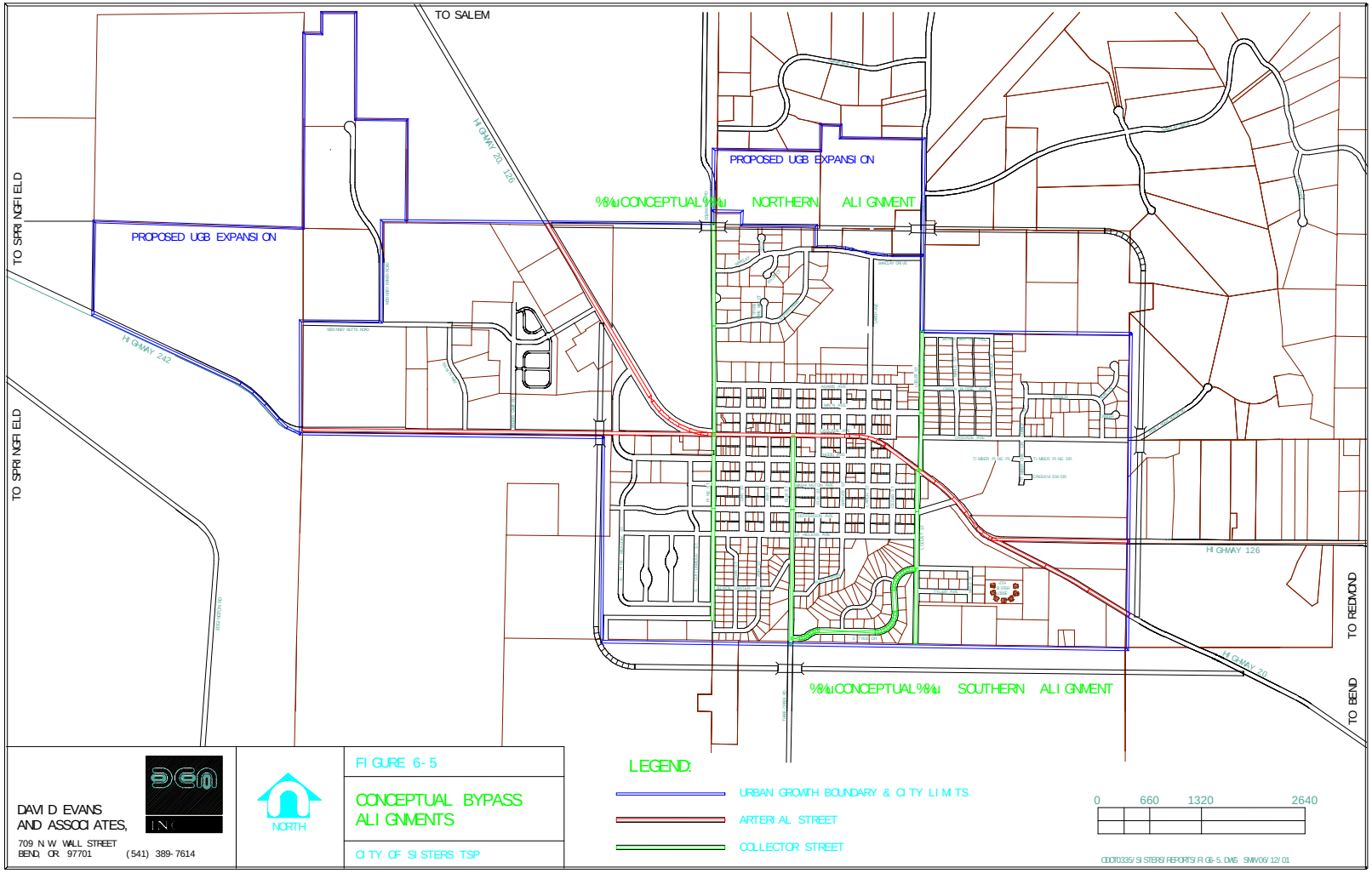
CITY OF SISTERS TSP

DAVID EVANS AND ASSOCIATES, INC.
709 N.W. WALL STREET
BEND, OR 97701 (541) 389-7614

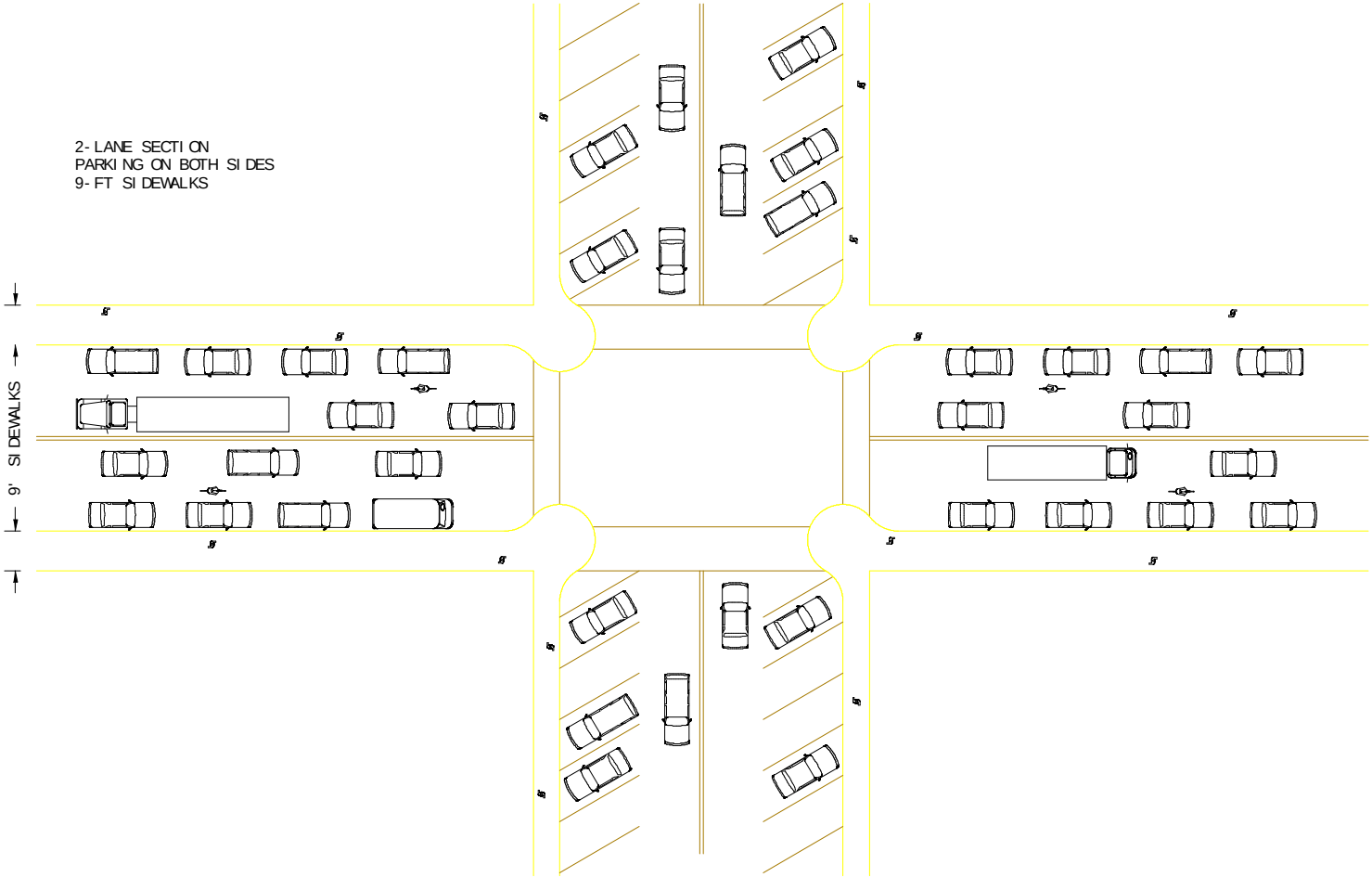
CDOF0335/SISTERSGRAPHICS/FIG3-1.DWG JHL 02/02/01


TO PORTLAND
TO SISTERS
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
TO REDMOND
TO BEND
LEGEND
URBAN GROWTH BOUNDARY & CITY LIMITS
ARTERIAL STREET
COLLECTOR STREET
0
660
1320
2640
NORTH
FIGURE 3-1
STREET CLASSIFICATION AND JURISDICTION
CITY OF SISTERS TSP
DAVID EVANS AND ASSOCIATES,
709 N.W. WALL STREET
BEND, OR 97701
(541) 389-7614


TO PORTLAND
TO SISTERS
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
TO REDMOND
TO BEND
LEGEND
URBAN GROWTH BOUNDARY & CITY LIMITS
ARTERIAL STREET
COLLECTOR STREET
0
660
1320
2640
NORTH
FIGURE 3-1
STREET CLASSIFICATION AND JURISDICTION
CITY OF SISTERS TSP
DAVID EVANS AND ASSOCIATES,
709 N.W. WALL STREET
BEND, OR 97701
(541) 389-7614

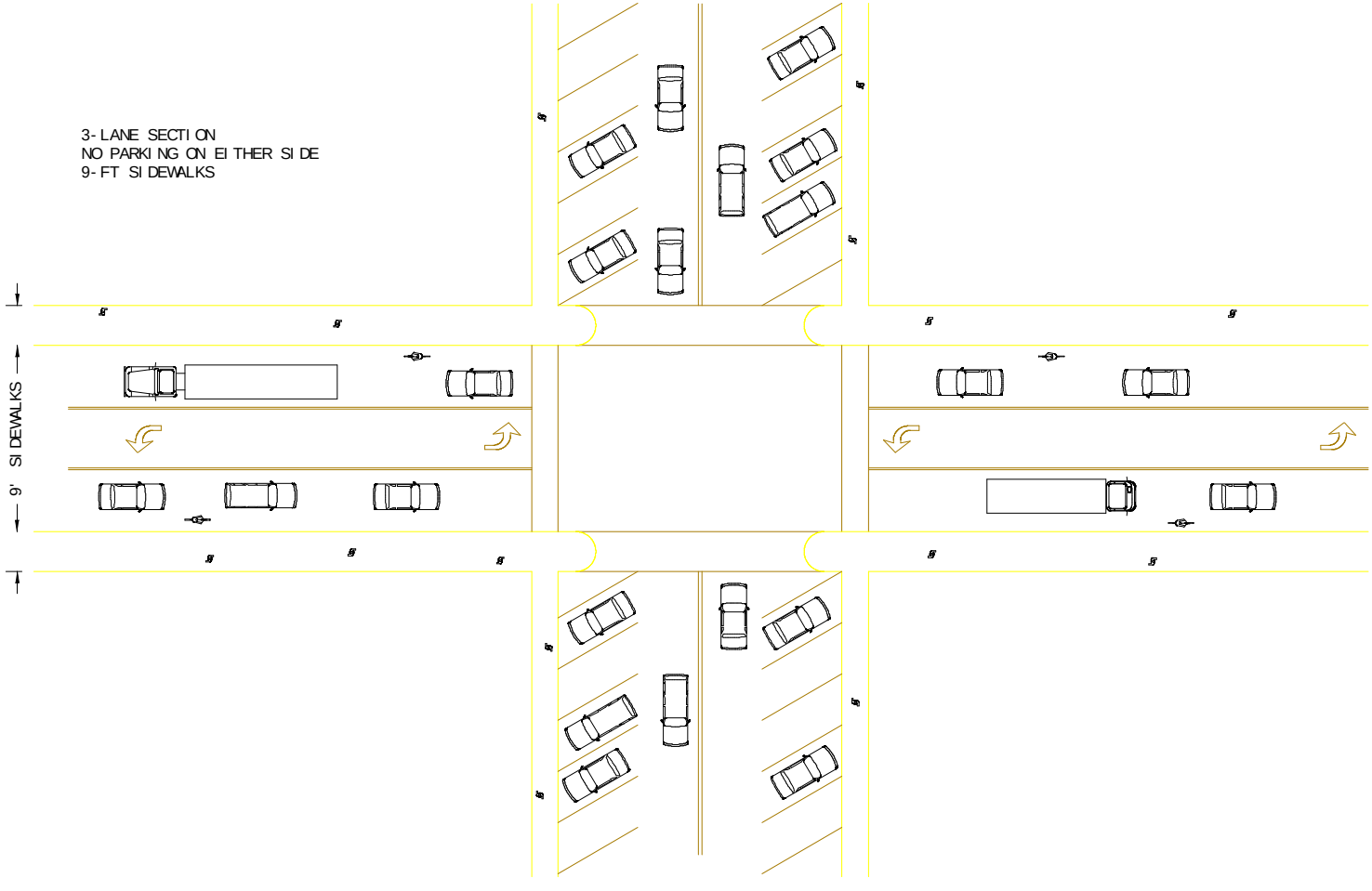

TO SALEM
TO SPRINGFIELD
TO SPRINGFIELD
TO REDMOND
TO BEND
HIGHWAY 20
HIGHWAY 126
HIGHWAY 242
PROPOSED UGB EXPANSION
PROPOSED UGB EXPANSION
%%uCONCEPTUAL%%u NORTHERN ALIGNMENT
%%uCONCEPTUAL%%u SOUTHERN ALIGNMENT
LEGEND:
URBAN GROWTH BOUNDARY & CITY LIMITS
ARTERIAL STREET
COLLECTOR STREET
0 660 1320 2640
DAVID EVANS AND ASSOCIATES, INC.
709 N.W. WALL STREET
BEND, OR 97701 (541) 389-7614
NORTH
FIGURE 6-5
CONCEPTUAL BYPASS ALIGNMENTS
CITY OF SISTERS TSP
CD01033S/SISTERS/REPORTS/FIG6-5.DWG SMW09/12/01

2- LANE SECTION
PARKING ON BOTH SIDES
9- FT SIDEWALKS



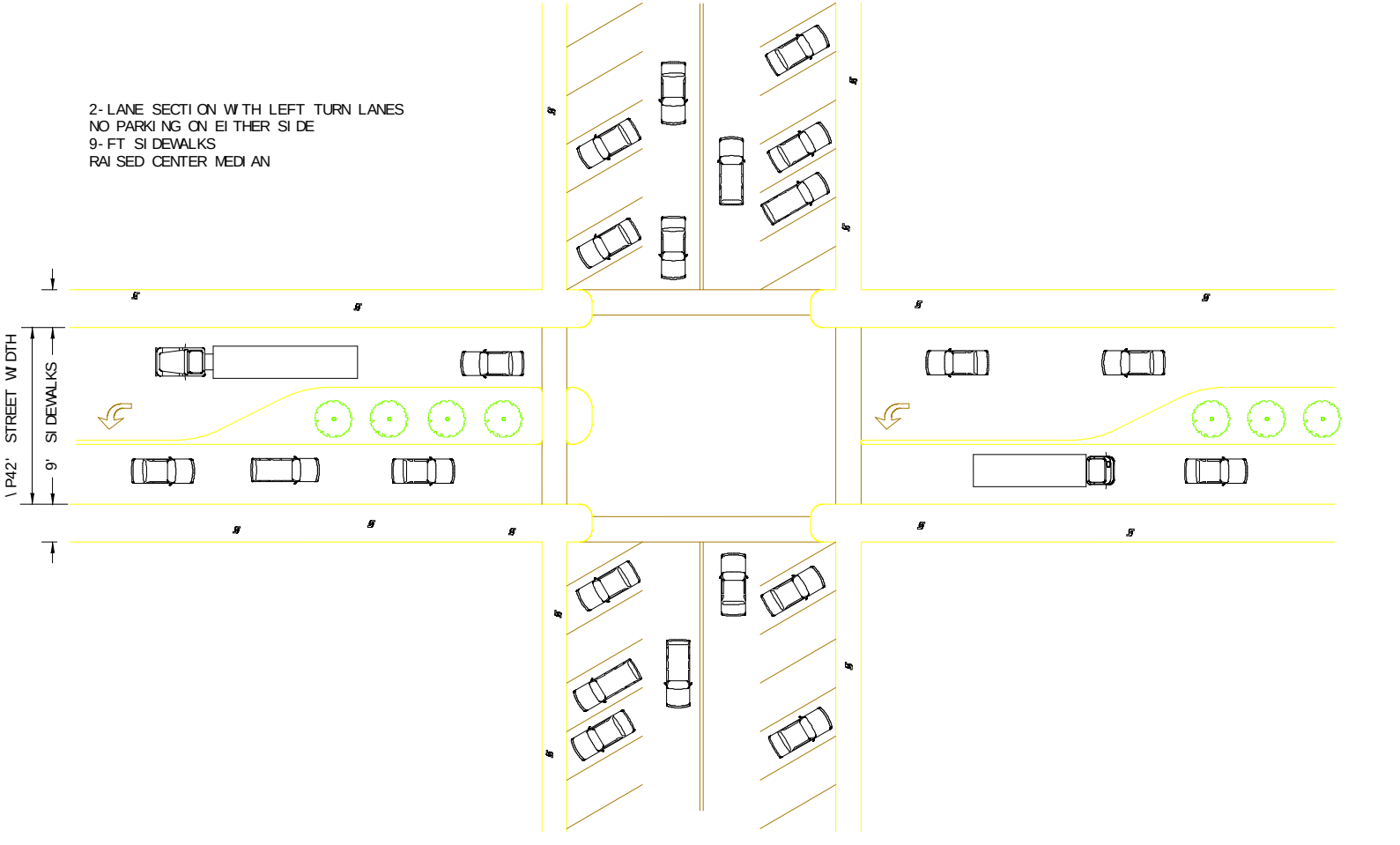
0 25 50

3- LANE SECTI ON
NO PARKI NG ON EI THER SI DE
9- FT SI DEWALKS

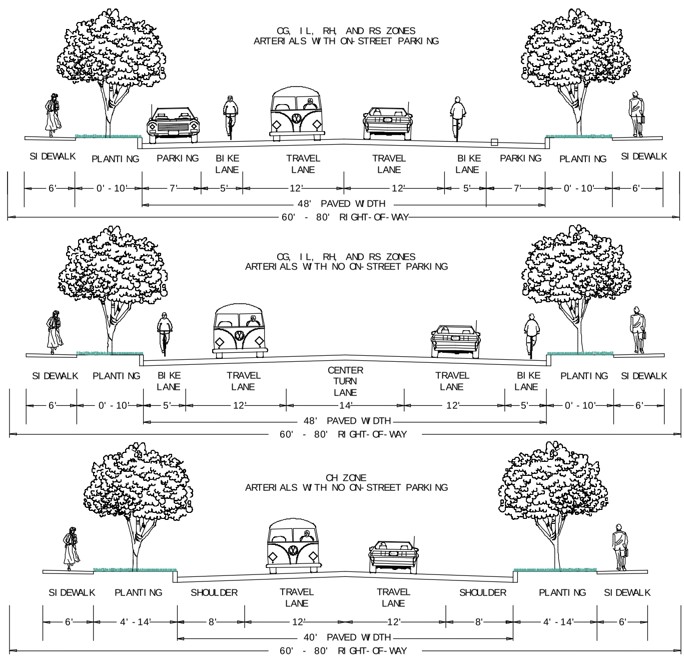


0 25 50

2-LANE SECTION WITH LEFT TURN LANES
NO PARKING ON EITHER SIDE
9-FT SIDEWALKS
RAISED CENTER MEDIAN



0 25 50



scale 1"=10' design DAK
date 6-06-00 drawn SMW/JHL
file Q:\ODOT0335\SISTERS\REPORTS\FIG7-1.DWG

DAVID EVANS
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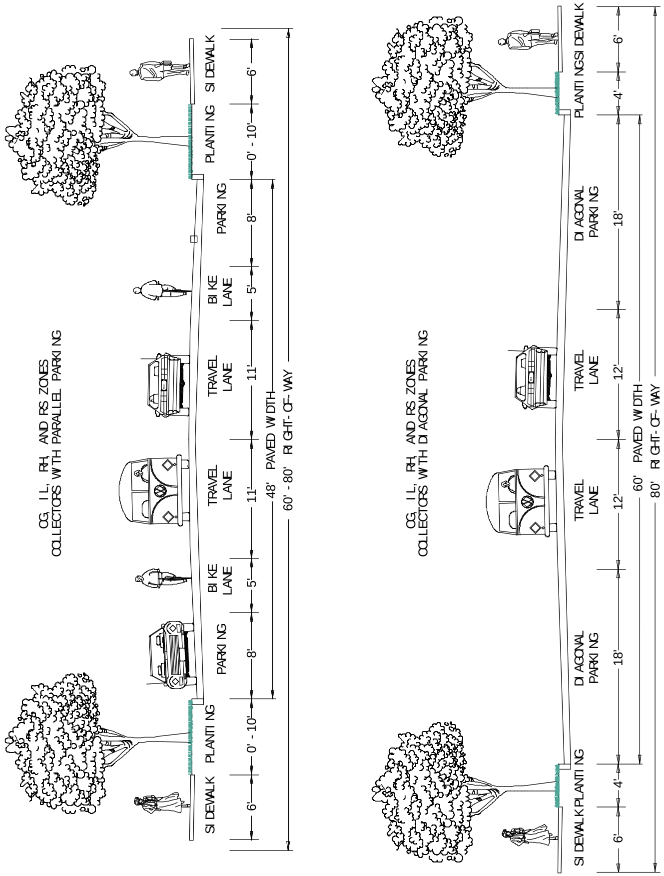
709 NW Wall Street, Suite 102
Bend, Oregon 97701 (541) 389-7614

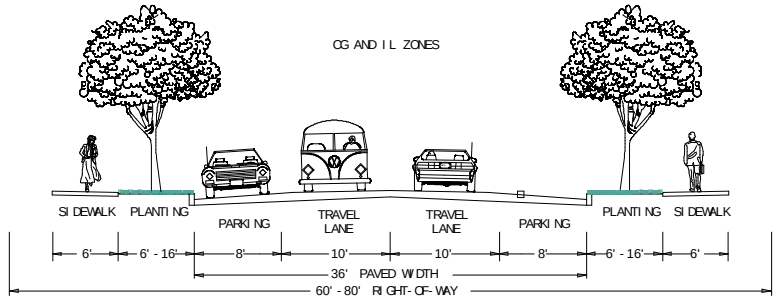
FIGURE 7-1
ARTERIAL STREET
CROSS SECTIONS

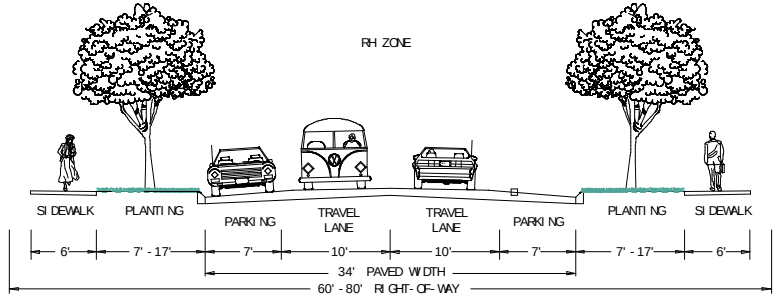


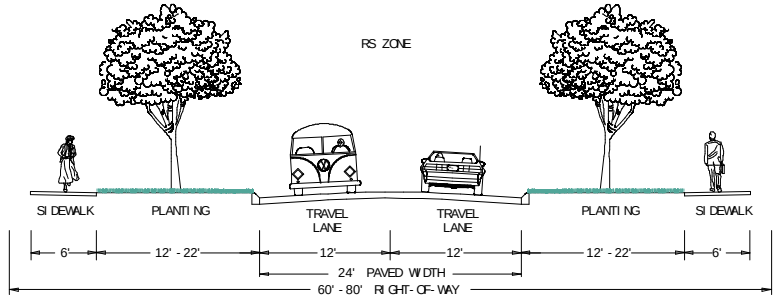
scale 1"=10'	design DAK
date 6-6-99	drawn SMW/JHL
file Q:\ODOT0335\SISTERS\REPORTS\	
FIG7-2.DWG	

DAVID EVANS
AND ASSOCIATES,
709 NW Wall Street, Suite 102
Bend, Oregon 97701 (541) 389-7614

FIGURE 7-2
COLLECTOR STREET
CROSS SECTIONS



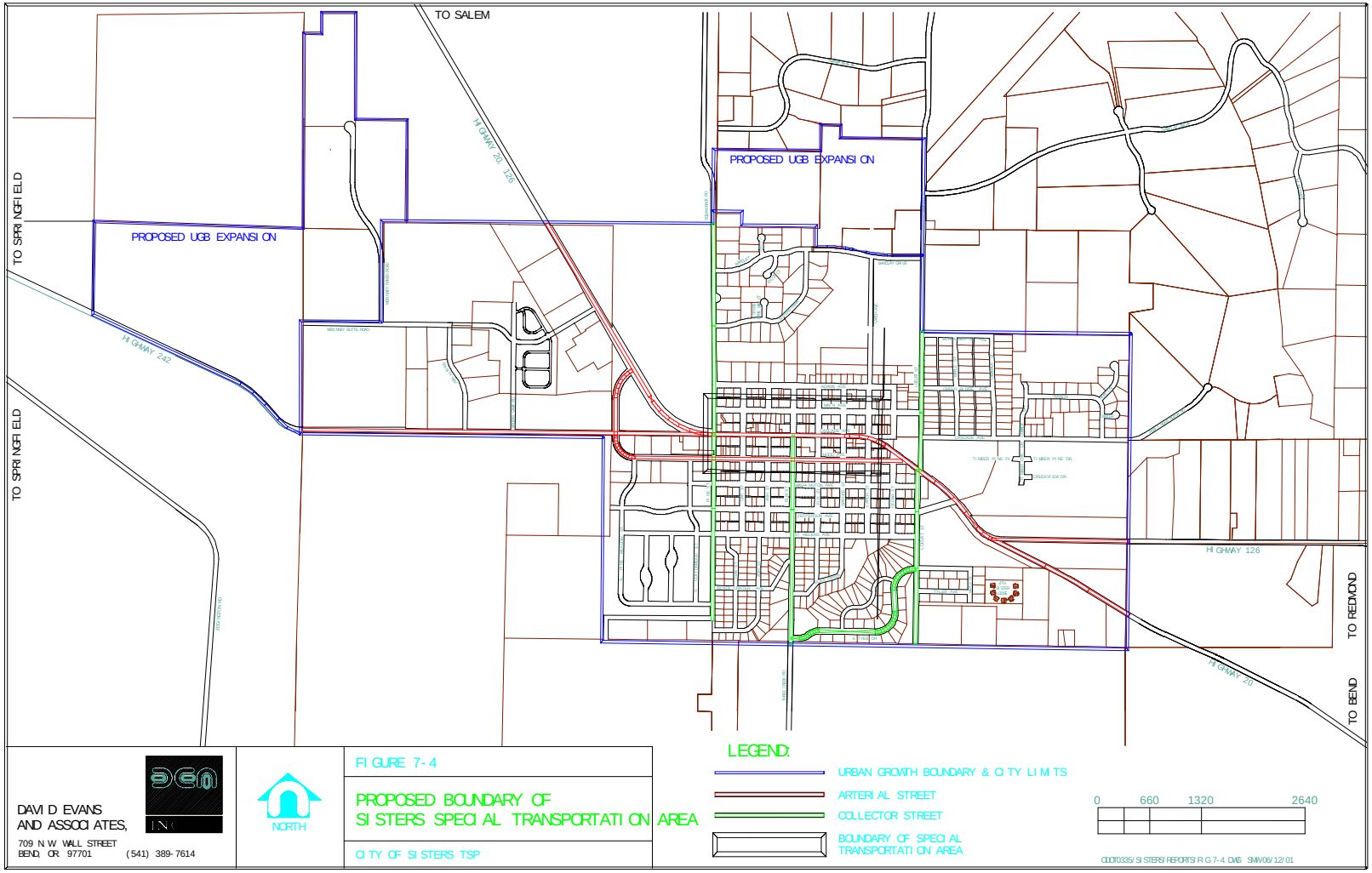




scale 1"=10' design DAK
date 6-6-99 drawn SMW / JHL
file Q:\ODOT0335\SISTERS\REPORTS\FIG7-3.DWG

DAVID EVANS AND ASSOCIATES, INC.
709 NW Wall Street, Suite 102
Bend, Oregon 97701 (541) 389-7614

FIGURE 7-3
LOCAL STREET
CROSS SECTIONS



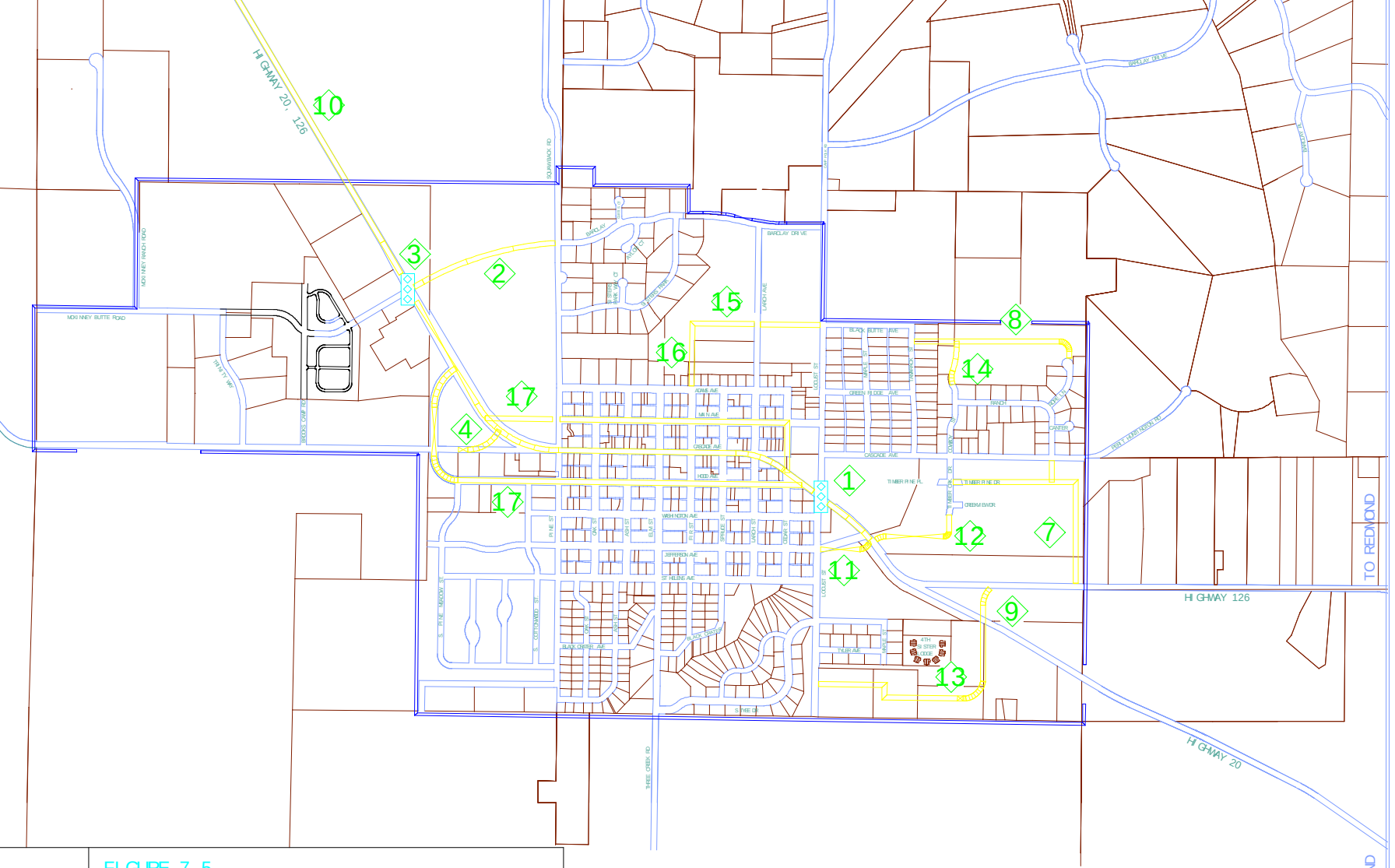
DAVID EVANS AND ASSOCIATES, INC.
709 N.W. WALL STREET
BEND, OR 97701 (541) 389-7614

FIGURE 7-4

PROPOSED BOUNDARY OF SISTERS SPECIAL TRANSPORTATION AREA

CITY OF SISTERS TSP

C:\DOT\0335\SISTERS\REPORTS\FIG 7-4.DWG SMW\08/12/01



NORTH

FIGURE 7-5

1 SREET SYSTEM IMPROVEMENTS
PRIORITIZED PROJECT NUMBER

CITY OF SISTERS TSP

ODOT0335/SISTERS/REPORTS/FIG 7-5.DWG SMW 06/12/01

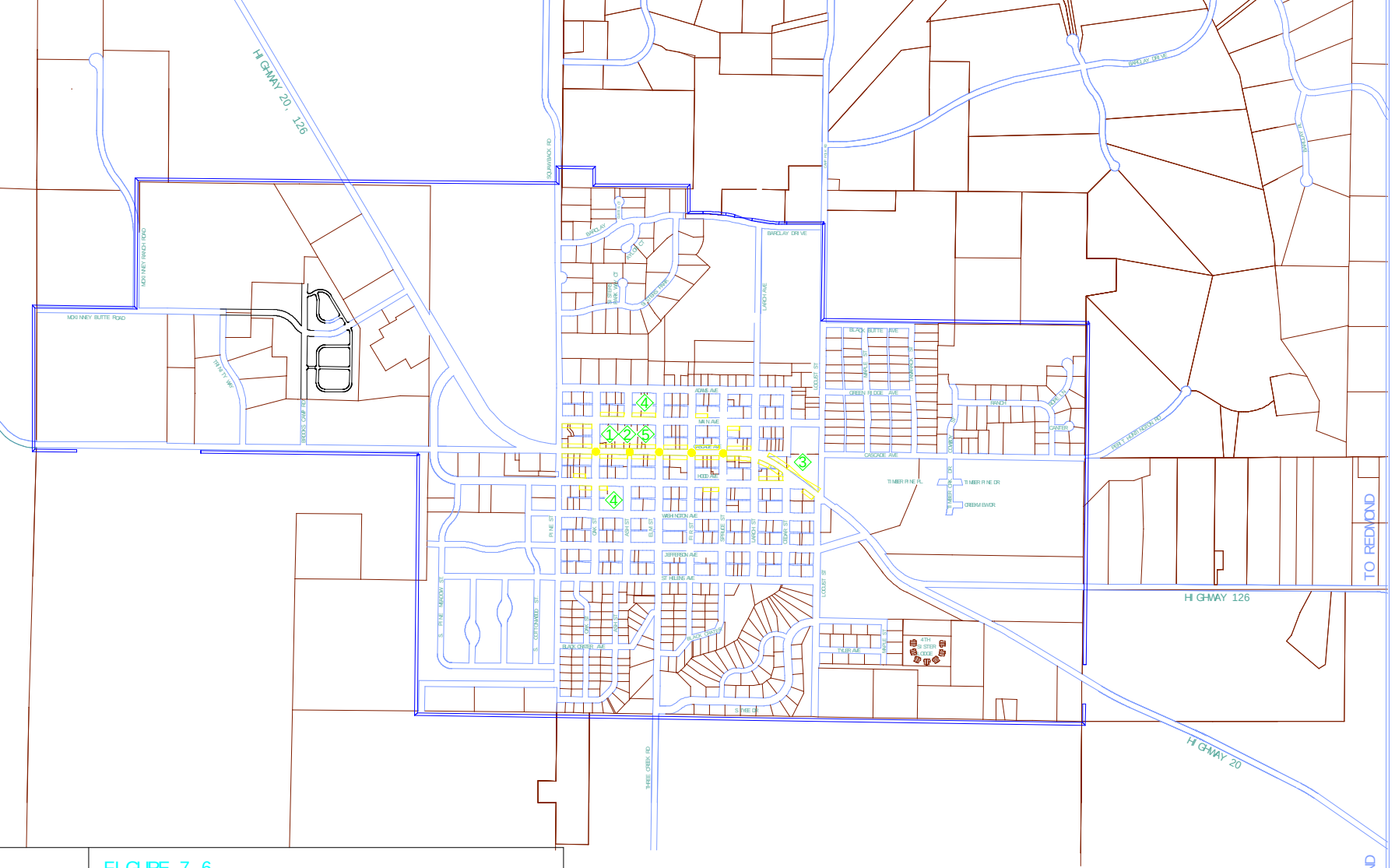


FIGURE 7-6

1 PEDESTRIAN SYSTEM IMPROVEMENTS PRIORITIZED PROJECT NUMBER

CITY OF SISTERS TSP

NORTH

0 660 1320 2640

ODOT0335/SISTERS/FIG 7-6.DWG SMW 06/18/01

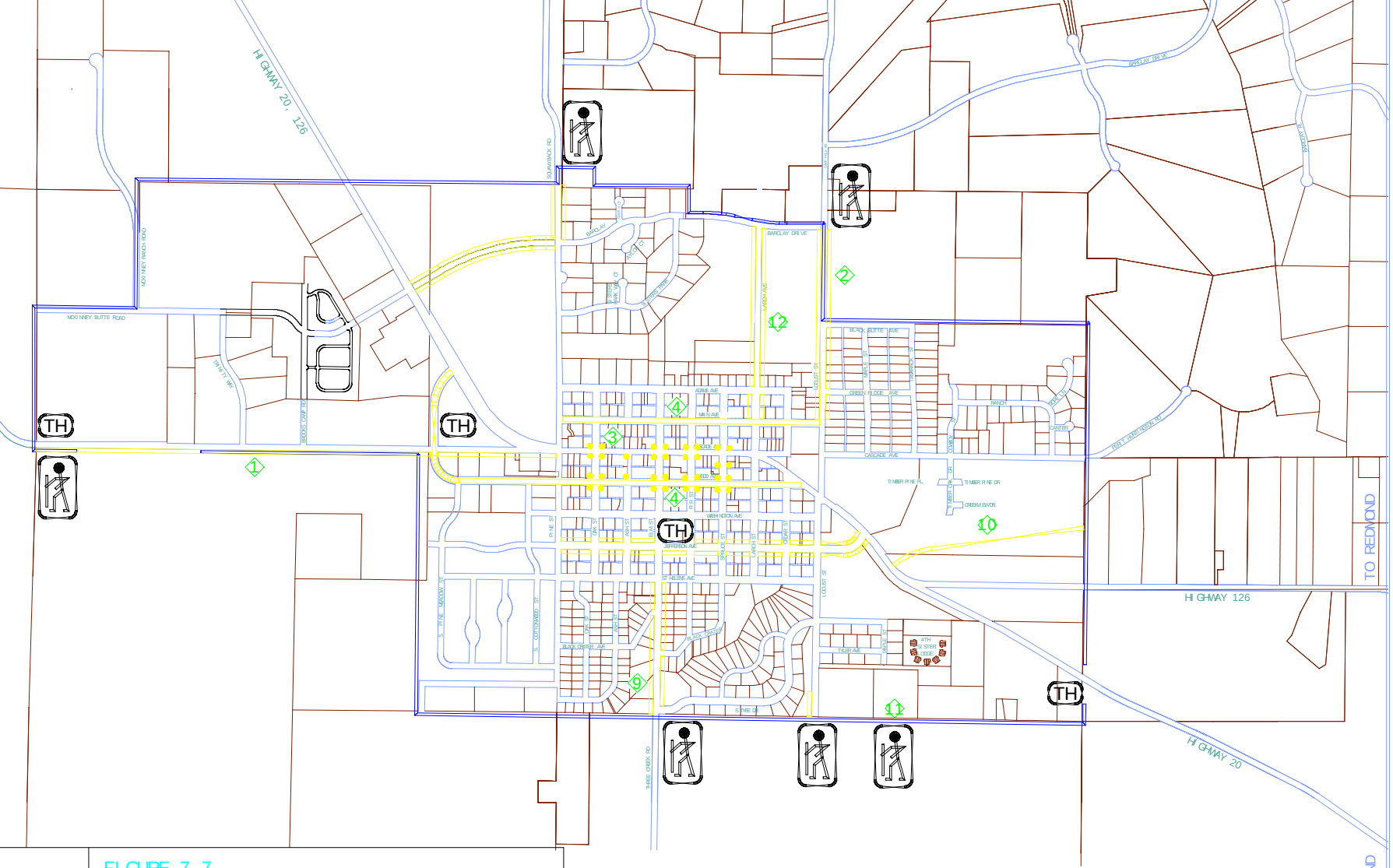


FIGURE 7-7

1 BICYCLE SYSTEM IMPROVEMENTS PRIORITIZED PROJECT NUMBER

CITY OF SISTERS TSP

NORTH

TH = BICYCLE AND PEDESTRIAN TRAILHEAD MAPS

= PROPOSED CONNECTION TO COUNTY TRAIL SYSTEM

0 660 1320 2640

ODOT0335/SISTERS/REPORTS/FIG 7-7.DWG SMW 06/21/01