



SISTERS

Transportation System

Plan Refinement

Prepared by



In Cooperation with



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Chapter 1. Executive Summary

Introduction

This chapter is an executive summary of the Sisters Transportation System Plan (TSP) update that was prepared in 2008 and updated through a refinement plan in 2018. It provides a brief overview of the purpose of the plan and process used to develop it. It also outlines the different chapters, summarizes the key findings by transportation mode, and reviews recommended funding sources to implement the transportation action plans.

Plan Purpose

This Sisters Transportation System Plan (TSP) identifies specific transportation projects and programs needed to support the City's goals and policies and to serve planned growth through the TSP horizon year (2030). This TSP builds on the previous plan that was developed for the City in 2003 and addresses changes in local and regional growth patterns and new transportation planning policies adopted by the state. In addition, it provides refined analysis used to determine a preferred alternative that addresses congestion on Highway 20 through the downtown commercial district.

This plan update is aimed at fulfilling Transportation Planning Rule (TPR) requirements for comprehensive transportation planning in the cities of Oregon, and presents the investments and priorities for the pedestrian, bicycle, and motor vehicle systems along with new transportation programs to correct existing shortfalls and enhance critical services. For each travel mode, a master plan project map and list are identified to support the City's transportation goals and policies. Projects that are reasonably expected to be funded over the next 20 years are identified and are referred to as action plans. This TSP also estimates transportation costs and revenues through the 2030 horizon year and recommends new funding sources to support the implantation of the pedestrian, bicycle, and motor vehicle action plans.

Plan Process and Committees

The plan was developed in close coordination with City of Sisters staff and a formal Project Advisory Committee (PAC) comprised of agency staff and citizen representatives. The agencies included the Oregon Department of Transportation (ODOT), Deschutes County, and the City of Sisters. Citizens on the committee were city council and planning commission members, local business owners, and other volunteers. The committee participated in reviewing the technical methods and findings of the study, providing input and feedback throughout the alternatives



selection process, and reaching consensus on new recommendations. Additionally, public open houses were held to allow citizens to comment on the plan, make suggestions, voice concerns, and provide feedback. In overview, the Sisters TSP process included the following steps:

- Update City of Sisters Transportation Goals and Policies
- Evaluate 2008 Existing Transportation Conditions
- Develop a Travel Demand Modeling Tool for the City of Sisters Transportation Network
- Estimate Future Travel Needs
- Determine a Preferred Transportation Alternative to Address Highway 20 Congestion
- Update Transportation Needs by Mode and Prioritize Improvement Projects
- Determine Planning Level Cost Estimates of Improvements
- Identify Financing Sources
- Draft TSP

2018 Refinement Plan

In 2016, the City of Sisters initiated a refinement of the 2010 TSP. The purpose of this update was to refine:

- the plan for improvements on Barclay Drive and Locust Street along the Alternate Route;
- the planned intersection improvements at the following intersections:
 - Barclay Drive/Locust Street
 - US 20/Locust Street
 - US 20/OR 126
- the local circulation and access along US 20 and OR 126 east of Locust Street to City limits; and
- the pedestrian and bicycle plans.

To evaluate these objectives, the City engaged with a Project Advisory Committee (PAC) to review and comment on improvement alternatives. The results of this refinement have been incorporated throughout the TSP document. Further detail on this refinement effort, including the technical analysis conducted to evaluate alternatives and public feedback received, is included in Appendix S.

Document Outline

This document is divided into seven chapters and a separate technical appendix. The title and focus of each chapter are listed below:

- **Chapter 1. Executive Summary:** Summarizes the purpose of and process followed to develop this TSP, the content of this document, the key findings for each transportation mode, and the funding needed to implement the transportation modes' action plans.
- **Chapter 2. Goals and Policies:** Presents transportation goals and policies for the City.



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- **Chapter 3. Existing Conditions:** Documents the current transportation system including the existing facilities, how well the facilities perform and comply with current policies, and where outstanding deficiencies exist.
 - **Chapter 4. Future Conditions and Needs:** Discusses estimated transportation needs through the 2030 forecast year (assuming projected traffic growth and no additional transportation improvements).
 - **Chapter 5. Pedestrian Plans:** Presents proposed pedestrian master and action plans.
 - **Chapter 6. Bicycle Plans:** Presents proposed bicycle master and action plans.
 - **Chapter 7. Motor Vehicle Plans and Standards:** Presents proposed motor vehicle master and action plans, along with other transportation standards (including street cross sections, access spacing standards, and functional class designations).
 - **Chapter 8. Financing and Implementation:** Identifies estimated revenues and costs for the transportation projects and programs developed in this TSP update and presents new funding sources that can be used to bridge the expected revenue shortfall.
 - **Technical Appendix:** Contains detailed information and technical documentation, such as existing transportation inventories, forecasting data and analysis, design standards, the recommended safe routes to school (SR2S) plan, and other background materials.

Key Findings

The key findings of the TSP are summarized below for each transportation mode.

Pedestrian

This TSP proposes multiple strategies to help Sisters become a truly walkable community. Some of the key strategies include the following:

Develop Pedestrian Programs

- **Sidewalk Infill Program:** to promote connectivity
- **Spot Improvement Program:** to respond quickly to location-specific pedestrian infrastructure improvement needs
- **Education programs:** to increase the awareness of pedestrian needs and rights
- **Encouragement programs:** to promote walking as a convenient, healthy, safe, and viable transportation mode
- **Enforcement programs:** to ensure that pedestrians, bicyclists, and motorists obey traffic laws
- **Routine maintenance schedule:** to address on-going facility upkeep and repair needs



Prepare Pedestrian Plans

- **Safe Routes to School Plan:** to establish and strengthen Safe Routes to School (SR2S) Programs at the Elementary School, Middle School, and High School; to prioritize facility improvements throughout the city on SR2S travel corridors; and to ensure long-term, successful programs at each school
- **Americans with Disabilities Act (ADA) Transition Plan:** to identify strategies and priorities for upgrading the City's current transportation infrastructure to accommodate persons with disabilities

Address Specific Concerns

- **Highway 20 Design:** Pursue a Special Transportation Area (STA) designation and complete design standards to implement the design exception obtained for Highway 20 in order to narrow highway crossings; widen sidewalks; provide increased access to community activities, businesses, and residences; and better accommodate pedestrian, bicycle, and transit movement along and across the highway (*2018 Update: Subsequent to the completion of the 2010 TSP, the City and ODOT completed a project that implemented the design exceptions for Highway 20. Given that this project achieved the stated objectives, the City is no longer planning to pursue an STA designation.*)
- **Design Standards:** Update and clarify pedestrian facility construction standards and incorporate them into the City's Public Works Standards and Development Code
- **Existing Facilities:** Retrofit existing pedestrian facilities to current standards to promote safety, connectivity, and consistency

This TSP also includes recommendations and resources that can be used to pursue these strategies. One key resource is a list of prioritized pedestrian network improvements. This list is provided in Chapter 5 and includes various projects that fill pedestrian facility gaps, upgrade intersections for safer pedestrian crossings, expand the shared-use path network, and implement other infrastructure projects to encourage walking. Suggested improvements include low-cost measures yielding immediate results, such as signing and filling small sidewalk gaps in the existing system. Other suggested improvements, such as expanding the local trail system and improving pedestrian crossings, represent longer-term strategies for transforming Sisters into a truly pedestrian-friendly community. Each improvement project is categorized as either high, medium, or low priority. Only the high priority projects are included in the pedestrian action plan, which has identified funding sources.

A Safe Routes to School Plan is also provided in this TSP. It is included as Appendix J. Recommended design standards for pedestrian facilities are provided in Appendix K. In addition, various suggestions for pedestrian programs are included in Appendix L.

Bicycle

This TSP proposes multiple strategies to help Sisters become a truly bikeable community. Some of the key strategies include the following:



Develop Bicycle Programs

- **Sidewalk Infill Program:** to promote connectivity
- **Spot Improvement Program:** to respond quickly to location-specific bicycle infrastructure improvement needs
- **Bicycle Network Signing Program:** to determine sign placement locations and sign content (e.g., locations, distance, and travel time)
- **Education programs:** to increase the awareness of bicyclist needs and rights
- **Encouragement programs:** to promote bicycling as a convenient, healthy, safe, and viable transportation mode
- **Enforcement programs:** to ensure that pedestrians, bicyclists, and motorists obey traffic laws
- **Routine maintenance schedule:** to address on-going facility upkeep and repair needs

Prepare Bicycle Plans

- **Safe Routes to School Plan:** to establish and strengthen Safe Routes to School (SR2S) Programs at the Elementary School, Middle School, and High School; to prioritize facility improvements throughout the city on SR2S travel corridors; and to ensure long-term, successful programs at each school

Address Specific Concerns

- **Highway 20 Corridor:** Create safe, comfortable, and convenient facilities parallel to Highway 20 for pedestrians and bicyclists of all ages and abilities
- **Design Standards:** Update and clarify bicycle facility construction standards and incorporate them into the City's Public Works Standards and Development Code
- **Existing Facilities:** Retrofit existing bicycle facilities to current standards to promote safety, connectivity, and consistency

This TSP also includes recommendations and resources that can be used to pursue these strategies. One key resource is a list of prioritized bicycle network improvements. This list is provided in Chapter 6 and includes various projects that fill on-street bikeway gaps, upgrade intersections for safer bicycle crossings, expand the shared-use path network, and construct other infrastructure projects to encourage and facilitate bicycling. Suggested improvements include low-cost measures yielding immediate results, such as striping bicycle lanes where sufficient street width already exists. Other suggested improvements, such as expanding the local trail system, represent longer-term strategies for transforming Sisters into a truly bicycle-friendly community. Each improvement project is categorized as either high, medium, or low priority. Only the high priority projects are included in the bicycle action plan and have identified funding sources.

In conjunction with the pedestrian plans and programs, a Safe Routes to School Plan is provided in this TSP and also addresses bicycle routes. It is included as Appendix J. In addition, recommended design standards for bicycle facilities are provided in Appendix K, and various suggestions for bicycle programs are included in Appendix L.



Motor Vehicle

This TSP proposes multiple strategies to help Sisters meet its motor vehicle needs through the year 2030. Some of the key strategies include the following:

- Develop a Motor Vehicle Improvement Plan that provides the necessary capacity and circulation improvements.
- Pursue a Special Transportation Area (STA) designation and complete design standards to implement the design exception obtained for Highway 20 in the downtown core. *(2018 Update: Subsequent to the completion of the 2010 TSP, the City and ODOT completed a project that implemented the design exceptions for Highway 20. Given that this project achieved the stated objectives, the City is no longer planning to pursue an STA designation.)*
- Acquire right of way from developers to meet cross-section needs
- Perform Transportation System Management (TSM) – Improve management of the existing transportation system through one or more measures, including:
 - Neighborhood Traffic Management
 - Functional Classification
 - Cross-section standards
 - Access Management
 - Local Street Connectivity
- Perform Transportation Demand Management (TDM) – Encourage other transportation modes during the peak travel demand period besides single occupant vehicles.
- Designate Truck Routes through Sisters.

This TSP also includes recommendations and resources that can be used to pursue these strategies. One key resource is a list of motor vehicle intersection and roadway improvements that will allow the roadway network to support projected growth in Sisters through the year 2030. This list is provided in Chapter 7 and is based on the implementation of an alternate route that circumvents downtown Sisters during peak periods of congestion. This alternate route provides relief to Highway 20 and consists of improvements on Barclay Drive and Locust Street, intersection improvements at either end of the route, a roundabout at the Barclay Drive/Locust Street intersection, and intelligent transportation system (ITS) technology that detects congestion on the highway and directs traffic onto the alternate route. *(2018 Update: The 2018 refinement plan documents a phased approach to implementation of the alternate route.)*

Other Modes

Other transportation modes include transit, rail, and air. Regarding transit, due to the demand for transportation options for employees and residents needing to travel between Bend and Sisters and Redmond and Sisters, increased transit service around the city is considered important. Transit connections to neighboring cities and other locations of interest are desirable and have been placed in service by Cascade East Transit (CET). The existing transit plan for Sisters is



discussed in more detail in Chapter 3. Public opinion should be sought on the issue and used for guidance in managing the existing transit plan and developing future transit plans if needed to meet livability goals as growth continues. For rail, no facilities are planned in or near the City of Sisters. For air, no additional facilities are considered necessary within the City of Sisters

Funding Needs

The City of Sisters must incorporate new funding sources in order to construct all of the transportation improvement projects listed in the Motor Vehicle, Pedestrian, and Bicycle Action Plans and to provide transportation maintenance and operations services. Based on current funding sources and the total costs of maintenance, transportation programs, and infrastructure improvements (including the pedestrian, bicycle, and motor vehicle action plans), the City of Sisters expects to experience a funding shortfall of approximately \$20 million dollars through the year 2030. Recommended funding sources to cover the expected shortfall include increased transportation systems development charges (SDCs), Oregon Department of Transportation (ODOT) STIP, and fronting development exactions.

The total estimated transportation costs through the year 2030 are listed in Table 1-1. The current and recommended new funding sources through the year 2030 are listed in Table 1-2. As shown, the new funding sources would allow the City to meet its expected costs through the year 2030. The result is that the City would be expected to generate sufficient resources to fully fund its proportional share of the capital improvement projects listed in the Motor Vehicle, Pedestrian, and Bicycle Action Plans as well as ongoing maintenance and operations of City facilities.



Table 1-1: Estimated Transportation Costs through 2030 (2018 Dollars)

Transportation Element (by Project Type)	Estimated Cost (in \$1,000's)
Action Plan Projects	
Motor Vehicle	\$ 15,270
Pedestrian	\$ 3,768
Bicycle	\$ 3,176
Total Capital Projects	\$ 22,214
Planning, Operations, and Maintenance Programs and Services	
Materials & Services (\$ 280,000 per year)	\$ 3,360
Capital Outlay (\$130,000 per year)	\$ 1,560
Personal Services (\$260,000 per year)	\$ 3,120
Total Planning, Operations, and Maintenance Programs	\$ 8,040
Total Costs through 2030 (2018 Dollars)	\$ 30,254

Table 1-2: Current and Recommended New Funding Sources through 2030 (2018 Dollars)

Transportation Funding Source	Estimated Revenue (in \$1,000's)
Current Funding Source	
Street Fund	\$ 8,075
Urban Renewal District	\$ 170
System Development Charges	\$ 2,050
Total Current Revenue through 2030	\$ 10,295



Chapter 2. Goals and Policies

Introduction

This chapter presents transportation-related goals and policies for the City of Sisters. These goals and policies were used to guide development of the City of Sisters Transportation System Plan (TSP) Update and can be incorporated into appropriate sections of the City's code. These goals and policies were reviewed by the public at the open house held on December 5, 2007. The comments received at the open house are incorporated, and the goals are listed in the surveyed order of importance. These goals support the City's Vision Statement adopted by the City Council on February 22, 2007.

Sisters Community Vision Statement

We have a modern western community that honors and preserves its history. Sisters is a safe community with an authentic village atmosphere and a variety of public gathering places that invites walking and cycling. We especially support our youth and elders and provide services for all. We have a belief in all aspects of education and the presence of community institutions that foster individual and community growth. We create our future through a strong planning process that protects the town character, encourages environmental sustainability, and defines future development including housing options for all citizens.

The surrounding natural environment provides a spectacular setting for the community, and there are strong connections to it for personal, social, and economic purposes. We have a strong tourism economy because of this beauty. But we are also a diversified entrepreneurial economy that includes arts and culture, light industry, natural resource-based businesses and small retail. This economy especially supports locally conceived and owned businesses that provide a wide variety of year-round family wage jobs.

Highly developed local leadership and an active and informed citizenry make Sisters a fine example of community self-sufficiency and grassroots democracy.

Furthermore, during the city visioning process, action teams formed around certain aspects of the city vision statement and created goals for the community. Many of these goals are consistent with the goals established for the TSP process. The following three particular goals relate to transportation issues in the City of Sisters:



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- Goal 1: There is a reduction in through traffic in downtown Sisters and adequate parking for visitors.
 - Goal 2: Sisters has a public transportation system and a pedestrian and bicycle-friendly city core that minimizes motor vehicle use.
 - Goal 3: The community focuses on the preservation of spaces that help preserve the historic community character.

Goals and Policies

The goals established for this TSP update are listed below along with general descriptions and a number of associated policies designed to assist the City to accomplish the goals.

Goal 1: Livability

Design and construct transportation facilities in a manner that enhances the livability of the Sisters neighborhoods and business community.

- Policy a. Provide convenient walking and bicycling facilities to promote the health and physical well being of citizens.
- Policy b. Protect residential neighborhoods from excessive through traffic and travel speeds while providing reasonable access to and from residential areas.
- Policy c. Protect residential neighborhoods from excessive noise and pollutants associated with higher functional class streets and industrial uses.
- Policy d. Minimize the “barrier” effect that wide and/or high-volume transportation facilities have on non-motorized modes of travel.
- Policy e. Construct a transportation system that is accessible to all members of the community.
- Policy f. Provide a seamless and coordinated transportation system that is barrier-free, provides affordable and equitable access to travel choices, and serves the needs of all people and businesses, including people with low income, people with disabilities, children, and seniors.

Goal 2: Safety

Develop and maintain a safe and secure transportation system.

- Policy a. Design and maintain safe and secure pedestrian and bicycle ways between parks, schools, and other activity centers.
- Policy b. Design and construct transportation-related improvements to meet applicable City and Americans with Disabilities Act (ADA) standards.



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- Policy c. Adopt and implement access control and spacing standards for all streets under the City’s jurisdiction to improve safety and promote efficient through-street movement. Access control measures should be generally consistent with County and ODOT access guidelines to ensure consistency on City, County, and State roadways.

Goal 3: Economic Vitality

Promote the development of the City, Region, and State economies through the efficient movement of people, goods, and services and through the distribution of information.

- Policy a. Ensure a safe and efficient freight system that facilitates the movement of goods to, from, and through the City, Region, and State while minimizing conflicts with other travel modes.
- Policy b. Provide transportation facilities that support land uses that are consistent with the City’s Comprehensive Plan.
- Policy c. Evaluate land development projects to determine possible adverse traffic impacts.
- Policy d. Ensure that all new development contributes a fair share toward on-site and off-site transportation system improvements.

Goal 4: Sustainability

Provide a sustainable transportation system that meets the needs of present and future generations.

- Policy a. Encourage an energy efficient transportation system.
- Policy b. Increase the use of walking and bicycling for all travel purposes.
- Policy c. Decrease reliance on the automobile and increase the use of other modes to minimize transportation system impacts on the environment.
- Policy d. Practice stewardship of air, water, land, wildlife, and botanical resources. Take into account the natural environments in the planning, design, construction and maintenance of the transportation system.

Goal 5: Travel Choices

Plan, develop, and maintain a transportation system that provides travel choices and allows people to reduce the number of trips made by single-occupant vehicles.

- Policy a. Provide a citywide network of convenient walkways and bikeways that are integrated with other transportation modes and regional destinations.
- Policy b. Support travel options that allow individuals to reduce single-occupant vehicle trips.



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- Policy c. Encourage local employment and commercial opportunities to target local employees and retail customers.

Goal 6: Quality Design

Establish and maintain a set of transportation design and development regulations that are sensitive to local conditions.

- Policy a. Design streets to support their intended users.
- Policy b. Integrate bicycle and pedestrian facilities into all street planning, design, construction, and maintenance activities.
- Policy c. Require developers to include pedestrian, bicycle, and transit-supportive improvements within proposed developments and to adjacent rights-of way in accordance with adopted policies and standards.
- Policy d. Promote context-sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.
- Policy e. Minimize private property impacts.
- Policy f. Minimize construction impacts.

Goal 7: Reliability and Mobility

Develop and maintain a well-connected transportation system that reduces travel distance, improves reliability, and manages congestion.

- Policy a. Enhance street system connectivity wherever practical and feasible.
- Policy b. Maintain traffic flow and mobility on arterial and collector roadways.
- Policy c. Facilitate truck movements by providing adequate turn lane storage and turning radii at intersections and accesses used by trucks.
- Policy d. Adopt City mobility standards to evaluate the impacts of growth on City facilities. The standard for signalized, all-way stop, or roundabout intersections should be level of service D and a volume to capacity ratio equal to or less than 0.85. The standard for unsignalized, two-way stop control intersections should be a volume to capacity ratio equal to or less than 0.90. Mobility should be evaluated by methods approved by the City Engineering or Public Works Department (e.g. Highway Capacity Manual).

Goal 8: Efficient and Innovative Funding

Efficiently allocate available funding for recommended transportation improvements and pursue additional transportation funding that includes innovative funding methods and sources.



-
- Policy a. Plan for an economically viable and cost-effective transportation system.
 - Policy b. Identify and develop diverse and stable funding sources to implement recommended projects in a timely fashion.
 - Policy c. Make maintenance of the transportation system a priority.
 - Policy d. Identify local street improvement projects that can be funded by the State of Oregon to improve the state highway system.
 - Policy e. Provide funding for local match share of jointly funded capital projects with other public partners.
 - Policy f. Prioritize funding of projects that are most effective at meeting the goals and policies of the Transportation System Plan.

Goal 9: Compatibility

Develop a transportation system that is consistent with the City's Comprehensive Plan and that coordinates with County, State, and Regional plans.

- Policy a. Coordinate and cooperate with adjacent jurisdictions and other transportation agencies to develop transportation projects that benefit the City, Region, and State as a whole.
- Policy b. Work collaboratively with other jurisdictions and agencies so the transportation system can function as one system.
- Policy c. Coordinate with other jurisdictions and community organizations to develop and distribute transportation-related information.
- Policy d. Review City transportation standards periodically to ensure consistency with Regional, State, and Federal standards.
- Policy e. Coordinate with the County and State agencies to ensure that improvements to County and State highways within the City benefit all modes of transportation.



Chapter 3. Existing Conditions

Introduction

This chapter documents the existing conditions of the transportation system in the City of Sisters for all travel modes, including pedestrians, bicycles, transit, motor vehicles, rail, and air. The existing transportation needs for each mode are also specified.

The 2018 refinement included textual and project list updates to reflect completed projects. The operational analysis that formed the basis of the motor vehicle planned projects was not updated as part of the 2018 refinement and continues to reflect the existing conditions reported in the 2010 TSP. Updated analyses for the intersections specifically evaluated as part of the 2018 refinement are reflected in Appendix S.

Study Area

The study area is shown in Figure 3-1 and includes the transportation system network within the Sisters Urban Growth Boundary (UGB). To understand existing travel patterns and conditions, an inventory of the existing transportation infrastructure was conducted in the winter of 2007-2008 to establish base year conditions. In addition to the citywide inventories of study area roadways, focused operational analysis was performed for 15 specific study intersections:

- McKenzie Highway (OR 242)/West McKinney Butte Road
- McKenzie Highway (OR 242)/South Hood Street (OR 242)–West Hood Avenue
- Santiam Highway (US 20/OR 126)/Rail Way
- Santiam Highway (US 20/OR 126)/West Barclay Drive–West McKinney Butte Road
- Santiam Highway (US 20/OR 126)/South Hood Street (OR 242)
- West Cascade Avenue (US 20/OR 126)/Pine Street
- Cascade Avenue (US 20/OR 126)/Elm Street
- Main Avenue/North Elm Street
- Hood Avenue/South Elm Street
- East Cascade Avenue/North Locust Street (Camp Polk Road)
- McKenzie Highway (US 20/OR 126)/Locust Street (Updated with 2018 refinement plan, See Appendix S)
- McKenzie Highway (US 20/OR 126)/Buckaroo Trail (Updated with 2018 refinement plan, See Appendix S)
- McKenzie Highway (OR 126)/East Creekside Court (Updated with 2018 refinement plan, See Appendix S)



-
- West Barclay Drive/North Pine Street (Updated with 2018 refinement plan, See Appendix S)
 - East Barclay Drive/North Locust Street (Camp Polk Road) (*Updated with 2018 refinement plan, See Appendix S*)
 - McKenzie Highway (US 20/OR 126)/Jefferson Avenue (*Added with 2018 refinement plan, See Appendix S*)
 - McKenzie Highway-Bend (US 20)/McKenzie Highway (OR 126) (*Added with 2018 refinement plan, See Appendix S*)
 - Barclay Drive/North Larch Street (Added with 2018 refinement plan, See Appendix S)

City of Sisters Transportation System Plan

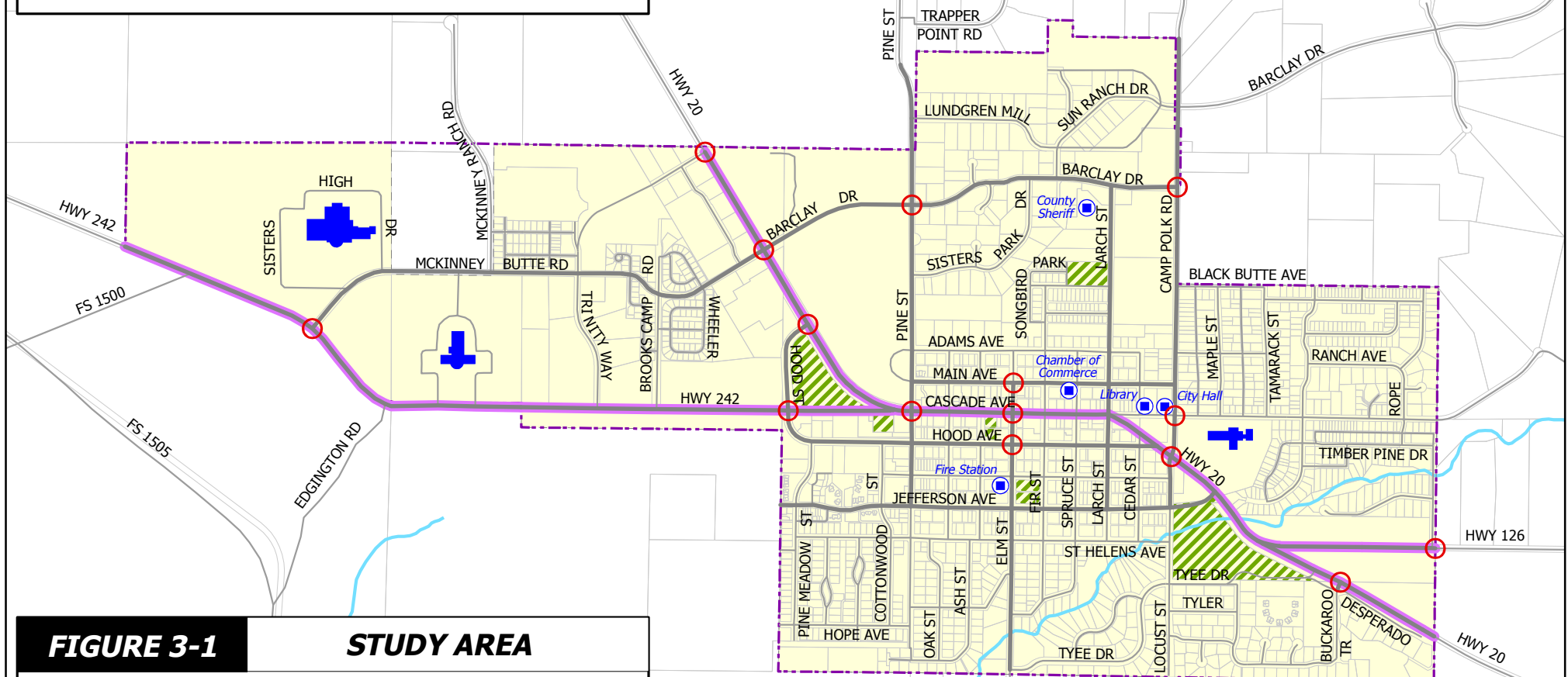
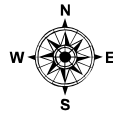


FIGURE 3-1

STUDY AREA

Legend

- Study Intersection
- Civic/Government
- School
- Park
- Urban Growth Boundary
- City Limit
- Parcels
- Water
- Major Street
- Local Street

Roadway Jurisdiction

State of Oregon
All other streets within City Limits are City of Sisters jurisdiction.



Pedestrians

Pedestrians play a key role in the community identity of Sisters, and a great deal of emphasis is put on their ability to safely and efficiently traverse town and access the schools, parks, businesses, and other attractions and venues throughout Sisters. This section reviews the various pedestrian facilities in the City of Sisters, summarizes pedestrian volume data, identifies major pedestrian destinations (with particular emphasis on the walking environment near the schools in Sisters), and discusses other critical pedestrian elements such as transit connections. It also summarizes existing and anticipated system deficiencies of the pedestrian network. This assessment served as a basis for identifying site-specific and system-wide pedestrian improvements in the City of Sisters.

Facilities

Pedestrian travel is accommodated and enhanced by sidewalks, shared use paths, crosswalks, curb ramps and other infrastructure. Figure 3-2 depicts the current pedestrian network in the City of Sisters. The inventory and assessment largely focused on the arterial and collector street system, as citywide transportation system plans focusing on system framework typically do not address site-specific conditions on local streets; however, general observations on local streets were performed to gain an understanding of potential pedestrian issues on these corridors.

Sidewalks

The presence and condition of sidewalks in Sisters have improved drastically with several key pedestrian improvement projects completed since the 2010 TSP. Sidewalk widths throughout the city measure to five to eight feet, and planter strips separate sidewalks from traffic in some areas, with widths ranging between 4-feet and 16-feet, except in some blocks downtown, as noted below.

A complete sidewalk system (with sidewalks on both sides of streets) exists in the downtown core (i.e. the area bounded by Hood Avenue, Main Avenue, Locust Street and Pine Street). The downtown core's sidewalk environment includes a variety of complementary pedestrian facilities at various locations, including ADA-compliant curb ramps, curb-extensions, pedestrian-scale lighting, and amenities such as benches and trash receptacles. In addition, diagonal parking creates a spatial buffer between pedestrians and motorists along Hood and Main Avenues.

City of Sisters Transportation System Plan

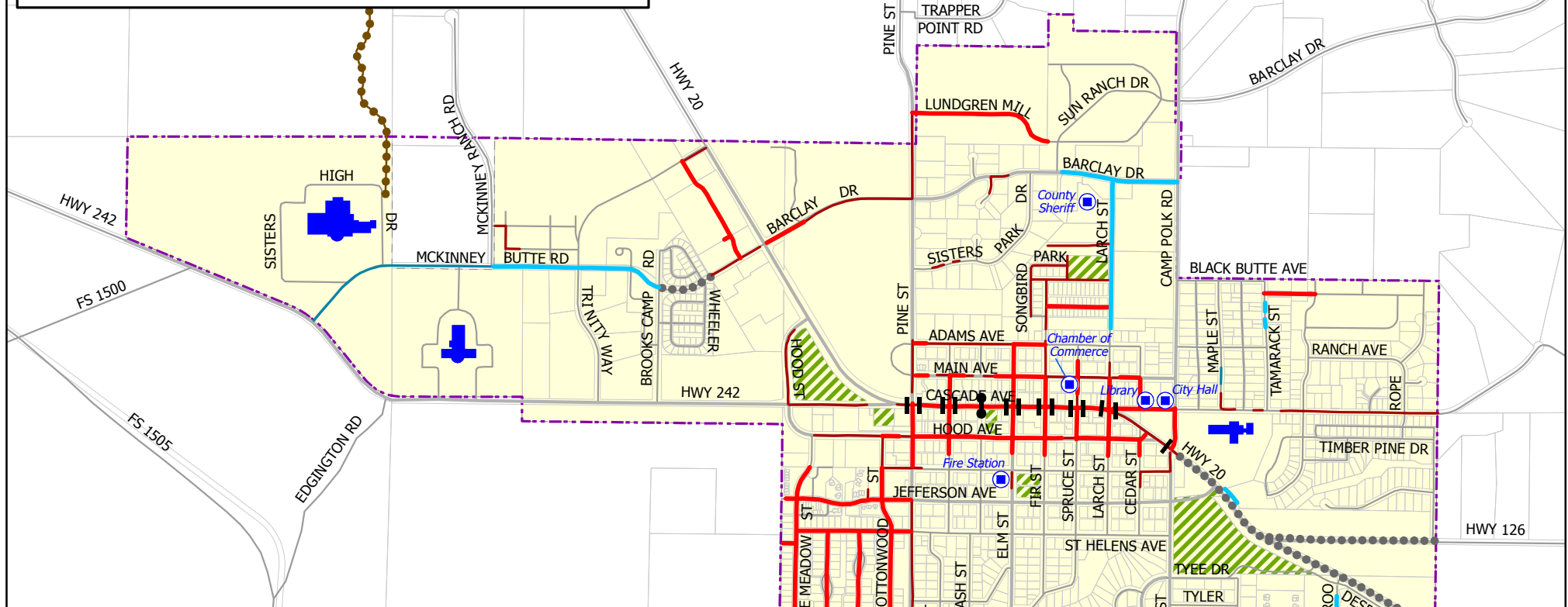
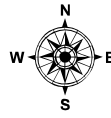


FIGURE 3-2

EXISTING PEDESTRIAN FACILITIES

Legend

- | | | | |
|------------------------------|-----------------------------|--|-----------------------|
| | Pedestrian Path, Both Sides | | Civic/Government |
| | Pedestrian Path, One Side | | School |
| | Sidewalk, Both Sides | | Park |
| | Sidewalk, One Side | | Urban Growth Boundary |
| | Shared Use | | City Limit |
| | Wide Shoulder | | Parcels |
| Highway 20 Crosswalks | | | Major Street |
| | With Curb Extension | | Local Street |
| | Without Curb Extension | | |



Pedestrian Paths

In some residential areas and along collectors outside the downtown area, narrow asphalt paths (less than 6 feet) take the place of sidewalks. These paths exist along portions of Barclay Drive, McKinney Butte, Larch St and within residential areas such as Timber Creek and the Edge of the Pines. Although intended specifically for pedestrians, bicyclists and other non-motorized transportation users also take advantage of these facilities.

Shared Use Paths

Construction and development of the shared use path system within the city limits is directed by the 2010 Transportation System Plan. The Sisters Community Trails Plan (2011) directs trail development outside the city limits and emphasizes connections with facilities recommended by the 2010 TSP. The Safe Routes to School project was the first bicycle/pedestrian project completed from this plan and accommodates bicycles and pedestrians around all three school facilities.

Roadway Shoulders

Roadway shoulders are utilized for two-way pedestrian travel in areas of Sisters where sidewalks do not exist. Some major streets where shoulders are the only pedestrian facilities include the following:

- Portions of Highway 20 within the city limits
- Highway 126
- Portions of Barclay Drive

Although roadway shoulders may appropriately accommodate pedestrians in rural and lower volume residential areas, the gradual outward expansion of Sisters urban development has resulted in higher traffic volumes on most roads, necessitating the provision of additional pedestrian and bicycle facilities to separate pedestrians and motorists.

Street Crossings

The majority of pedestrian street crossings occur at intersections, and the quality of these crossings varies by location. Marked crosswalks and curb ramps exist at many intersections within downtown Sisters and in areas outside the downtown that were built or rebuilt after 1999. These crosswalks vary in design and are primarily located at intersections near the schools and other pedestrian trip generators. Marking of intersections along lower-order streets varies by location, and outside of downtown Sisters, most intersections either lack curb ramps or may lack curbs and sidewalks all together.

Pedestrian Destinations

Major pedestrian destinations typically include schools, employment areas, shopping areas, neighborhood commercial areas, and parks. Within Sisters, popular pedestrian destinations include:

- Downtown Sisters retail and commercial businesses



-
- Sisters Elementary School
 - Sisters Middle and High Schools
 - Post Office
 - Five Pine
 - Recreational trails including Peterson Ridge, Deschutes National Forest trails, and Sisters community trails
 - Community facilities
 - Parks and recreation areas (e.g. The Village Green, Triangle Park and Sisters City Park)

Connections to Schools

Schools are important pedestrian destinations that should receive particular consideration due to the high levels of youth, child, and family pedestrian activity they typically generate. The following sections describe pedestrian access for the City of Sisters public schools, which include elementary, middle, and high schools; the middle and high schools are analyzed together due to their proximity.

Sisters Elementary School

Sisters Elementary School is located at the corner of Locust Street and Cascade Avenue on the east side of town. The McKenzie Highway (US 20/OR 126) runs along the southwest edge of the property and is a significant barrier for pedestrian access.

Pedestrian facilities vary in the vicinity. As shown in Figure 3-2, sidewalks exist on both sides of Cascade Avenue east of the school and along Locust Street near the public library, but on some nearby streets (e.g., Locust Lane, Maple Street and Cascade Avenue across from the school) , sidewalks are lacking and students have created demand paths through front yards and have been observed walking in the roadway, on roadway shoulders, or in adjacent ditches. In addition, several marked crosswalks and accompanying warning signs exist in the vicinity of the school, primarily at intersections. One existing crossing location that is a safety concern for pedestrians is at the intersection of the McKenzie Highway (US 20/OR 126) and Locust Street; this location has high traffic volumes and speeds.

Sisters Middle and High Schools

Sisters Middle and High Schools are located in adjoining facilities on the west side of town near the intersection of the McKenzie Highway (OR 242) and McKinney Butte Road. Several pedestrian paths, including one on McKinney Butte Road, serve the schools. A ten-foot wide shared use path connects the Tollgate Housing development to the school. One marked crosswalk exists on McKinley Butte Road in front of the high school, but there are no facilities on the McKenzie Highway (OR 242) near the middle school entrance. A winter site visit revealed travel paths worn into icy and snowy road shoulders.



Pedestrian Volumes

Pedestrian volumes were not counted separately, but data were available in conjunction with motor vehicle traffic counts collected at TSP study intersections between the years 2005 and 2007. The counts were performed between April and October during peak motor vehicle traffic conditions (i.e., 4:00 p.m. to 6:00 p.m.).

Most intersections experienced ten or fewer pedestrian crossing movements per hour, though intersections on Cascade Avenue served higher volumes. The highest count occurred at Cascade Avenue (US 20/OR 126) and Pine Street and consisted of 108 pedestrians. Another intersection of interest is the McKenzie Highway (US 20/OR 126) and Locust Street intersection, located near Sisters Elementary School. It is anticipated that much higher pedestrian volumes occur here during the AM and PM school peak hours, and public concern has been expressed due to high traffic volumes and speeds.

These counts capture a brief snapshot of pedestrian activity, but may not accurately capture the entire picture. While the 4:00 p.m. to 6:00 p.m. timeframe during the weekday captures peak vehicle volumes, these hours don't always correspond to peak pedestrian volumes. Weekend and/or midday or evening pedestrian activity may be significantly greater. In the future, a better picture of existing pedestrian activity levels may be obtained by counting pedestrians at key locations during periods known for having high activity.

Pedestrian Collision History

The Oregon Department of Transportation provided collision data for 2004 through 2006. Within this time period, there were five collisions that reported the involvement of a pedestrian. In one of these collisions, a pedestrian was hit and injured; this occurred at the intersection of Cascade Avenue (US 20/OR 126) and Pine Street.¹ The other four collisions were rear-ending of vehicles but cited the involvement of pedestrians; based on the crash type and locations (i.e. at various intersections along Cascade Avenue), it is likely that the front vehicles had slowed down to allow pedestrians to cross the road, and the motorists following from behind were following too closely or were inattentive.

Existing Issues

Based on the existing pedestrian facilities inventory, the following issues were identified (a more detailed explanation of existing pedestrian issues faced by the City of Sisters can be found in the attached document):

Highway 20 (US 20/OR 126) Concerns

- High traffic volumes along Cascade Avenue (US 20/OR 126) create challenging pedestrian crossing conditions and, in effect, form a barrier dividing the city. This is especially true during summer months and during events such as the Quilt Show.

¹ The location of this vehicle-pedestrian collision is shown in Figure 3-9 along with the motor vehicle collisions.



-
- Awkward intersection geometry in places along Cascade Avenue (US 20/OR 126) creates challenging pedestrian crossing conditions. Locations of specific concern include the intersection of McKenzie Highway (US 20/OR 126) and Locust Street due to its proximity to the elementary school.

Other Concerns

- Discontinuous streets (as well as circuitous streets such as those in northern and western Sisters) impede direct travel between pedestrian destinations.
- Shared use path network is not sufficiently comprehensive or connected.
- Sidewalk networks are fragmented along Adams Avenue and near public schools.
- Facilities are lacking in key locations where there is demand, as indicated by informal paths created by pedestrians along Cascade Avenue near Sisters Elementary School and along Highway 242 near Sisters Middle and High Schools.
- Ditches on roadway shoulders force pedestrians to walk on road.
- Street lighting is poor in some places.
- Inadequate curb ramps make travel difficult for disabled persons.
- Auto bumper intrusion decreases sidewalk width available for pedestrian usage.
- High vehicle speeds create pedestrian safety and comfort issues on Locust Street near Sisters Elementary School and on Highways 20, 126, and 242 as motorists approach the downtown core.



Bicycles

This section reviews the various bicycle facilities in the city, summarizes bicycle volume data at study intersections, identifies major bicycle destinations (with particular emphasis on facilities near Sisters' schools), and discusses other critical bicycle elements. It also summarizes the existing and anticipated deficiencies of the bicycle network. This assessment served as a basis for identifying site-specific and system-wide bicycle improvements in Sisters.

Facilities

Several types of bicycle facilities exist in Sisters, including shared roadways, shoulder bikeways, bike lanes, and shared-use paths (also known as trails or multi-use paths). Figure 3-3 depicts the current bike network. The inventory and assessment largely focused on the arterial and collector street system, as citywide transportation system plans typically do not address site-specific conditions on local streets; general observations on local streets were recorded to gain an understanding of current conditions and potential issues on these corridors.

Shared Roadways

Most local streets in Sisters are low speed/low volume roadways that could be classified as shared roadways. These streets can accommodate bicyclists of all ages and currently have little need for dedicated bicycle facilities (e.g., bicycle lanes). They generally have low vehicle volumes (3,000 ADT or less) and low posted speeds (25 MPH or less). On some streets, however, motorists have been observed exceeding posted speeds (e.g., Barclay Drive). Curb-to-curb (or edge of pavement where curbs are absent) widths range between 25 and 40 feet with typical street cross-sections including two vehicle travel lanes (with or without striping) and on-street parking.

Shoulder Bikeways

Shoulder bikeways accommodate bicyclists on rural roadways connecting Sisters with outlying communities. Sisters has shoulder bikeways on Highway 126 and Highway 20 east of Locust Street. Although shoulder bikeways are appropriate in rural areas, Sisters is gradually expanding its urban area, resulting in higher traffic volumes on outlying roads; therefore, there is a need to provide additional designated facilities for cyclists.

Bike Lanes

State highways, arterial streets, and collector streets comprise the majority of the bike lane network in Sisters. The bike lanes are generally 5 feet wide and are throughout Sisters. Bike lanes are striped in the downtown core along Main Ave and Hood Ave as well as on many of the roadways on the edges of town.

City of Sisters Transportation System Plan

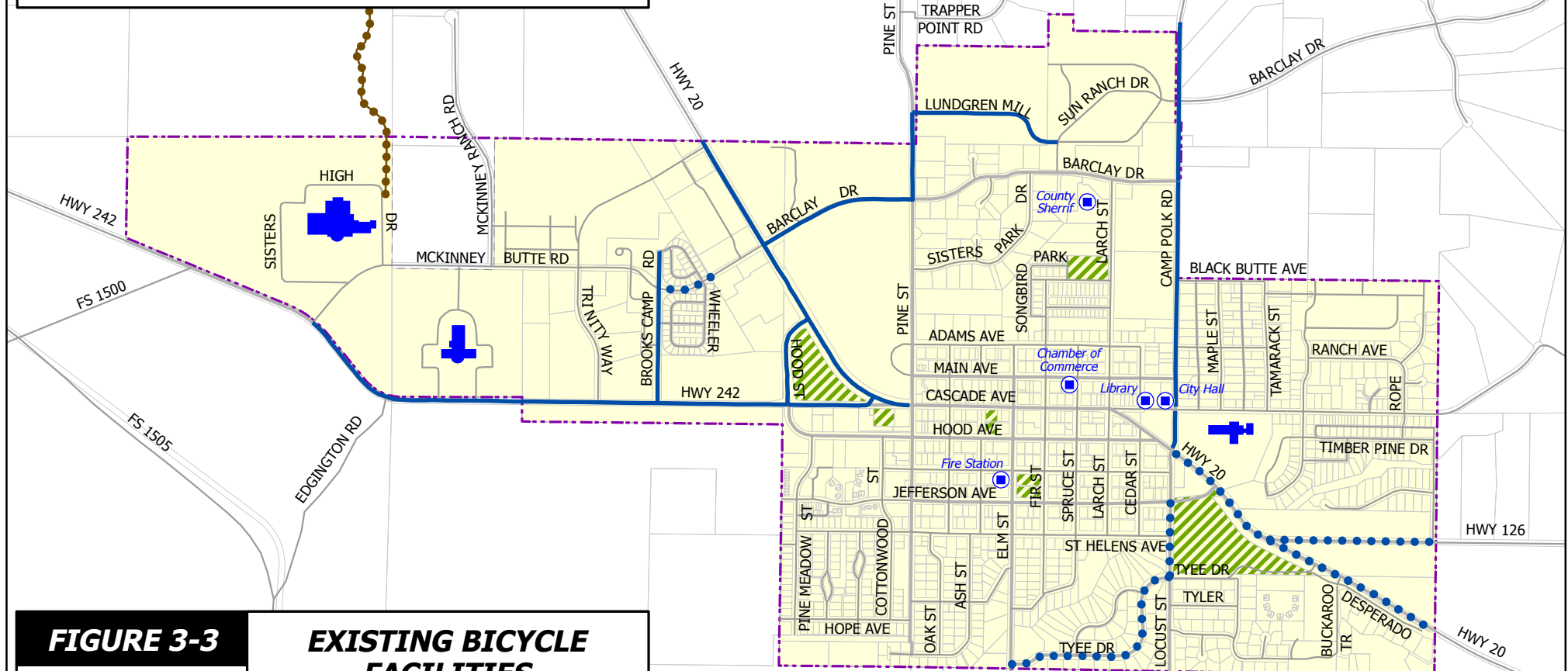
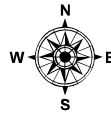


FIGURE 3-3

EXISTING BICYCLE FACILITIES

Legend

- | | | | |
|--|------------------|--|-----------------------|
| | Bicycle Lane | | Urban Growth Boundary |
| | Wide Shoulder | | City Limit |
| | Shared Use | | Parcels |
| | Civic/Government | | Major Street |
| | School | | Local Street |
| | Park | | |



Shared Use Paths

Construction and development of the shared use path system is directed by the Sisters Community Trails Plan (2011). The Safe Routes to School project was the first bicycle/pedestrian project completed from this plan and accommodates bicycles and pedestrians around all three school facilities.

There are a number of additional existing, paved shared use paths within the City, as shown in Figure 3-3.

Bicycle Parking

Bicycle parking is an essential component of a community's bikeway network, and can significantly influence whether a person decides to complete a trip via bicycle. The City of Sisters Comprehensive Plan notes that new developments are required to have bike parking, as described in Chapter 4 of the City of Sisters Development Code.

In Sisters, the quantity of bike parking facilities varies by location. Bike racks exist at several commercial locations, schools and government buildings in the downtown core. Most parking facilities consist of a bicycle rack located in a parking lot or near a building entrance. Some key bicycle parking locations include City Hall, Chamber of Commerce, Public Library, Sisters Market, and Sisters Elementary, Middle and High Schools.

The quality of existing bicycle parking varies by location, primarily due to the style, upkeep and/or placement of the rack. Racks situated immediately adjacent to walls or shrubbery have reduced capacity by limiting user access to one side of the rack. Some existing racks are considered substandard because they do not allow a bicycle frame and at least one wheel to be locked to the rack without the use of a long cable or unless the bicycle hangs over the rack. The shortage of quality bicycle racks in high-demand locations typically generates informal bicycle parking activities with cyclists securing their bikes to hand rails, poles and other objects.

Bicyclist Destinations

Major bicyclist destinations typically include schools, employment areas, shopping areas, neighborhood commercial areas, and parks. Within Sisters, popular bicycle destinations include the following locations:

- Downtown Sisters retail and commercial businesses
- Sisters Elementary School
- Sisters Middle and High Schools
- Recreational trails including Buckrun, Three Creeks, Sisters community trails and others
- Community facilities (e.g. post office)



Parks and recreation areas (e.g. The Village Green, Barclay, Fir St, Creekside and Clemens Park) Connections to Schools

Schools are important bicycle destinations that should receive particular consideration due to the moderate levels of youth and child bike activity they typically generate. The following sections describe bicycle access for Sisters' public schools, which include elementary, middle, and high schools.

Sisters Elementary School

Sisters Elementary School is located at the corner of Locust Street and Cascade Avenue on the east side of town. Facilities to service bicyclists traveling to and from the school include bike lanes on Main Avenue, Hood Avenue, North Locust Street (Camp Polk), and asphalt paths on Cascade Avenue east of Locust Street. Some students were also observed riding on sidewalks and other facilities intended for pedestrians.

Sisters Middle and High Schools

Sisters Middle and High Schools are located in adjoining facilities on the west side of town near the intersection of the McKenzie Highway (OR 242) and McKinney Butte Road. Bicyclists are accommodated by a paved multi-use path on the north side of McKenzie Highway (OR 242) and a shared use path that connects the Tollgate Housing development to the school with a 10 foot wide compact-gravel path. In addition, the McKenzie Highway (OR 242) has marked bike lanes.

Bicycle Volumes

Bicycle volumes were not counted separately, but data were available in conjunction with motor vehicle traffic counts collected at TSP study intersections between the years 2005 and 2007. The counts were performed between April and October during peak motor vehicle traffic conditions (i.e., 4:00 p.m. to 6:00 p.m.).

Most intersections experienced two or fewer bicyclist crossing movements per hour. Some intersections, including several along existing bicyclist facilities and one near Sisters Elementary School, served higher volumes. These intersections include Cascade Avenue at Locust Street, Pine Street at Cascade Avenue, Highway 20 at Cascade Avenue and Hood Street at Highway 242. The intersection of Locust Street and Camp Polk Road served the highest number of cyclists of all count intersections.

These counts capture a brief snapshot of bicycling activity, but may not accurately capture the entire picture. The 4:00 p.m. to 6:00 p.m. timeframe during the weekday captures peak vehicle volumes, but these hours don't always correspond to peak bicycle volumes. For example, these counts may not include seasonal cyclists passing through town on a tour or children traveling to school for recreation on neighborhood streets. Weekend and/or midday or evening bicycle activity may be significantly greater due to the higher numbers of recreational bicycling trips. In the future, a better picture of existing bicycling activity levels may be obtained by counting cyclists at key locations during periods known for having high activity.



Existing Issues

Based on the existing bicycle facilities inventory, the following issues were identified (a more detailed explanation of existing bicycle issues faced by the City of Sisters can be found in the attached document):

Highway 20 (US 20/OR 126) Concerns

- High traffic volumes along Cascade Avenue (US 20/OR 126) create challenging bicyclist crossing conditions and, in effect, form a barrier dividing the city.
- Minimal bicycle crossing treatments exist along Cascade Avenue (US 20/OR 126), with particular concern at the intersection of McKenzie Highway (US 20/OR 126) and Locust Street due to its proximity to the elementary school.

Other Concerns

- Discontinuous streets (as well as circuitous streets such as those in northern and western Sisters) impede direct travel between bicyclist destinations.
- Shared use path network is not sufficiently comprehensive or connected.
- Long distances between bike lane pavement markings in some places (e.g. Locust Street) create a feeling of facility discontinuity.
- Lack of shoulders in some locations forces cyclists to share travel lanes with motorists on some higher volume roads.
- Street lighting is poor in some places.
- High vehicle speeds create bicyclist safety and comfort issues on Locust Street near Sisters Elementary School and on Highways 20, 126, and 242 as motorists approach the downtown core.
- Significant gaps exist in the bicycle network, especially along Locust, Jefferson and Pine Streets, which are locations where improvements were suggested in the 2001 Transportation System Plan².
- Inadequate bike parking exists (e.g. lack of spaces and use of ‘wheel-bender’ racks), especially near Sisters Elementary School.

² *City of Sisters Transportation System Plan (TSP)*, David Evans and Associates, June 2001.



Transit

Transit systems provides service so that passengers may access a variety of different destinations, including essential trips such as those for healthcare or jobs. Existing transit facilities and issues in the City of Sisters are described in this section.

Facilities

The City of Sisters is served by CET with fixed transit routes. CET provides transit service (the Community Connector shuttle) between Bend and Sisters (Route 29) and Redmond and Sister (Route 28) with roundtrip service three times per weekday. There are currently three transit stops in city limits, one at City Hall on Main Avenue, one stop at the Kiwanis Food Band and one along Arrowleaf Trail near St. Charles Medical clinic.

The Community Connector has one morning route from Bend to Sisters and two afternoon routes from Sisters to Bend. These routes originate and terminate at Hawthorne Station in Bend. The Redmond to Sisters route offers two morning runs from Redmond to Sisters and one afternoon run. This route originates and terminates at the Downtown Redmond transit Center.

Additional routes between Sisters and Three Creeks Lake, Black Butte Ranch, Suttle Lake, Hoodoo ski resort and Santiam Pass are currently being evaluated through a grant opportunity via the Federal Lands Access Program (FLAP). Additional community-stakeholder input and will be necessary for the success of this project.

Additionally, CET provides dial-a-ride service to all residents of the Sisters area on a demand-responsive basis. Residents must schedule a ride 24 hours in advance but can ride anywhere in the service area, which extends five-miles from the City center. Additionally, dial-a-ride service allows for bicycle transport.

Existing Issues

Based on the existing transit facilities inventory, the following issues were identified:

- Transit connections between Sisters and Bend and between Sisters and Redmond are in demand. Transit connections to other neighboring cities and other locations of interest are infrequent or nonexistent.



Motor Vehicles

The use of personal motor vehicles is the predominant method of transportation to, from, and within the City of Sisters. Existing motor vehicle facilities, volumes, intersection operations, safety, and issues within the City of Sisters are described in this section.

Motor Vehicle Facilities

The motor vehicle system within the City of Sisters includes city streets and state highways. The existing jurisdiction, classifications, standards, and physical conditions of these facilities are documented.

Roadway Jurisdiction

Roadway ownership and maintenance responsibilities of the various roads in the Sisters UGB depend on the roadway's jurisdiction. The State highways are under the jurisdiction of the Oregon Department of Transportation (ODOT), and the City of Sisters is responsible for the remainder of the roads within the city limits. The exceptions are designated private roadways, where maintenance and improvements are the responsibility of the owner.

Functional Classification

Functional classification is the designation of a roadway by the level of access or mobility it is intended to provide. The three principal classification designations are local (more access but less mobility), collector (transition between access and mobility), and arterial (less access but more mobility). The existing functional classifications from the 2001 Sisters TSP are shown in Figure 3-4. Three categories were identified including: arterial, collector, and local streets.

For State highways in the Sisters UGB, ODOT classifications and designations exist and are also shown in Figure 3-4. The Oregon Highway Plan identifies the Santiam Highway (US 20), the McKenzie-Bend Highway (US 20), and the segments of the McKenzie Highway passing through Sisters (US 20/OR 126) and heading east towards Redmond (OR 126) as Statewide Highways. The segment of the McKenzie Highway west of Sisters (OR 242) is a District Highway and a non-freight route.³ In addition, the Santiam (US 20), McKenzie-Bend (US 20), and McKenzie (US 20/OR 126) Highways are designated as freight routes along their entire length through Sisters, and the portions of these highways east of the City limits are designated as expressways. These designations generally correspond to more stringent mobility standards.

³ 1999 Oregon Highway Plan (OHP).

City of Sisters Transportation System Plan

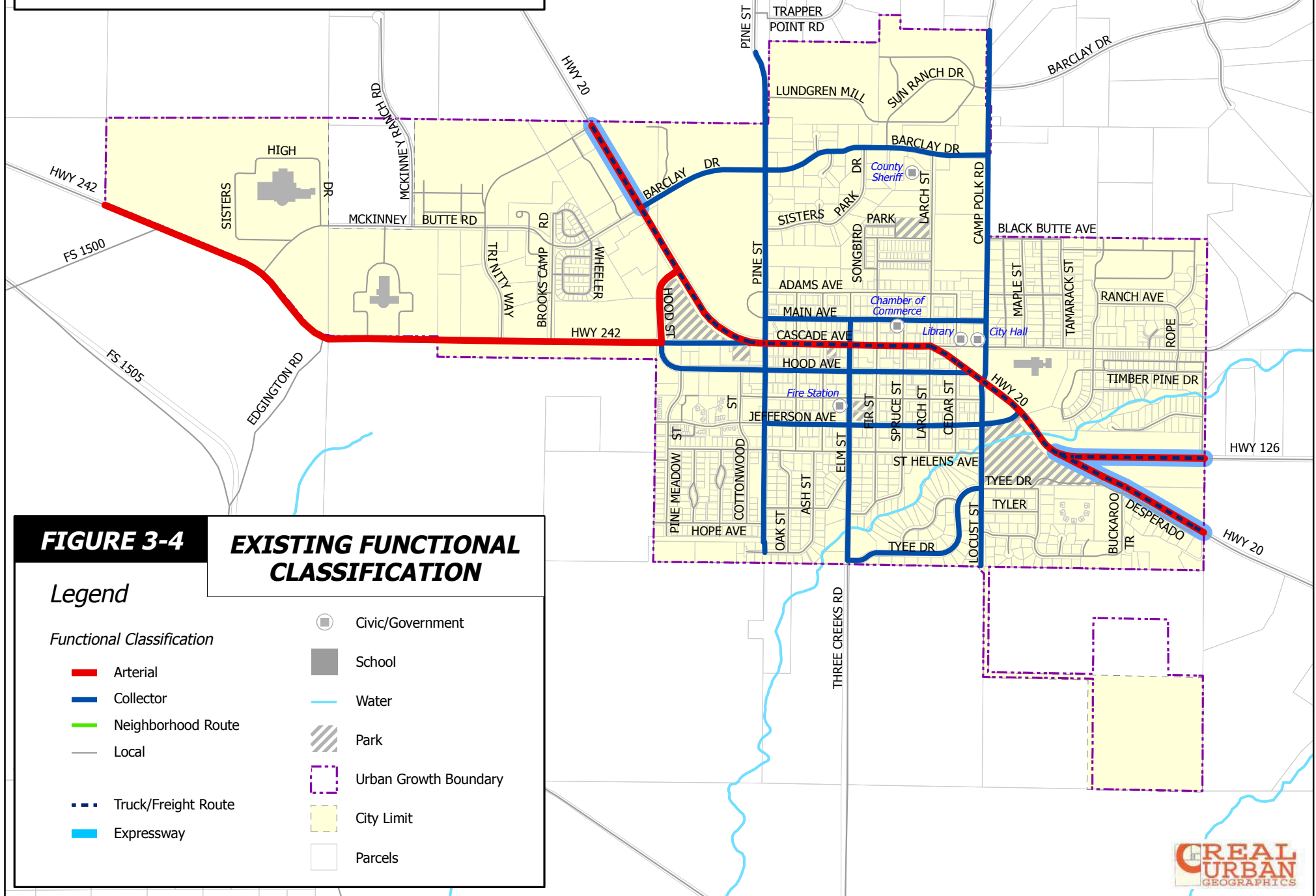
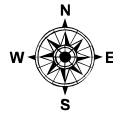


FIGURE 3-4

EXISTING FUNCTIONAL CLASSIFICATION

Legend

Functional Classification

- Arterial
- Collector
- Neighborhood Route
- Local
- - - Truck/Freight Route
- Expressway

- Civic/Government
- School
- Water
- Park
- Urban Growth Boundary
- City Limit
- Parcels



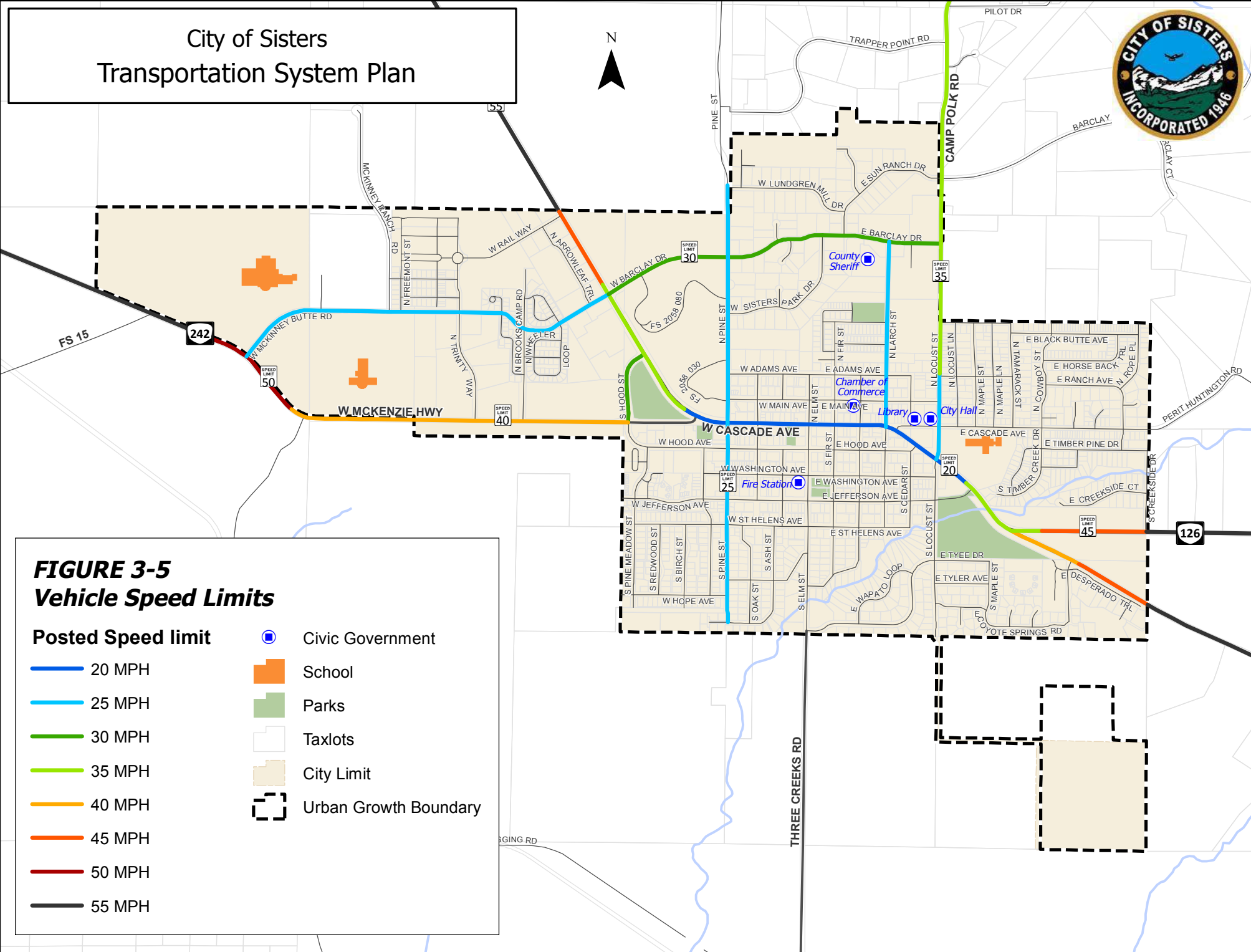
Posted Speeds

An inventory of the posted speeds in the Sisters UGB is shown in Figure 3-5. The majority of streets within the UGB have posted speed limits of 25 miles per hour (mph). Arterial roadways outside of the downtown area have higher speeds, ranging from 35 mph to 45 mph, and the main downtown streets (Main, Cascade, and Hood Avenues) have a lower speed of 20 mph.















On-Street Parking

Existing striped on-street parking is shown in Figure 3-6 and is concentrated in downtown Sisters. All the on-street parking on Cascade Avenue (US 20/OR 126) is parallel parking, consistent with ODOT standards. Most of the other streets in the downtown network have parking on both sides of the street, with the majority being diagonal parking. Outside of downtown, there is limited striped on-street parking along collectors and neighborhood routes. The majority of local streets allow on-street parking, but no striping exists to designate stall locations.

City of Sisters Transportation System Plan



**FIGURE 3-5
Vehicle Speed Limits**

- | | | | |
|--|--------|---|-----------------------|
|  | 20 MPH |  | Civic Government |
|  | 25 MPH |  | School |
|  | 30 MPH |  | Parks |
|  | 35 MPH |  | Taxlots |
|  | 40 MPH |  | City Limit |
|  | 45 MPH |  | Urban Growth Boundary |
|  | 50 MPH | | |
|  | 55 MPH | | |

City of Sisters Transportation System Plan

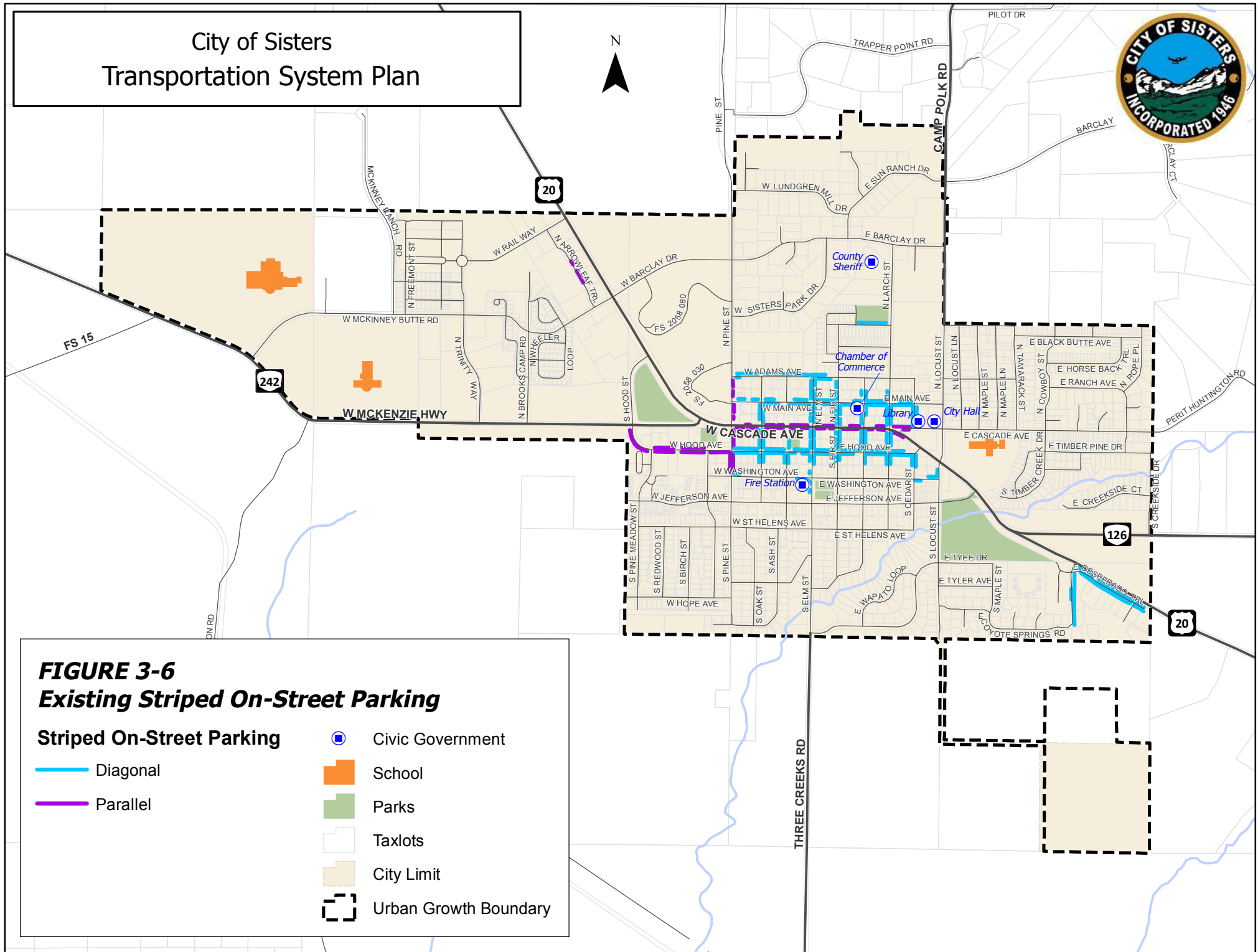










FIGURE 3-6
Existing Striped On-Street Parking

- | | | | |
|---|----------|---|-----------------------|
|  | Diagonal |  | Civic Government |
|  | Parallel |  | School |
| | |  | Parks |
| | |  | Taxlots |
| | |  | City Limit |
| | |  | Urban Growth Boundary |



Intersection Control

There are no traffic signals located within the Sisters UGB. Two roundabouts exist within Sisters city limits; one at the intersection of US 20 and Barclay Drive and one at the intersection of Trinity Way and Rail Way. The placement of the unsignalized intersection controls (i.e. stop and yield signs) for the TSP study intersections are shown in Figure 3-7.

Motor Vehicle Volumes

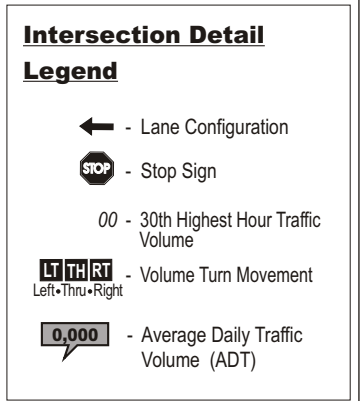
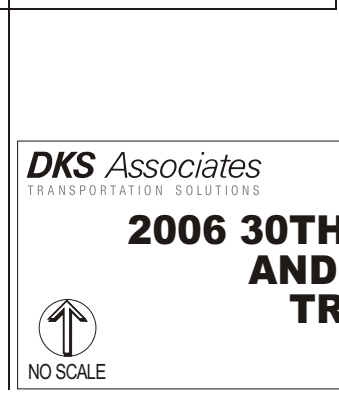
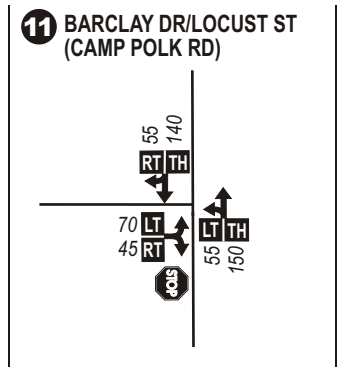
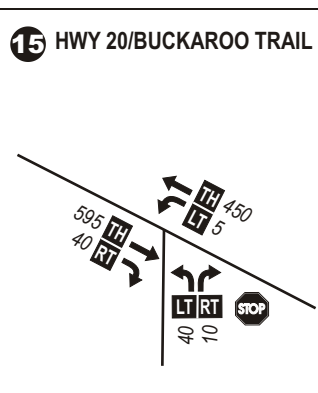
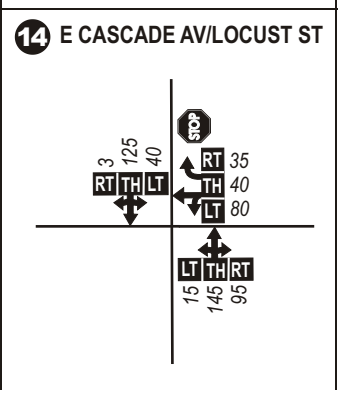
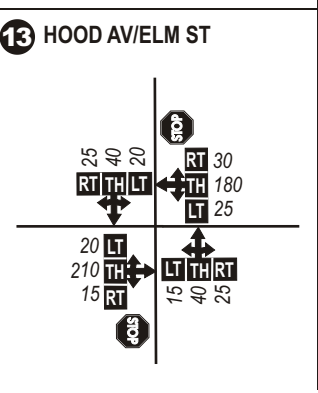
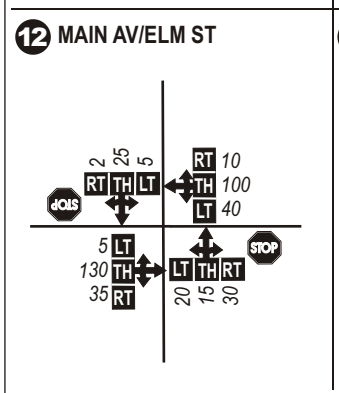
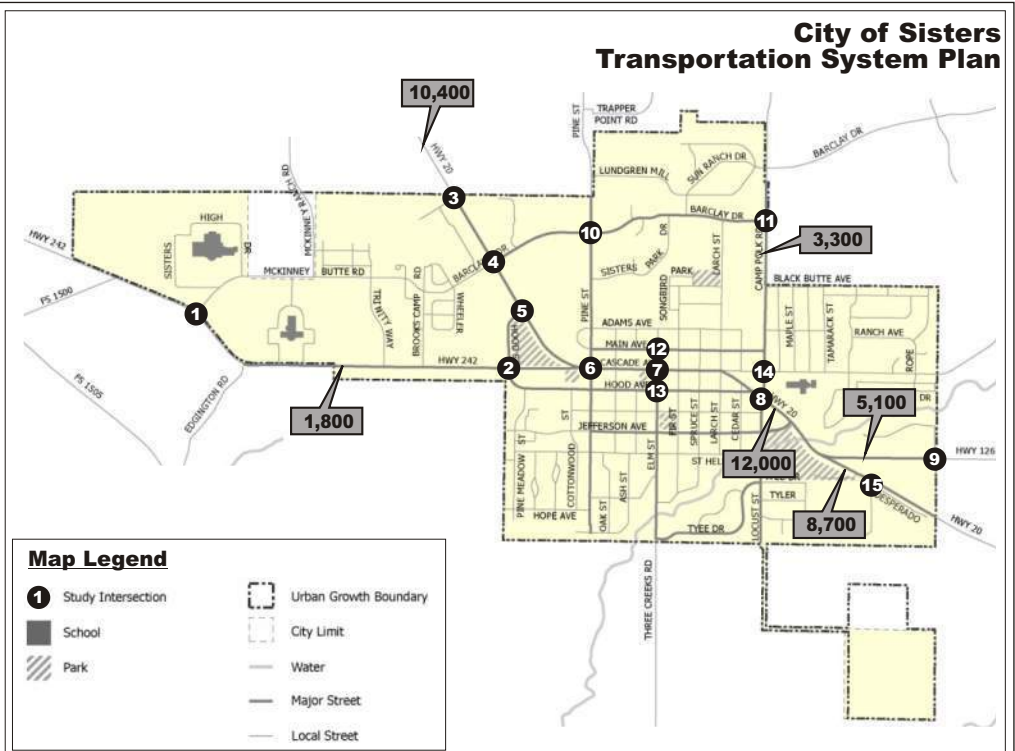
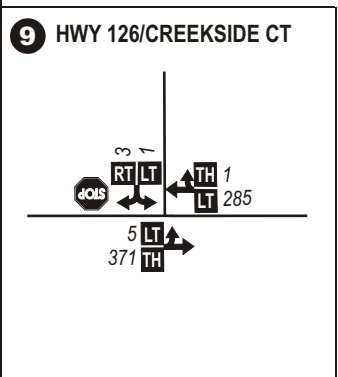
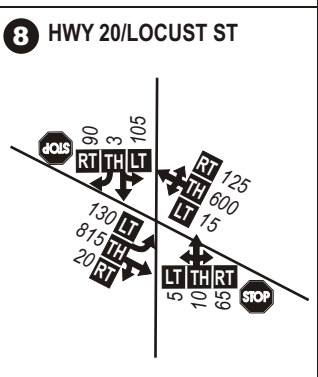
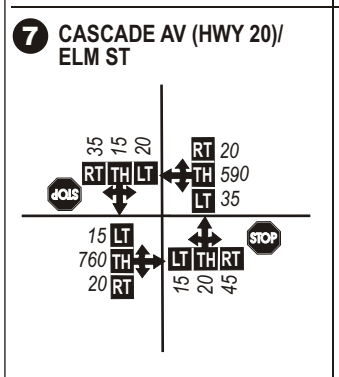
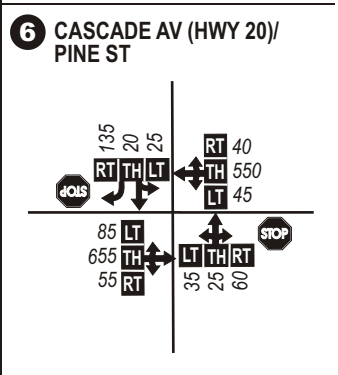
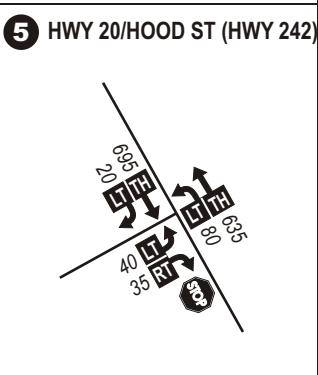
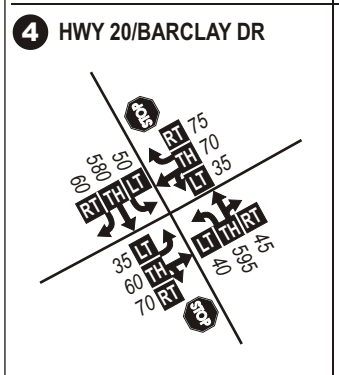
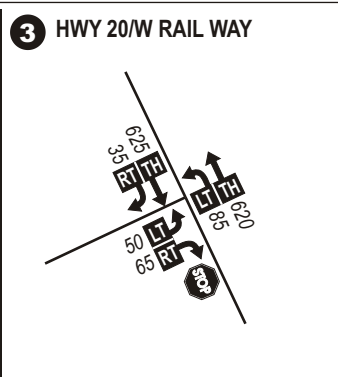
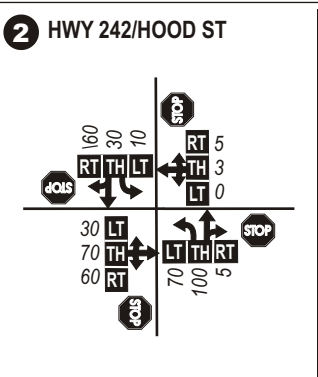
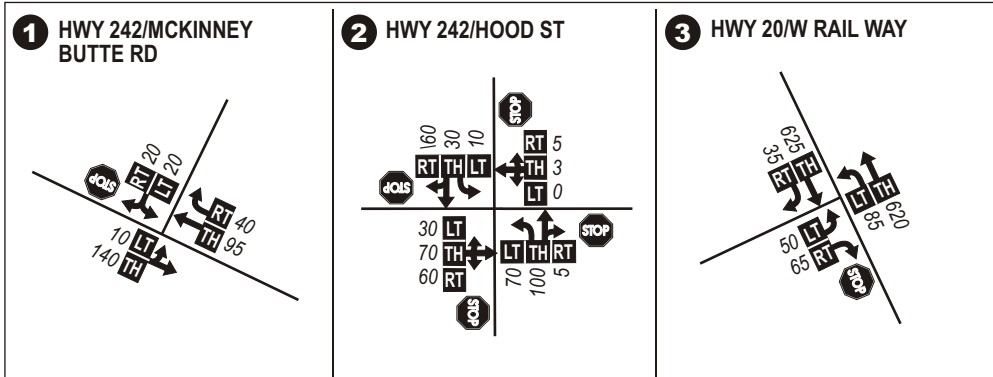
Existing motor vehicle volumes were estimated for key roadways and intersections using historical count data. Two commonly utilized motor vehicle volume measures include average daily traffic (ADT) volumes along roadways and peak hour turn movement volumes at intersections. The ADT volumes (from historical data) were used to estimate growth trends, and adjustments were made to intersection turn movement counts (TMCs) to determine model volumes for use in intersection operations analysis.

Average Daily Traffic (ADT) Volumes

Historic average daily traffic (ADT) volumes along various roadways were obtained from ODOT and Deschutes County. Average daily traffic (ADT) volumes are typically collected during a 24-hour period during the peak month (e.g., July or August) of the year and provide a general comparison of traffic growth from year to year. In Figure 3-7, 2006 average daily traffic (ADT) volumes at key locations in and near the City of Sisters are shown. The count locations were primarily on the edges of the City of Sisters or at ODOT Automatic Traffic Recorder (ATR) stations and included the following:

- Sisters Automatic Traffic Recorder (ATR) – on US 20, 7 miles west of City limits
- Three Sisters Viewpoint ATR – on US 20, 8.5 miles southeast of City limits
- Santiam Highway (US 20/OR 126) – west City limits
- Cascade Avenue (US 20/OR 126) – east of Locust St
- McKenzie-Bend Highway (US 20) – southeast of McKenzie Highway (OR 126)
- McKenzie Highway (OR 126) – 4 miles east of City limits
- McKenzie Highway (OR 242) – west City limits
- Camp Polk Road – south of Barclay Drive

The historical ADT counts were analyzed from 1995-2005, and the percentage of growth over the ten year time period ranged from 0.7% to 3.5% per year, with the exception of the McKenzie Highway (OR 242) on the western edge of Sisters where ADT volumes decreased in 2001 and then began to gradually increase (although they have not yet reached pre-2001 levels). The highest percentage of growth occurred along the McKenzie-Bend Highway (US 20) near the eastern City limits. Average daily traffic (ADT) growth trends are shown in Figure 3-8 with average yearly growth percentages (from 1995 to 2005) indicated.



DKS Associates
TRANSPORTATION SOLUTIONS

Figure 3-7

2006 30TH HIGHEST HOUR AND AVERAGE DAILY TRAFFIC VOLUMES

NO SCALE

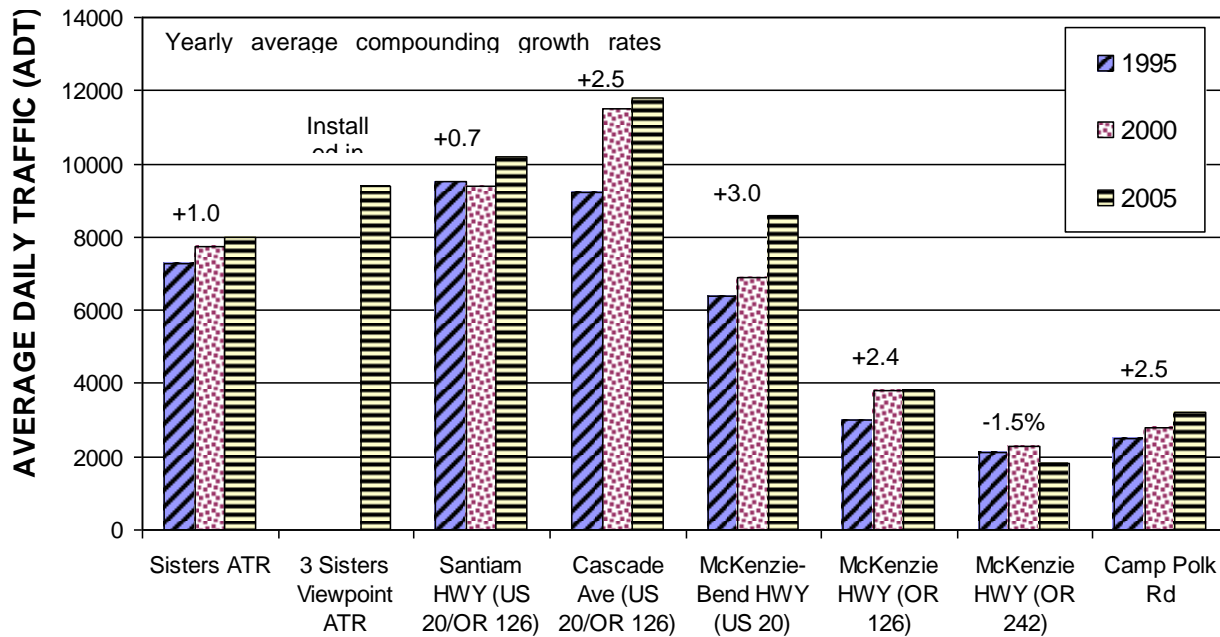


Figure 3-8: Average Daily Traffic (ADT) Growth Trends in and near Sisters

30th Highest Hourly Volumes (30th HV)

The Oregon Department of Transportation (ODOT) has specified that 30th Highest Hourly Volumes (30th HV), as measured from yearly count data, should be used for design and analysis purposes due to the fact that they have been shown to represent the typical peak hour during the peak month of the year.⁴ The 30th HV conditions are also important to analyze in the City of Sisters because seasonal variation in Highway 20 traffic volumes is a key focus of this TSP update. One method for obtaining yearly count data is from an ODOT automatic traffic recorder (ATR).

The Sisters ATR (#09-014) is the closest recorder and is located on N Santiam Highway (US 20) approximately seven miles west of City limits. This location is a good representation of study area traffic volume fluctuations since it is on the main highway of interest and no other cities or highway junctions are located between it and Sisters. The 3 Sisters Viewpoint ATR (#09-015) is another nearby ODOT recorder and is located southeast of Sisters, between Sisters and Bend. Based on data collected in 2006 at these two recorders, the 30th HV occurs from 4:00 p.m. to 5:00 p.m. (PM peak hour) on a typical Friday in the summer (i.e. on a non-holiday weekend).

Because current counts corresponding to the 30th HV were not available, weekday PM peak hour traffic turn movement counts were compiled from past data for the majority of the study intersections. To estimate 30th HV conditions, counts were adjusted with factors determined by comparing intersection volumes with the nearby 30th HV ATR volumes and by balancing

⁴ *Developing Design Hour Volumes*, ODOT Analysis Procedure Manual, Chapter 4, September 2006.



between intersections. The 30th highest hour traffic volumes (i.e., the design volumes) for the study intersections are provided previously in Figure 3-7.

Heavy Vehicles

Heavy vehicles play an important role in the economical movement of raw materials and finished products. Providing efficient heavy vehicle movement significantly benefits businesses and consumers and should be a goal of a city’s transportation network; however, it is important that other goals, including neighborhood livability, public safety, and minimized roadway maintenance costs, not be overlooked when considering the accommodation of trucks.

The designation of freight routes encourages efficient movement while also directing truck traffic away from neighborhoods and other locations of concern. As noted previously while discussing functional classification (and shown in Figure 3-4), the Santiam (US 20/OR 126), McKenzie (US 20/OR 126), and McKenzie-Bend (US 20) Highways are designated as freight routes along their entire length through Sisters. Trucks traveling through town use these routes.

Heavy vehicle volumes and percentages along the freight routes were collected at study intersections as part of the turn movement counts. Table 3-1 lists the approximate percentage of trucks traveling along the key corridors (i.e. the arterials) in Sisters during the PM peak hour. The portion of US 20/OR 126 in Sisters has a significant level of heavy vehicle traffic. Given the narrow cross-section (2 lanes) and absence of turn lanes on Cascade Avenue, it is likely that this high level of truck traffic significantly affects highway performance and livability in the downtown core.

Table 3-1: Heavy Vehicle Activity in the City of Sisters

Location	Approximate 2006 30 th HV Truck Values	
	Truck Percentage	Number of Trucks
McKenzie HWY (OR 242)	3%	10
Santiam HWY (US 20/OR 126)	3%	40
Cascade Ave (US 20/OR 126)	10%	170
McKenzie-Bend HWY (US 20)	5%	50
McKenzie HWY (OR 126)	5%	35



Traffic Operations

Existing traffic operations were analyzed at the 15 study intersections based on the *2000 Highway Capacity Manual* methodology⁵ for unsignalized intersections⁶. Focus is on intersections because they are the controlling bottlenecks of traffic flow and the ability of a roadway system to carry traffic efficiently is nearly always diminished in their vicinity. Prior to presenting the analysis results, commonly used intersection operation performance measures are explained, and the applicable thresholds that have been incorporated into agency mobility standards are given.

Intersection Performance Measures

The level of service (LOS) is a performance measure that is similar to a “report card” rating and is based on average vehicle delay. Level of service A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. Level of service D and E are progressively worse operating conditions. Level of service F represents conditions where average vehicle delay has become excessive and demand is near capacity; this condition is typically evident in long queues and delays, with delays often being difficult to measure because congestion may extend into and be affected by adjacent intersections. The average delay value (in seconds) corresponding to each level of service designation, along with additional level of service descriptions, are provided in Appendix D.

The unsignalized intersection level of service calculation evaluates each movement separately to identify problems (typically left turns from side streets). The calculation is based on the average total delay per vehicle for stop-controlled movements (typically on the minor side street or left turn movements). Level of service (LOS) F indicates that there are insufficient gaps of suitable size to allow minor street traffic to safely enter or cross the major street. This is generally evident by long delays and queuing on the minor street. Level of service F may also result in more aggressive driving, with side street vehicles accepting shorter gaps. It should be noted that the major street traffic moves without delay and the LOS F is for side-street or left turns, which may be only a small percentage of the total intersection volume. It is for these reasons that level of service results must be interpreted differently for signalized and unsignalized locations. A summary of the descriptions for level of service is provided in Appendix D.

The volume-to-capacity (V/C) ratio is another performance measure and represents the level of saturation (i.e. what proportion of capacity is being used). It is given as a decimal (typically between 0.00 and 1.00) and is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. If the ratio is greater than 1.00, the intersection, lane, or movement is oversaturated and usually results in excessive queues and long delays.

⁵ *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.

⁶ See Appendix S for updated analysis of the eight intersections evaluated as part of the 2018 refinement plan.



Mobility Standards

Mobility standards are agency specific and apply to intersections under the agency's jurisdiction. Within the City of Sisters, ODOT standards apply to intersections along state highways and City standards apply to the remaining intersections. ODOT operating standards are given as V/C ratios and are based on roadway classification, designations, and posted speed limits.⁷ As described previously in the functional classification section of this memorandum, there are both Statewide and District Highways in the City of Sisters. There are also freight designations, and speed limits vary between 20 mph and 45 mph.

Because no City of Sisters standards for traffic operations are included in the 2001 City of Sisters TSP or Comprehensive Plan, the generally accepted level of service D standard will be applied as the performance threshold for the remaining intersections. The mobility standard of each Sisters TSP study intersection is given in Table 3-2 along with operating analysis results.

Existing Operating Conditions

Existing traffic operations were analyzed at the 15 study intersections based on the *2000 Highway Capacity Manual* methodology⁸ for unsignalized intersections. The 30th Highest Hourly Volumes (30th HV) were used to determine the level of service for the major and minor streets as well as the delay and V/C ratio for the critical movement at each intersection. Table 3-2 summarizes the existing 30th HV operating conditions at the Sisters TSP study intersections.

Under existing 30th HV operating conditions, four study intersections do not meet jurisdictional operating standards. All of these intersections are located on the Highway US 20/OR 126 and three of them are in the downtown core. The four study intersections are as follows:

- Santiam Highway (US 20/OR 126) and Barclay Drive–McKinney Butte Road (2018 Update: This intersection has since been mitigated with the construction of a roundabout.)
- Cascade Avenue (US 20/OR 126) and Pine Street
- Cascade Avenue (US 20/OR 126) and Elm Street
- McKenzie Highway (US 20/OR 126) and Locust Street

Based on the analysis, intersection failure occurs due to high delays experienced by minor street traffic. The delays are caused by high through traffic volumes and the resulting lack of available gaps for minor street traffic to enter or cross the major street traffic stream.

The analysis also estimates that three of the intersections have V/C ratios above 1.0. In reality, observed traffic volumes cannot exceed intersection capacity; however, when counts are factored to estimate 30th HV conditions, a conservative analysis can result in calculated V/C ratios above

⁷1999 Oregon Highway Plan - Amendment, The Oregon Department of Transportation, July 2005.

⁸2000 Highway Capacity Manual, Transportation Research Board, Washington DC, 2000.



1.0. Such results may indicate that demand is in excess of capacity at these movements, and if users do not adjust their routing decisions, then there will be the formation of excessive queues.

In addition, even though analysis was not performed, it is expected that the remaining intersections on Highway US 20/OR 126 in the downtown core (i.e., the Cascade Avenue intersections with Oak Street, Elm Street, Spruce Street, Larch Street, and Cedar Street) are also failing for similar reasons.



Table 3-2: Study Intersection 30th HV Operating Conditions

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	LOS	V/C
McKenzie HWY (OR 242)/ McKinney Butte Rd	ODOT	≤ 0.80	9.6	A/A	0.05
McKenzie HWY (OR 242)/Hood St (OR 242)	ODOT	≤ 0.85	8.6	A ^a	0.23
Santiam HWY (US 20/OR 126)/Rail Wy	ODOT	≤ 0.70	29.3	A/D	0.40
Santiam HWY (US 20/OR 126)/ Barclay Dr (McKinney Butte Rd)	ODOT	≤ 0.70	> 50.0	A/F	≥ 1.00^b
Santiam HWY (US 20/OR 126)/ Hood St (OR 242)	ODOT	≤ 0.80	40.4	B/E	0.42
Cascade Ave (US 20/OR 126)/ Pine St	ODOT	≤ 0.80	> 50.0	A/F	≥ 1.00^b
Cascade Ave (US 20)/Elm St	ODOT	≤ 0.80	> 50.0	B/F	0.90
McKenzie HWY (US 20/OR 126)/ Locust St	ODOT	≤ 0.80	> 50.0	B/F	≥ 1.00^b
McKenzie HWY (US 20/OR 126)/ Buckaroo Trail	ODOT	≤ 0.70	25.0	A/C	0.19
McKenzie HWY (OR 126)/ Creekside Ct	ODOT	≤ 0.70	11.1	A/B	0.01
Barclay Dr/Pine St	City of Sisters	D ^c	10.5	A/B	0.12
Barclay Dr/Locust St	City of Sisters	D ^c	12.2	A/B	0.20
Main Ave/Elm St	City of Sisters	D ^c	12.4	A/B	0.12
Hood Ave/Elm St	City of Sisters	D ^c	13.8	A/B	0.39
E Cascade Ave/Locust St	City of Sisters	D ^c	14.5	A/B	0.30

Delay = Average Stopped Delay per Vehicle (seconds) for worst approach

LOS = Level of Service (Major Street/Minor Street)

V/C = Volume/Capacity Ratio (of worst movement)

Bold Underlined values exceed standards (failing movement specified)

^a LOS for all-way stop intersection reported for entire intersection

^b When V/C ratios are greater than 1.0, demand exceeds capacity and causes the formation of excessive queues that spread delay into other hours of the day.

^c Typical LOS D standard used, though none specified in Sisters TSP or Comprehensive Plan



Corridor Performance

The performance of Highway 20 (US 20/OR 126) as a corridor is one of the most significant transportation issues being faced by the City of Sisters. The previous intersection analysis indicates that nearly all intersections along Highway 20 exceed mobility standards. In addition, the segment of highway in downtown Sisters experiences significant pedestrian crossing activity, which contributes to a decrease in the highway's vehicle flow capacity through town. In addition, the reduced speeds (20 mph speed limit) and on-street parking also contribute to a lower capacity, and it was mentioned in the 2001 Sisters TSP that highway capacity in downtown Sisters drops from the typical highway capacity of 1,800 vphpl (vehicles per hour per lane) to a much lower 850 vphpl.⁹ This estimated capacity level is supported by observations, which indicate that significant queuing occurs during 30th HV conditions (which have an estimated vehicle flow demand of approximately 900 vphpl).

Traffic Safety

Collision data for the City of Sisters was obtained from the Oregon Department of Transportation (ODOT) and includes all collision records found in the State archives from January 1st, 2004 to December 31st, 2006. Figure 3-9 shows locations where injury collisions were reported. In addition, Table 3-3 summarizes the collision data for the eight highest total crash intersections in the City of Sisters, where at least three crashes were reported during these three years. The collisions are broken down by severity, and a calculated collision rate is given for intersections where traffic counts were available. Overall, the study intersections had relatively low collision rates, and none exceeded the 1.0 threshold rate that is typically used to indicate which intersections have crash rates above average conditions.

The intersection with the highest number of collisions was the McKenzie Highway (US 20/OR 126) and Locust Street intersection, which is located on the eastern edge of the downtown core. This intersection is of particular concern due to its proximity to the elementary school. It is anticipated that one reason for the safety issues is that vehicles are traveling at higher speeds as they transition between typical rural highway travel and urban downtown conditions.

Also of note, the intersection of Cascade Avenue (US 20/OR 126) and Pine Street had a collision involving a pedestrian who was injured. The reported cause of the collision was that the driver was inattentive and did not yield. It was also reported that it was a snowy day, the road was wet, and it was dark. This intersection is located on western edge of town and also is in a transition zone between typical rural highway travel and urban downtown conditions.

⁹ *City of Sisters Transportation System Plan (TSP)*, David Evans and Associates, June 2001.

City of Sisters Transportation System Plan

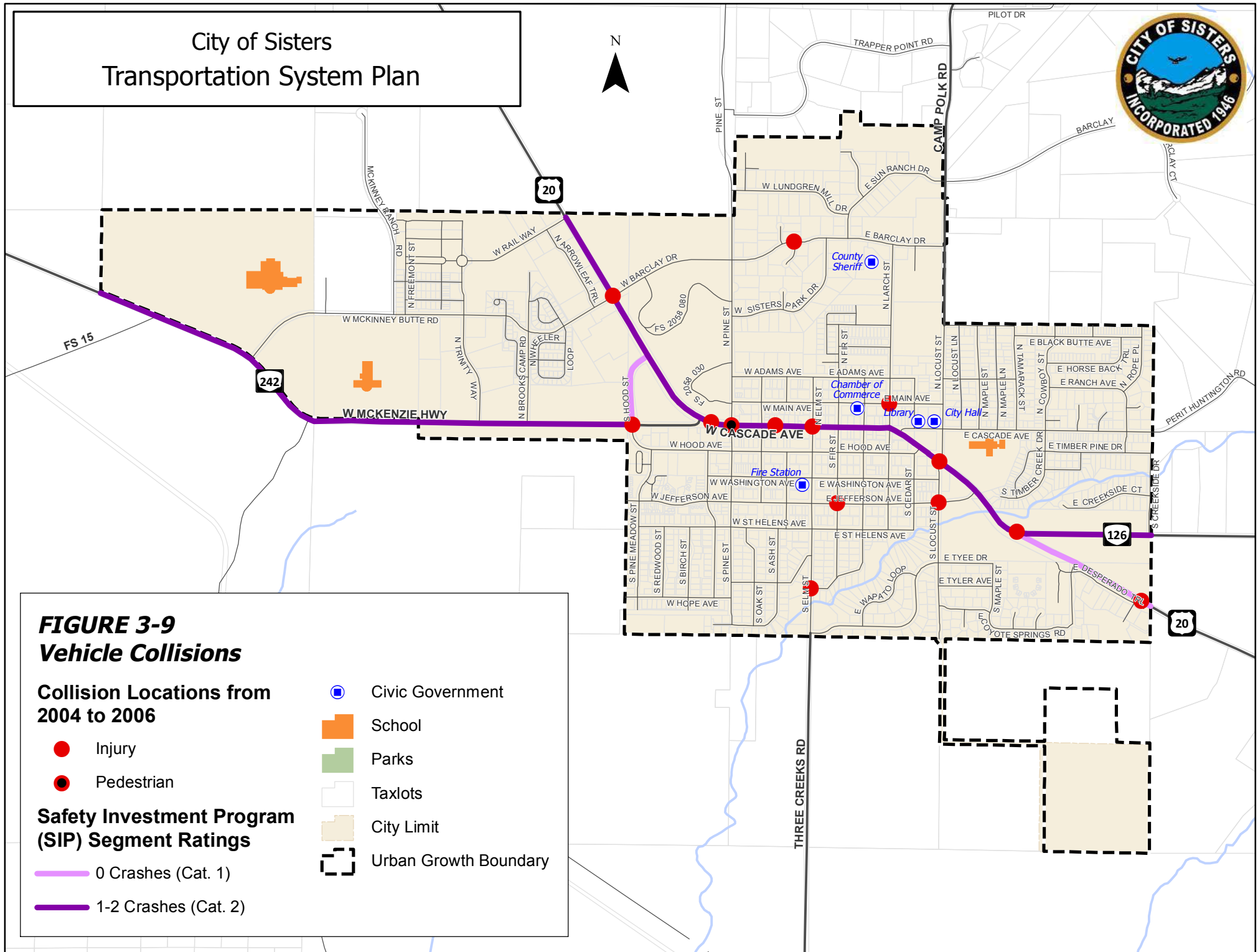




Table 3-3: Study Intersection Collision Summary (2004-2006)

Study Intersection	Collision Severity			Total	Collision Rate ^b
	Fatal	Injury	PDO ^a		
McKenzie HWY (US 20/OR 126) / Locust St	0	2	3	5	0.23
Hood Ave / Fir St	0	0	4	4	-
McKenzie-Bend HWY (US 20) / McKenzie HWY (OR 126)	0	2	1	3	0.17
Santiam HWY (US 20) / W Cascade Ave	0	1	2	3	0.18
Cascade Ave (US 20/OR 126) / Pine St	0	1 ^c	2	3	0.16
Santiam HWY (US 20) / Barclay Dr-McKinney Butte Rd	0	1	2	3	0.05
Cascade Ave (US 20/OR 126) / Spruce St	0	0	3	3	-
Cascade Ave (US 20/OR 126) / Larch St	0	0	3	3	-

^a PDO = Property damage only.

^b Average annual crashes per million entering vehicles (MEV); MEV estimates based on 30th HV.

^c This collision involved a pedestrian who was injured.

Source: ODOT Collision Data for 2004, 2005, and 2006.

Existing Issues

Based on the existing motor vehicle facilities inventory and operational analysis, the following issues were identified:

Highway 20 (US 20/OR 126) Concerns

- Four intersections (i.e. Barclay Drive, Pine Street, Elm Street, and Locust Street) fail to meet jurisdictional operation standards. (2018 Update: The operational deficiency at the US 20/OR 126 and Barclay Drive has since been mitigated with the construction of a roundabout.)
- Minor street traffic experiences high delays while waiting to enter or cross highway.
- Queues form in downtown Sisters and extend beyond the edges of town.
- High level of truck traffic likely affects highway performance.

Other Concerns

- A significant number of access driveways in downtown Sisters do not conform to ODOT access management standards.
- Various arterial and collector streets are in need of pavement improvements.

Rail Facilities

There are no rail facilities in or near the City of Sisters.



Air Facilities

The Sisters Eagle Air Airport is a privately owned airport located in the northeastern portion of city limits. It is classified as a category 4 airport in the Oregon Aviation Plan¹⁰, is open to the public, and has a landing fee. In addition, the runway is in good condition.¹¹ On average, the airport operates twenty-seven times a week with a majority of use coming from general aviation.

Other passenger and freight air transportation is available in Redmond at the Roberts Field Airport and in Bend at the Bend Municipal Airport. Both airports are approximately 25 miles away.

¹⁰ *Oregon Aviation Plan*, Oregon Department of Transportation Aeronautics Division, February 2000.

¹¹ Information obtained from <http://www.airnav.com/airport/6K5> on February 25, 2008.



Chapter 4. Future Conditions and Needs

Introduction

This chapter summarizes the projected future transportation needs of the City of Sisters through the year 2030. The needs are based on a future conditions analysis that assumes the addition of a few roadway links in areas currently experiencing growth but does not assume any significant system improvements; the purpose of this analysis is to provide the basis for developing future transportation projects within the City of Sisters. These future needs are given for each of the three principal modes: pedestrians, bicycles, and motor vehicles.

The 2018 refinement included textual and project list updates to reflect completed projects. The operational analysis that formed the basis of the motor vehicle planned projects was not updated as part of the 2018 refinement and continues to reflect the future conditions reported in the 2010 TSP. Updated analyses for the intersections specifically evaluated as part of the 2018 refinement are reflected in Appendix S.

Future Pedestrian Needs

Planned pedestrian facilities, projected pedestrian growth, and future pedestrian issues are presented in this section.

Planned Pedestrian Facilities

Pedestrian facilities are planned as sidewalks or curb-extensions along roadways and as separate shared-use paths within the City of Sisters.

Sidewalks and Curb-Extensions

Recommend future pedestrian facilities along roadways, as listed in the TSP, include:

- Completion of infill sidewalk projects in the Downtown Commercial core area from Adams Ave to Washington Ave and Pine St. to Locust St.
- Sidewalk improvements on Washington Ave (Pine St. to Locust St.)

In addition, a 1999 City ordinance requires adequate pedestrian provisions along all newly built and reconstructed roadways. This ordinance also requires sidewalk facilities within areas zoned as High or Standard Density Residential and General Commercial.



Shared-use paths & Future connections

The Sisters Community Trails Plan (2011) specifies that shared-use paths are planned to connect the Crossroads subdivision with the high school and the Five Pines Fitness Center to the Deschutes National Forest. The Trails Plan also identifies paths and trails intended to serve a single mode only. These paths will primarily serve to increase connectivity throughout Sisters and improve connections to the surrounding Deschutes County Trail System. In cases where infrastructure does not exist to serve other non-motorized travel in the corridor, these pedestrian paths may also serve as defacto bicycle facilities.

There are a number of existing trails, as well as anticipated future trails and shared-use paths, at the edge of city limits extending into the County. The City supports the development of future trails and connectivity to adjacent communities and destinations. Internal shared-use paths connecting to existing and future trails and paths are identified in Figure 5-1 and Figure 6-1.

Projected Pedestrian Volume Growth

Population growth estimates indicate a probable doubling of the population living within the Sisters UGB by 2030. If walking trips retain their current mode share, then they will also double. Should Sisters be effective in creating a more pedestrian friendly atmosphere throughout the City, they may see pedestrian volumes more than double. The implementation of the Safe Routes to School programs will also likely continue to contribute to increasing numbers of pedestrians.

Future Pedestrian Issues

Based on the projected future pedestrian conditions, the following issues were identified and are in addition to the existing pedestrian issues discussed in Chapter 3:

- Increased crossing challenges at Highway 20 (US 20/OR 126) due to greater traffic volumes and fewer gaps in traffic long enough to facilitate safe pedestrian crossing.
- Overflow motor vehicle traffic onto Hood and Main may decrease the quality of the pedestrian experience through increasing noise and pollution associated with greater motor vehicle traffic.
- Fewer gaps in traffic may lead to increased instances of aggressive crossing behavior as pedestrians begin to utilize gaps in traffic that are too short to facilitate normal crossing. This will likely have the greatest impact on children, the elderly and disabled pedestrians that require more time to cross or have challenges judging adequate crossing conditions.
- Potentially longer pedestrian delay at intersection crossings may degrade the quality of the pedestrian experience.
- Increased bicycle and pedestrian volumes will lead to more conflicts between users on shared facilities and sidewalks. Though riding is currently prohibited on sidewalks in Sisters, this type of behavior is especially common among children. Sidewalk riding will probably continue to occur despite education and policing targeted at discouraging this behavior.



-
- Increased traffic volumes will increase the number of turning movement conflicts. The challenges presented by turning conflicts can occur when pedestrians cross either the major street (halting motor vehicle traffic and decreasing the opportunities of motorists to make unprotected left turns, resulting in increased congestion and reduced motor vehicle capacity) or the minor street (inhibiting the ability of vehicles to turn left or right off the major streets, resulting in increasing congestion and reducing motor vehicle capacity). In addition, increased vehicle volumes may result in vehicles taking advantage of smaller gaps in traffic and speeding through turning movements without checking to see if minor streets are clear of pedestrians.

These issues are mainly associated with unsignalized intersections having increased motor vehicle volumes. While these issues may occur anywhere throughout the City, the greatest number of instances will most likely occur in downtown Sisters along Cascade, Hood and Main Avenues at intersections where operational standards are not met.

Future Bicycle Needs

Planned bicycle facilities, projected bicyclist growth, and future bicycle issues are presented in this section.

Planned Bicycle Facilities

All planned road projects classified as arterials or collectors should include striped bike lanes or shared-use paths. In addition, as mentioned in the planned pedestrian facilities section, there are multiple shared-use paths that are planned for the City of Sisters, including trails connecting the Crossroads subdivision with the high school and the Five Pines Fitness Center to the Deschutes National Forest. The Sisters Trail Plan also recommends various shoulder bikeways, which will primarily serve cyclists and include the following:

- **Camp Polk Loop to Redmond Highway:** Shoulder bikeway connecting Sisters to Panoramic View Estates
- **Indian Ford Road:** Shoulder bikeway accessing the Indian Ford subdivision and forming a loop route with Highway 20 and Camp Polk Road
- **Three Creek Road:** Shoulder bikeway providing access to the National Forest
- **Highway 20, Sisters to Indian Ford Road:** Current 4-foot shoulder bikeway targeted for improvements due to high traffic volumes
- Highway 20, Sisters to Jordan Road: Paved shoulder bikeway
- **McKenzie Highway 242:** Shoulder bikeway connecting Sisters to the National Forest

Projected Bicyclist Volume Growth

Population growth estimates indicate a probable doubling of the population living within the Sisters UGB by 2030. Assuming cycling trips retain the current mode share, cycling trips will also double. Sisters may see an increase greater than a doubling due to their efforts to create a bicycle friendly atmosphere throughout the City. Additionally, the implementation of the Safe



Routes to School programs will also likely continue to contribute to increasing numbers of cycling trips.

Future Bicycling Issues

Bicycles and pedestrians share many of the same issues associated with increased motor vehicle volumes. In addition to the issues mentioned previously in the future pedestrian issues section of this chapter and the existing bicycle issues in Chapter 3, cyclists face the following unique challenges:

- Increasing traffic volumes along all streets will decrease the comfort of the cycling experience. A general rule of thumb suggests that facilities remain designated as shared when motorist volumes remain below 3,000 vehicles per day. As volumes increase, bicycle facilities may require delineation, which will impact lane width and motor vehicle capacity. Some roadways expected to exceed the 3,000 vehicles per day threshold include the highways (i.e. US 20, OR 126, and OR 242), Hood Avenue, Barclay Drive, and Locust Street (Camp Polk Road).
- Discontinuous paved facilities (network gaps) can unexpectedly force cyclists back into the path of motor vehicle traffic, which increases the number of bicycle/motor vehicle conflicts and potential for collisions. This may happen currently, but the frequency would increase due to the greater volumes of bicycles and motor vehicles.

Future Motor Vehicle Needs

Future motor vehicle needs estimated through the year 2030 are presented in this section. These needs assume the construction of currently planned roadway improvements and are based on land use and population growth projections. The growth assumptions were translated into PM peak hour trips and routed through the City of Sisters transportation network using a travel demand analysis tool that was developed in conjunction with this TSP. Details relating to the forecasting methodology and development of the travel demand analysis tool are included in Appendices I and J.

The following sections summarize the planned roadway improvements, existing and forecasted land uses, projected 2030 traffic volumes, and estimated future traffic operating conditions.

Planned Roadway Improvements

Several roadways in the study area would be required to support access and circulation for developing lands. Roadways that were assumed to be built for the baseline future scenario and that have since been built include the following:

- New mixed-use developments near Sun Ranch Business Park at north edge of City
- New bridge connecting Creekside Court to Cascade Avenue at eastern edge of City
- New connection between Rail Way and Trinity Way in western portion of City



Existing and Forecasted Land Uses

Land use is a key factor affecting demands placed on a City’s transportation system. The location, density, type, and mixture of land uses have a direct impact on traffic levels and patterns. Existing land uses within the City of Sisters were obtained from tax assessors data, census data, and zoning data and compared with existing aerial photography. In addition, land use inventories were compared and controlled to the data published by the City’s Comprehensive Plan¹². The land uses were grouped into four main categories: households, retail employment, service employment, and other employment.

Projected land uses within the Sisters Urban Growth Boundary (UGB) were estimated for the future 2030 horizon year by extrapolating growth trends identified in the City’s Comprehensive Plan. The land use growth was allocated to vacant lands in the City’s urban and urban reserve areas.¹³ Table 4-1 summarizes the existing and future land use within the Sisters UGB. The existing land use corresponds to a population of approximately 1,800 residents, and the future land use corresponds to a year 2030 population projection of approximately 4,700 residents.

Table 4-1: Land Use Projection within Sisters Urban Growth Boundary

Land Use	Existing 2007 Land Use	Projected Growth from 2007 to 2030	Projected 2030 Land Use
Households			
Total Households	920	1,215 (+132%)	2,135
Employees			
Retail Employees	695	550 (+79%)	1,244
Service Employees	375	230 (+61%)	605
Other Employees	755	530 (+70%)	1,285
Total Employees	1,824	1,310 (+72%)	3,134

Projected 2030 Traffic Volumes

Traffic volumes for the year 2030 were estimated for the Sisters transportation network using the travel demand analysis tool developed in conjunction with this TSP. The volumes include the 30th Highest Hourly Volumes (30th HV) by turn movement at the TSP study intersections and average daily traffic (ADT) volumes at various locations within the City of Sisters.

¹² *Sisters Urban Area Comprehensive Plan*; Sisters, Oregon; Deschutes County; July 2005.

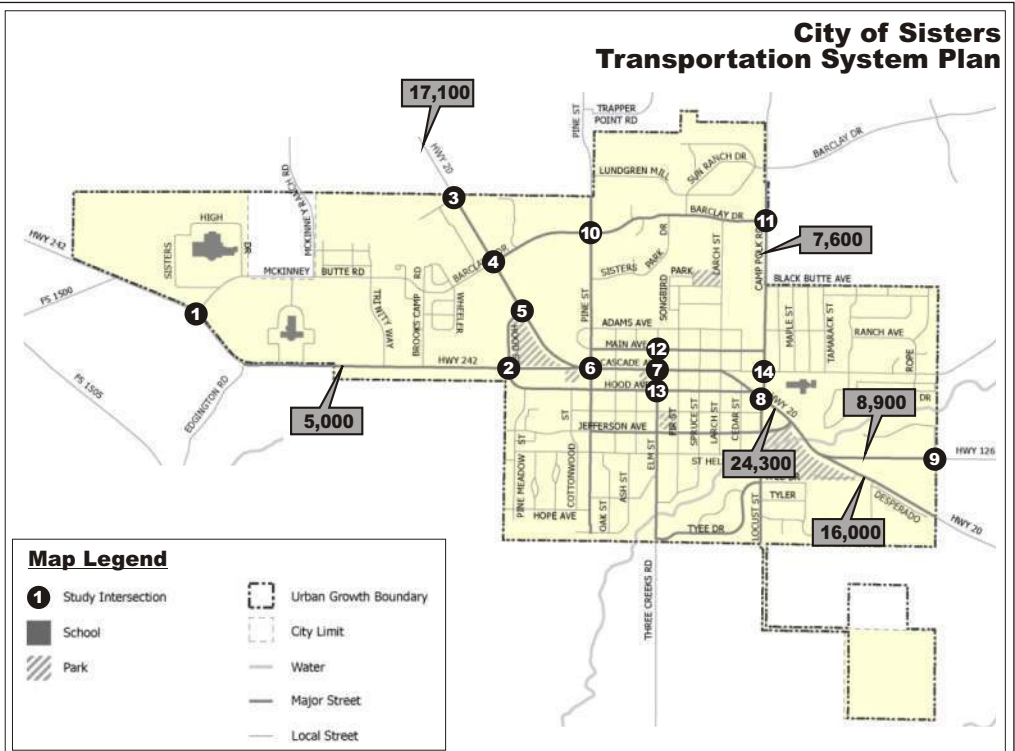
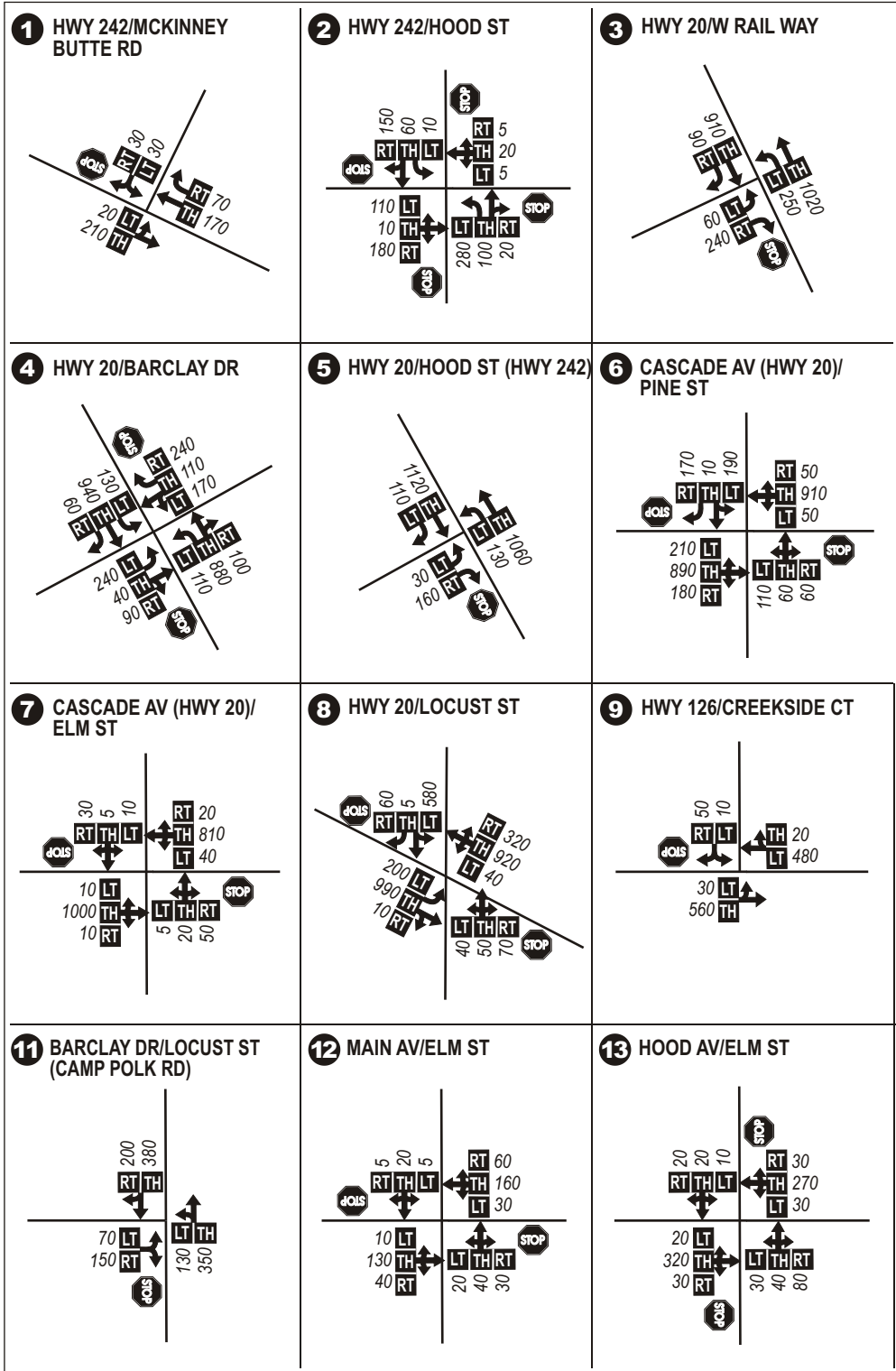
¹³ Because vacant lands exist mostly on the northern and western edges of the Sisters UGB, the majority of growth is estimated to occur in the corresponding TAZs (i.e. TAZs 12 and 16).



The projected 30th HV for the year 2030 are shown in Figure 4-1. These volumes were used to estimate future intersection operating conditions.

The projected 2030 ADT volumes estimated using the analysis tool are shown graphically in Figure 4-2 along with yearly ADT counts for all available years between 1995 and 2006. Road closures during both the summer and winter impact the year-to-year traffic volumes for the Highway 242 corridor but are not considered to affect trends. The future compounding growth rates were calculated between 2005 and 2030 and range between 2.1% and 4.2%; these rates are also shown in Figure 4-2. Because each growth rate is multiplied by a different volume, the slopes shown cannot be used for comparison of growth rates; instead, the slopes indicate yearly growth volumes.

City of Sisters Transportation System Plan



Map Legend

- 1 Study Intersection
- School
- Park
- Urban Growth Boundary
- City Limit
- Water
- Major Street
- Local Street

Intersection Detail Legend

- ← - Existing Lane Configuration
- STOP - Stop Sign
- 00 - 30th Highest Hour Traffic Volume
- LT|TH|RT - Volume Turn Movement (Left+Thru+Right)
- 0,000 - Average Daily Traffic (ADT)

DKS Associates
TRANSPORTATION SOLUTIONS

Figure 4-1

2030 PROJECTED 30TH HIGHEST HOUR AND AVERAGE DAILY TRAFFIC VOLUMES

↑
NO SCALE

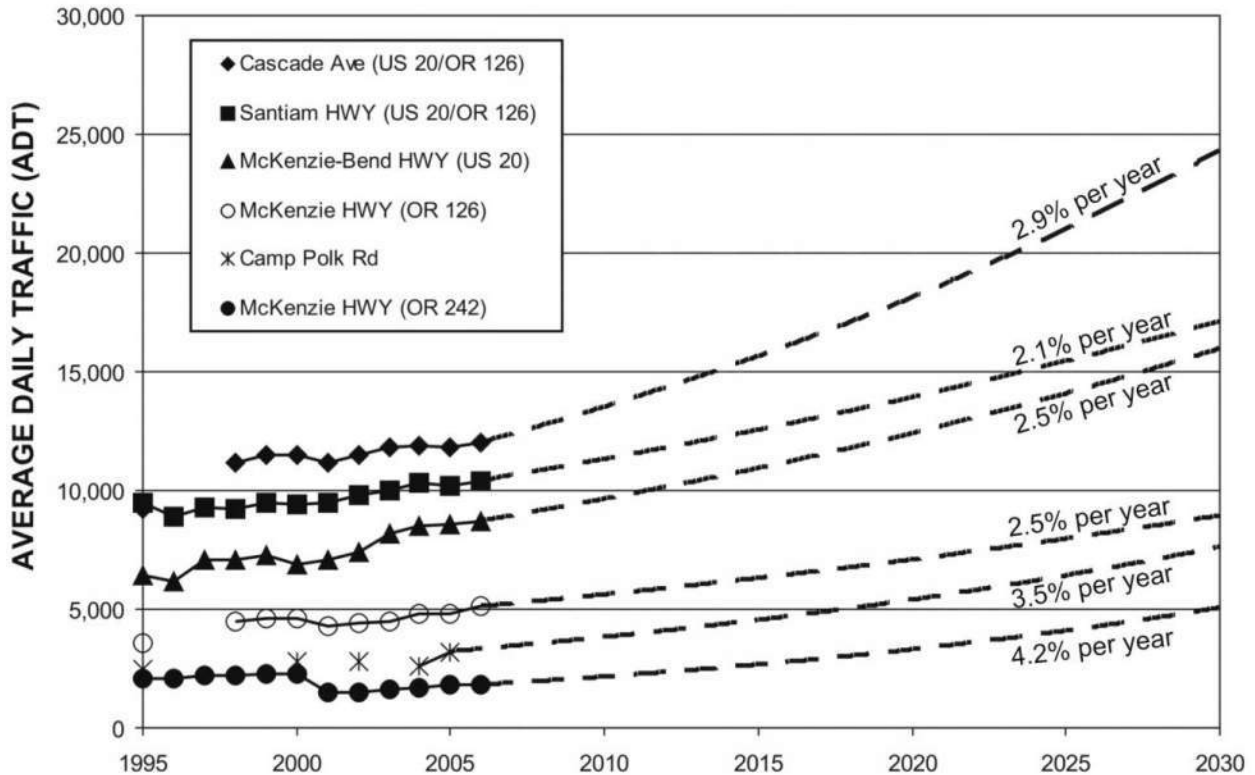


Figure 4-2: Average Daily Traffic (ADT) Growth Trends In and Near Sisters
(Compounding yearly growth rates used to estimate future volumes)

Traffic Operating Conditions

Traffic operations were analyzed for 30th Highest Hourly Volume (30th HV) conditions for the future 2030 horizon year. The analysis includes intersection performance of Sisters TSP study intersections and corridor performance of Highway 20 (US 20/OR 126). In addition, intersection operations were analyzed for the 2030 weekday PM peak hour conditions in order to estimate daily performance levels throughout the City and determine which intersections should be fixed first (since they have operational issues year round rather than just during peak days).

30th HV Intersection Operating Conditions

Projected 2030 traffic operations were analyzed at the fourteen study intersections based on the 2000 *Highway Capacity Manual* methodology¹⁴ for unsignalized intersections. Table 4-2 summarizes the future 2030 30th HV operating conditions at the fourteen Sisters TSP study intersections.¹⁵

¹⁴ 2000 *Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000

¹⁵ See Appendix S for updated analysis of the eight intersections evaluated as part of the 2018 refinement plan.



Table 4-2: 2030 Projected Study Intersection 30th HV Operating Conditions

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	LOS	V/C
McKenzie HWY (OR 242)/ McKinney Butte Rd	ODOT	≤ 0.80	10.9	A/B	0.10
McKenzie HWY (OR 242)/Hood St (OR 242)	ODOT	≤ 0.85	13.4	B ^a	0.56
Santiam HWY (US 20/OR 126)/Rail Wy	ODOT	≤ 0.70	> 50.0	C/F	> 2.00^b
Santiam HWY (US 20/OR 126)/ Barclay Dr (McKinney Butte Rd)	ODOT	≤ 0.70	> 50.0	B/F	> 2.00^b
Santiam HWY (US 20/OR 126)/ Hood St (OR 242)	ODOT	≤ 0.80	> 50.0	C/F	1.43^b
Cascade Ave (US 20/OR 126)/ Pine St	ODOT	≤ 0.80	> 50.0	B/F	> 2.00^b
Cascade Ave (US 20)/Elm St	ODOT	≤ 0.80	> 50.0	B/F	1.65^b
McKenzie HWY (US 20/OR 126)/ Locust St	ODOT	≤ 0.80	> 50.0	C/F	> 2.00^b
McKenzie HWY (US 20/OR 126)/ Buckaroo Trail	ODOT	≤ 0.70	> 50.0	B/F	1.04^b
McKenzie HWY (OR 126)/ Creekside Ct	ODOT	≤ 0.70	16.0	A/C	0.16
Barclay Dr/Pine St	City of Sisters	D ^b	19.8	A/C	0.48
Barclay Dr/Locust St	City of Sisters	D ^b	36.6	<u>A/E</u>	0.70
Main Ave/Elm St	City of Sisters	D ^b	12.8	A/B	0.17
Hood Ave/Elm St	City of Sisters	D ^b	20.8	A/C	0.65
E Cascade Ave/Locust St	City of Sisters	D ^b	> 50.0	<u>A/F</u>	1.03

Delay = Average Stopped Delay per Vehicle (seconds) for worst approach

LOS = Level of Service (Major Street/Minor Street)

V/C = Volume/Capacity Ratio (of worst movement)

Bold Underlined values exceed standards (failing movement specified)

^a LOS for all-way stop intersection reported for entire intersection

^b When V/C ratios are greater than 1.0, demand exceeds capacity and causes the formation of excessive queues that spread delay into other hours of the day.

^c Typical LOS D standard used, though none specified in Sisters TSP or Comprehensive Plan



Under 2030 projected future 30th HV operating conditions, eight study intersections do not meet jurisdictional operation standards, including all six study intersections located on Highway 20 (US 20/OR 126). The eight intersections are as follows:

- Santiam Highway (US 20/OR 126) and Rail Way (2018 Update: This intersection has since been mitigated with the construction of a median that prohibits eastbound left turns.)
- Santiam Highway (US 20/OR 126) and Barclay Drive–McKinney Butte Road (2018 Update: This intersection has since been mitigated with the construction of a roundabout.)
- Santiam Highway (US 20/OR 126) and Hood Street (OR 242)
- Cascade Avenue (US 20/OR 126) and Pine Street (2018 Update: This intersection has since been mitigated with left-turn lanes on Cascade Avenue.)
- Cascade Avenue (US 20/OR 126) and Elm Street
- McKenzie Highway (US 20/OR 126) and Locust Street
- Barclay Drive and Locust Street (Camp Polk Road)
- East Cascade Avenue and Locust Street

Based on the analysis, intersection failure occurs due to high delays experienced by minor street traffic. The delays are caused by the lack of available gaps for minor street traffic to enter or cross the major street traffic stream.

30th HV Corridor Performance

The performance of Highway 20 (US 20/OR 126) as a corridor is another significant issue being faced by the City of Sisters. Based on the 2001 Sisters TSP, highway capacity in downtown Sisters drops from 1,800 vphpl (vehicles per hour per lane) to 850 vphpl due to reduced speeds (20 mph speed limit), on-street parking, and frequent pedestrian crossings.¹⁶ Because existing 30th HV traffic demand (approximately 700 to 850 vphpl) is nearly equal to the 850 vphpl capacity level and projected demand is estimated to increase (to approximately 1100 to 1440 vphpl), queuing is expected to worsen.

To exacerbate the problem, the intersection analysis performed previously indicates that minor street approach traffic at all six study intersections located on Highway 20 (US 20/OR 126) is expected to experience high levels of delay even without considering the additional negative effect of queuing spillbacks from adjacent intersections.

The model also projects that some through traffic will divert from Cascade Avenue to the parallel route of Hood Avenue.

¹⁶ *City of Sisters Transportation System Plan (TSP)*, David Evans and Associates, June 2001.



Typical Weekday PM Peak Hour Intersection Operating Conditions

Projected 2030 PM peak hour intersection operating conditions for a typical weekday were analyzed at the study intersections in order to estimate daily performance levels. The results are provided in Table 4-3. The analysis indicates that three intersections are expected to have operational issues year-round rather than just during peak summer days and therefore should be improved first. The three intersections include the following:

- Santiam Highway (US 20/OR 126) and Barclay Drive–McKinney Butte Road (2018 Update: This intersection has since been mitigated with the construction of a roundabout.)
- Cascade Avenue (US 20/OR 126) and Pine Street
- McKenzie Highway (US 20/OR 126) and Locust Street

The analysis also indicates that the projected weekday PM peak hour intersection operations are similar to the 30th HV conditions that exist today. This means that in the year 2030, traffic conditions during a typical peak hour on any given weekday of the year (e.g. a Wednesday afternoon in March) can be expected to approximate current summer weekend conditions; therefore, without capacity or circulation improvements, traffic operations in 2030 would fail throughout the year and excessive queuing and delay would become common.

Future Motor Vehicle Issues

Based on future traffic volume projections, the following future issues arise and are in addition to the existing motor vehicle issues discussed in Chapter 3:

- 30th HV operational issues (i.e. queuing and delay) would increase significantly along state Highway 20 (US 20/OR 126).
- Weekday PM peak hour operating conditions along state Highway 20 (US 20/OR 126) would approach highway through-put thresholds, and traffic along the highway would experience queuing and delay levels similar to existing 30th HV conditions.



Table 4-3: 2030 Projected Weekday PM Peak Hour Operating Conditions

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	LOS	V/C
McKenzie HWY (OR 242)/ McKinney Butte Rd	ODOT	≤ 0.80	9.7	A/A	0.05
McKenzie HWY (OR 242)/Hood St (OR 242)	ODOT	≤ 0.85	9.6	A ^a	0.31
Santiam HWY (US 20/OR 126)/Rail Wy	ODOT	≤ 0.70	26.7	B/D	0.43
Santiam HWY (US 20/OR 126)/ Barclay Dr (McKinney Butte Rd)	ODOT	≤ 0.70	> 50.0	A/F	≥ 2.00^b
Santiam HWY (US 20/OR 126)/ Hood St (OR 242)	ODOT	≤ 0.80	21.5	B/C	0.26
Cascade Ave (US 20/OR 126)/ Pine St	ODOT	≤ 0.80	> 50.0	A/F	≥ 2.00^b
Cascade Ave (US 20)/Elm St	ODOT	≤ 0.80	28.1	A/D	0.23
McKenzie HWY (US 20/OR 126)/ Locust St	ODOT	≤ 0.80	> 50.0	B/F	≥ 2.00^b
McKenzie HWY (US 20/OR 126)/ Buckaroo Trail	ODOT	≤ 0.70	23.3	A/C	0.22
McKenzie HWY (OR 126)/ Creekside Ct	ODOT	≤ 0.70	11.5	A/B	0.07
Barclay Dr/Pine St	City of Sisters	D ^b	12.0	A/B	0.22
Barclay Dr/Locust St	City of Sisters	D ^b	13.9	A/B	0.09
Main Ave/Elm St	City of Sisters	D ^b	10.9	A/B	0.08
Hood Ave/Elm St	City of Sisters	D ^b	12.5	A/B	0.34
E Cascade Ave/Locust St	City of Sisters	D ^b	18.7	A/C	0.28

Delay = Average Stopped Delay per Vehicle (seconds) for worst approach

LOS = Level of Service (Major Street/Minor Street)

V/C = Volume/Capacity Ratio (of worst movement)

Bold Underlined values exceed standards (failing movement specified)

^a LOS for all-way stop intersection reported for entire intersection

^b When V/C ratios are greater than 1.0, demand exceeds capacity and causes the formation of excessive queues that spread delay into other hours of the day.

^c Typical LOS D standard used, though none specified in Sisters TSP or Comprehensive Plan



Chapter 5. Pedestrian Plan

Introduction

The recommended pedestrian network includes a diverse set of walking facilities connecting key destinations throughout Sisters. System improvements include filling pedestrian facility gaps, upgrading intersections for safer pedestrian crossings, expanding the shared-use path network, and other infrastructure projects to encourage walking. Suggested improvements include low-cost measures yielding immediate results, such as signing and filling small sidewalk gaps in the existing system. Other suggested improvements, such as expanding the local trail system and improving pedestrian crossings, represent longer-term strategies for transforming Sisters into a truly pedestrian-friendly community.

The 2018 refinement included textual and project list updates to reflect completed projects.

Facilities

Sisters currently benefits from a relatively complete network of sidewalks and pedestrian pathways in the downtown core and throughout several neighborhoods. Sisters has several existing paths, and there are plans to build additional facilities as well as enhance existing connections. Many intersections have curb extensions that improve visibility, reduce vehicular speeds and reduce the intersection crossing distance for pedestrians. For a comprehensive discussion, see the Existing Conditions Report for Bicycles and Pedestrians contained in Appendix H.

Strategies

This TSP proposes the following strategies to help Sisters become a truly walkable community. Strategies requiring additional explanation are addressed after this list. Several strategies include both bicycle and pedestrian elements. In each case where this occurs, the pedestrian-related elements of the project will be discussed here and bicycle-related elements will be discussed in the Bicycle Plan Chapter (Chapter 6). Cost estimates for integrated programs are found in the project tables at the end of the Bicycle Plan Chapter (Chapter 6).



Walkable Community Strategies for Sisters

- Develop a Sidewalk Infill Program.
- Continue to support policies that promote walking. Specific recommendations include:
- Update and clarify pedestrian facility construction standards and incorporate them into the City's Public Works Standards and Development Code.
- Retrofit existing pedestrian facilities to current standards to promote safety, connectivity, and consistency, as adjacent development occurs, as funds become available, or as roads are replaced or reconstructed.
- Require that all walkways be constructed in a manner that addresses environmental conditions, such as natural, cultural, and historical features.
- Require pedestrian connections within and between adjacent developments to provide convenience and safety for pedestrians.
- Develop and fund a Spot Improvement Program to respond quickly to location-specific pedestrian infrastructure improvement needs. This program integrates with spot improvement programs for bicycle infrastructure needs (discussed in Chapter 6).
- Develop an Americans with Disabilities Act (ADA) Transition Plan to identify strategies and priorities for upgrading the City's current transportation infrastructure to accommodate persons with disabilities.
- Establish a routine maintenance schedule for pedestrian facilities (e.g., repairing damaged sidewalks). This program integrates with suggested routine maintenance for bicycle facilities, discussed in Chapter 6.
- Continue implementation of the recommendations made by the Safe Routes to School Plan included with this TSP as Appendix J. Coordinate with the Sisters School District to strengthen Safe Routes to School (SR2S) Programs at the Elementary School, Middle School, and High School and ensure long-term, successful programs at each school. Prioritize facility improvements throughout the city on SR2S travel corridors.
- Develop education programs to increase the awareness of pedestrian needs and rights. See Appendix L for specific program recommendations.
- Develop encouragement programs to promote walking as a convenient, healthy, safe, and viable transportation mode. See Appendix L for specific program recommendations.
- Develop enforcement programs to ensure that pedestrians, bicyclists, and motorists obey traffic laws. See Appendix L for specific program recommendations.
- Identify and apply for available state and federal grant funding for system improvements identified in this Pedestrian Master Plan. Specific funding opportunities are discussed in the chapter on finance.
- Continue to seek funding for Washington Avenue multi-modal corridor improvements through grants or other funding mechanisms.
- Create safe, comfortable, and convenient facilities parallel to Highway 20 for pedestrians and bicyclists of all ages and abilities.



Policies to Promote Walking

Those strategies listed above that require additional explanation are addressed in the following sections.

Pedestrian Design Standards

Sisters currently has guidance for pedestrian facility design standards in Title 12 of the Municipal Code, Chapter 3 of the Development Code, and the Public Works Design Standards. A 1999 city ordinance requires provision of adequate pedestrian facilities along all newly built and reconstructed roadways. Further, this ordinance specifies that sidewalks are required within areas zoned as High or Standard Density Residential and General Commercial.

This TSP recommends that the City adopt a standard minimum of 6-foot wide pedestrian facilities in Commercial and Residential Zones and that this standard is referenced in the Municipal Code, the Development Code and the Public Works Design Standards. The pedestrian facility type should be determined based on curb type, zoning, street designation, and available right-of-way. This 6-foot minimum width is consistent with standards recommended by the *Oregon Bicycle and Pedestrian Plan*. Wider facilities should be encouraged by the code in areas with higher pedestrian traffic.

Sidewalk Infill Program

It is a major objective of this TSP to increase the number and quality of sidewalks to increase walking for transportation and recreation and to overcome system gaps in the sidewalk network that inhibit walking. The very qualities that make Sisters unique and livable are directly linked to its pedestrian-friendliness. The City also recognizes the health, safety, economic, and environmental benefits of improving pedestrian facilities and increasing the level of walking.

Sisters should develop a Sidewalk Infill Program that periodically inventories the street/walkway network to identify sidewalk gaps and obstructions. In addition, the City should further develop strategies, project prioritization criteria, and funding mechanisms for completing these gaps. Potential project prioritization criteria include:

- Filling gaps and removing obstructions along key pedestrian routes identified in this TSP
- Focusing on areas near major pedestrian trip generators like schools, downtown, parks, and civic facilities
- Meeting pedestrian needs along streets with high vehicle volumes or speeds

Spot Improvement Program

A Spot Improvement Program provides a set amount of money each year to implement low-cost, one-time fixes to the pedestrian system. Having the ability to respond quickly to the requests of pedestrians will enhance Sisters' standing as a pedestrian-friendly community. A Spot Improvement Program should be funded by grants and general funds, with all funds dedicated to smaller spot improvements identified by City staff and residents. Improvements might include:

- Striping and signing of a particular path to increase safety and path user compliance



-
- Sidewalk infill to connect essential pedestrian routes, especially in school areas
 - Adding appropriate directional and informational signing along paths and sidewalks
 - Re-striping of crosswalks where the striping has worn away
 - Re-striping of on-road pedestrian facilities (roadway shoulders)
 - ADA improvements in parks

Accommodating People with Disabilities

With the advent of the Americans with Disabilities Act in 1990, the nation recognized the need to provide equal access to all residents. Since its inception, ADA has significantly changed design requirements for the construction of public space. Much of the pedestrian environment built prior to the ADA's inception does not adequately accommodate people with disabilities. The City of Sisters' approach is to gradually improve facilities through land development project requirements, capital street improvement projects, and capital projects that specifically retrofit outdated public pedestrian facilities.

It is important to note that a pedestrian environment strategically built to be accessible for people with disabilities is also more accessible for all. Curb ramps, for instance, can accommodate strollers, shopping carts, and delivery handcars. Accessible intersection crossings can increase safety for people regardless of ability. In recognition of this, the City's philosophical approach is to create pedestrian environments that are attractive, functional, and accessible to all people.

Developing an ADA Transition Plan

As a part of ADA implementation, the Justice Department requires that all municipal jurisdictions have an ADA Transition Plan, intended to spell out the City's intention to retrofit the built environment to an accessible state. While the TSP's Pedestrian Element is purposely written to accommodate people with disabilities, a separate document with greater specificity is required. The ADA Transition Plan should use all relevant strategies of the TSP as well as other current practices that have merit.

To adequately plan the pedestrian environment for people with disabilities, the ADA Transition Plan must take into account each of the disabilities and the limitations they present. It is also important to be aware of how planning for people with one disability affects people with another disability. For example, gradual ramps and smooth transitions to the street help people in wheelchairs, but present challenges for the visually-impaired if they cannot easily identify the end of the sidewalk and beginning of the street. The Plan should also consider the needs of children and older adults.

Walkway Maintenance

Maintaining pedestrian facilities is just as important as building the system. The City should periodically inventory the existing walkway network to identify needed improvements (e.g., cracked or heaving pavement, intersections lacking curb ramps, etc.) and dedicate resources on an ongoing basis to address these problem areas or notify the responsible party about necessary maintenance. The design guidelines contained in Appendix K provide a suggested list of



maintenance activities and their frequency. A discussion of shared-use path maintenance can be found in the ‘Bikeway Maintenance’ section of Chapter 6.

Needs

As summarized in the Bicycle and Pedestrian Future Needs memo in Appendix H, future growth in Sisters may lead to increasing conflicts between motor vehicles, cyclists, and pedestrians. These conflicts include turning movements, crossing difficulties due to a reduced number of traffic gaps, and competition for space within the right of way. Future expansion of the multi-modal transportation network in Sisters may address and mitigate these future conflicts. Additional needs include updated pedestrian design standards, retrofitting of existing facilities to meet ADA requirements, and expansion of the shared-use path network.

Pedestrian Master Plan and Action Plan

In order to become a place where ‘people can get by without their car,’ the City is developing a plan to make Sisters a place where walking is a safe, attractive, and viable form of transportation that works seamlessly with other travel modes. The proposed infrastructure improvements and supporting programs will help Sisters reach its goal of safe and effective multi-modal transportation.

Recommended Pedestrian Improvements

The recommended pedestrian network builds upon Sisters’ existing system of sidewalks, shared-use paths, and other pedestrian infrastructure. Depicted on the Proposed Pedestrian System Map shown in Figure 5-1, the recommended projects are intended to enhance pedestrian safety and convenience while making walking an attractive and viable travel mode. Recommendations include filling gaps in the sidewalk system, developing an interconnected shared-use path network, and targeting specific intersections for pedestrian crossing enhancements.

The recommended network was developed based on extensive input from previous planning efforts, as well as input from the Project Advisory Committee (PAC), city leaders, and Sisters residents. The sections below discuss specific pedestrian facilities in greater detail, while Table 5-1 at the end of this section present the project list. Though this TSP recommends construction of pedestrian facilities on all streets within Sisters, only projects along Collectors, Arterials, and the proposed multi modal transportation corridors are called out as individual projects in this document.

Sidewalks

Sisters benefits from a relatively complete sidewalk system in several areas, including the downtown core, immediate surrounding neighborhoods, and on recently-constructed and reconstructed streets such as portions of Cascade Avenue east of Sisters Elementary School.



Sisters uses several types of sidewalks, including a curbed version in the downtown area, a rolled curb version with a meandering concrete, paver, or asphalt path in newer residential areas, and uncurbed asphalt pedestrian paths found throughout the city. The meandering sidewalk/pathway style allows flexibility to maneuver around significant natural features (e.g., Ponderosa Forest), and helps to create a less-urban feel while maintaining a smooth, paved travel surface.

A major challenge in Sisters is filling sidewalk gaps in areas where facilities are fragmented or lacking altogether, and in areas where significant redevelopment is not expected to occur in the foreseeable future. Completing some sidewalk links can be challenging, especially in older residential areas where private property development has encroached into the public right-of-way. In addition, some residents may not want any paved facilities that change the rural character of their neighborhoods, or facilities that may impact mature landscaping encroachments and trees. Regardless, the public right-of way that is generally located on either side of the paved driving and parking area is intended for walking, whether or not a sidewalk currently exists.

The City is taking an active role in completing sidewalk infill projects, as demonstrated by recent sidewalk improvements in the downtown core and surrounding areas. This TSP strongly recommends that the City continue its efforts to expand the sidewalk system through new street construction and reconstruction and independent sidewalk infill projects.

Intersection Improvements

Pedestrian crossings at intersections were identified as a major challenge in Sisters' existing walking environment. This TSP proposes an overall strategy to improve intersections and other pedestrian crossings citywide through a variety of treatments. Most intersections that could benefit from improvements are located along:

- Highly-traveled pedestrian corridors
- Streets with wide cross-sections (e.g., with wide travel lanes)
- Streets with higher vehicle speeds and volumes
- Streets with other conditions complicating pedestrian crossing movements

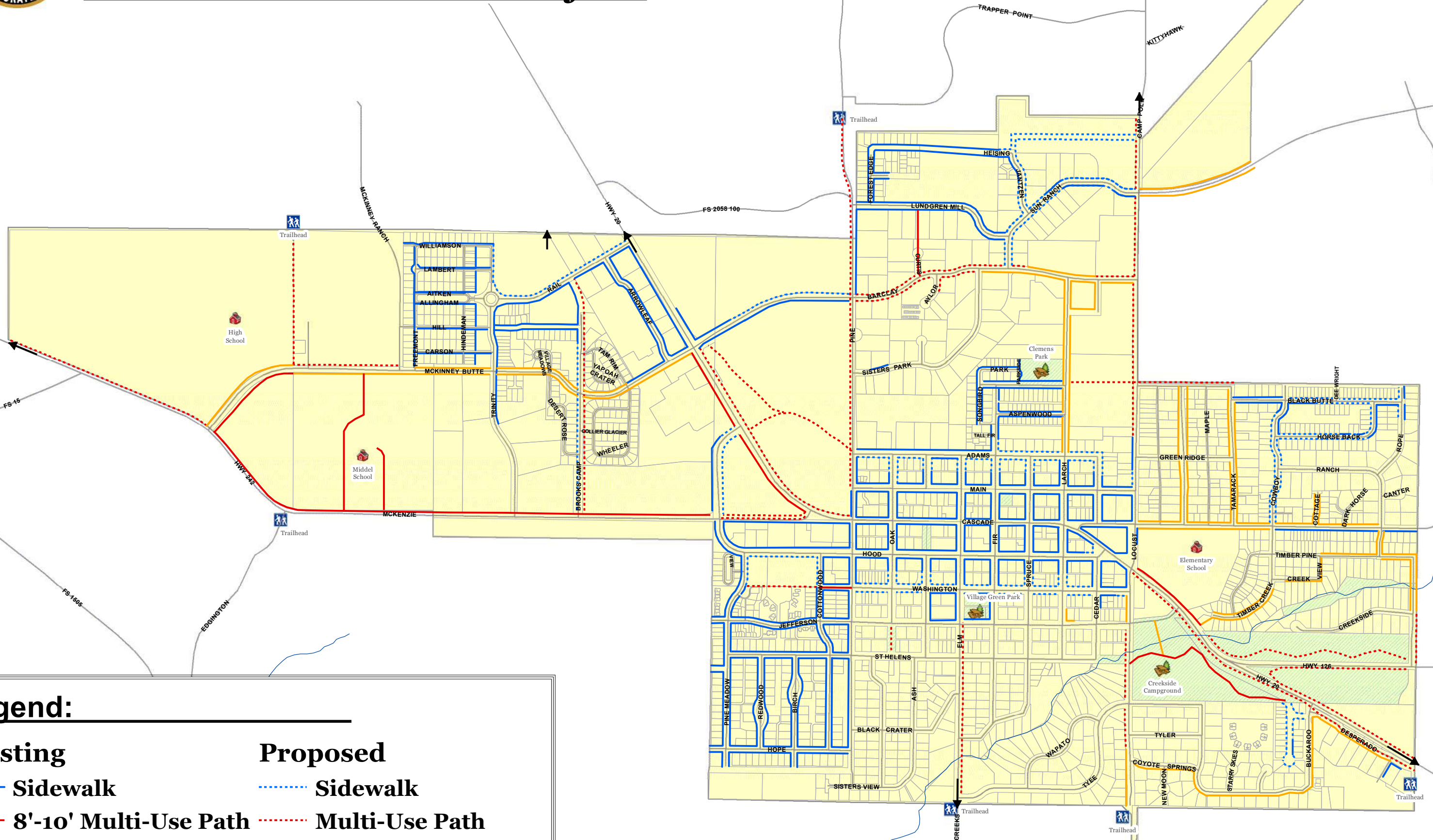
Examples include intersections along Highway 20 at Locust Street, Pine Street at Cascade Avenue, along Highway 20 on the west side of town, and Barclay Drive at Pine Street. This TSP also recommends intersection improvements as part of several proposed shared-use corridors to facilitate easy and safe pedestrian crossings where paths cross major streets. Additional guidance is provided in the design guidelines in Appendix K.

Shared-Use Paths

Shared-use paths within Sisters accommodate users of all types, ages, and ability levels. These paths form an important part of both the bicycle and pedestrian network and will connect to existing and proposed trails outside the city. See the Bicycle Chapter (Chapter 6) for a discussion of these facilities.



City of Sisters TSP Pedestrian Master Plan Projects



Legend:

Existing Sidewalk	Proposed Sidewalk
8'-10' Multi-Use Path	Multi-Use Path
6' Asphalt Path	Future Connections





Project Prioritization and Action Plan

Several evaluation criteria were developed to identify and prioritize projects for improving Sisters' walking environment. Specifically, the criteria were applied in two ways:

- To lay out the best possible future pedestrian network by identifying the features of a network most important to Sisters residents. Criteria identified by the PAC include:
 - Safe crossings
 - Improving connectivity between destinations
 - Filling system gaps
- To rank projects against each other as an indication of their relative importance.

Using the above criteria, the consultant team first ranked each project based on information obtained from site visits, field work, and input from City officials and the public. Then the consultant team grouped the projects into high, medium, and low priorities. The high, medium, and low priorities may change according to available funds, changing priorities, new roadway projects, new development and redevelopment opportunities, or other factors. It should be noted that the purpose of this exercise is to understand the relative priority of the projects so that the City may apportion available funding to the highest-priority projects. Medium and low priority projects are also important and may be implemented at any point as part of a development or public works project. The ranked list should be considered a "living document" and should be frequently reviewed to ensure it reflects current Sisters priorities.

The list of proposed pedestrian projects (and their relative priority) is located at the end of this chapter (see Table 5-1). The Master Plan refers to the list of projects the City would like to construct if there were no financial constraints. However, until implementation measures are taken (such as an update to the City's Capital Improvement Plan and implementation of necessary funding mechanisms), the Master Plan projects are not considered "reasonably likely to be funded" for Transportation Planning Rule (TPR) OAR 060 purposes.

Selected Sisters Pedestrian Projects

This TSP is intended to examine transportation conditions and facilities throughout the Sisters and recommend general improvements. However, the following section discusses several projects in greater detail due to high priority, special design treatments, or project complexity.

Cascade Avenue

The selection of Barclay/Locust as an alternative highway route affords the City of Sisters an excellent opportunity to enhance the Cascade Avenue streetscape and improve bicycle (and pedestrian) crossing conditions. The majority of the following improvements for Cascade Avenue have been completed in recent years, including: sidewalk widening (from five feet to eight feet), narrowing of parking lanes (from ten feet to eight feet), and adding extended curb extensions (removing one on-street parking space each) at intersections without left turn pockets (or at desired mid-block locations) to further reduce the pedestrian/bicycle crossing distance, and



narrowing the curb-to-curb width from 50 feet to 44 feet, and 32 feet at curb extensions.¹⁷ The City has obtained a design exception for Highway 20 to implement the proposed cross section. The design exception addresses the following:

- Limited right-of-way, freight, and capacity issues
- The need to retain on-street parking, as required by ODOT
- And trade-offs between bike lanes and wider sidewalks

Though bicycle and pedestrian facilities are recognized by the Oregon Highway Plan (1999) as important design treatments, it is not possible to accommodate all uses within the existing corridor while meeting freight and mobility needs.

Travel lane narrowing, curb extension installation, and sidewalk widening will improve the pedestrian realm and crossing conditions. Though these improvements favor pedestrians on Cascade Avenue, cyclists are accommodated one block to the north and south on Hood Avenue and Main Avenue. Additionally, they can use lower traffic shared streets (Adams Street or Washington Avenue) running parallel to Cascade Avenue two blocks to the north or south. Alternative travel corridors are especially important as they provide choices for bicycles and pedestrians of all ages and abilities to travel in conditions that feel safer and comfortable.

Crossing Improvements at East Locust Street and Cascade Avenue

The crossing of Locust Street at Cascade Avenue is a busy pedestrian intersection, especially at the beginning and end of the school day. Existing plans call for the removal of this barrier in conjunction with the future intersection improvements at US 20/Locust Street. This TSP proposes a pedestrian refuge island in-lieu of a left turn lane on Locust Street. This modification would have little effect on motor vehicle access to the library and city hall while achieving a significant increase in pedestrian safety. This design could be used at other intersections where a refuge island would enhance pedestrian safety (e.g., Cascade Avenue and Larch Street).

Multi-Modal Transportation Corridors

The Pedestrian System Map depicts existing and future multi-modal corridors in Sisters. These corridors (two running east-west and two running north-south) form the base of the proposed non-motorized transportation system in Sisters. Each corridor contains recommended projects of varying facility types designed to address identified needs, community desires, and available right-of-way. These corridors will emphasize pedestrian and bicycle travel while accommodating all modes of transportation. The design guidelines in Appendix K contain a description of facility types and treatments. These corridors include:

- Pine Street from Lundgren Mill Drive to Main Avenue: Improvements include a shared-use path along the western shoulder of Pine Street and intersection improvements.

¹⁷ These represent minimum sidewalk widths for the proposed cross section. Sisters may choose to seek ODOT approval to further decrease these widths. For more information, see the Motor Vehicle chapter.



- Larch Street from Washington Avenue to Barclay Drive: Improvements include sidewalk infill and intersection improvements.
- Northern cross-town connector. This route utilizes several streets including Highway 20, a shared-use path running between Highway 20 and Adams/Main Street, and Main Street itself to form a west/east running multi-modal transportation corridor on the north side of Cascade Avenue. Improvements include shared street treatments, shared use path treatments, intersection improvements, and sidewalk infill. Main Street is the identified east/west connector for bicycles and includes striped bicycle lanes as well as complete sidewalks. Adams Avenue is identified as a future pedestrian northern cross-town connector. The City should consider using the cross section proposed for Washington Avenue along Adams Street.
- Southern cross-town connector. This route utilizes several streets including Highway 242, Hood Avenue, Washington Avenue, Cedar Street, and Highway 20 to form a west/east running multi-modal transportation corridor on the south side of Cascade Avenue. Improvements include crossing treatments, sidewalk infill, shared street treatments, and wide sidewalks.

In June 2008, the City applied for a grant from the ODOT Pedestrian-Bicycle Improvement Grant Program for several improvements including sidewalks, bike lane striping, streetscape infrastructure, shared street treatments, and crossing improvements for several of the streets comprising the Southern cross-town connector. Improvements are proposed for:

- Pine Street between Washington Avenue and Highway 20
- Cedar Street between Washington Avenue and Highway 20
- Locust Street between Washington Avenue and Highway 20
- Washington Avenue between Pine Street and Locust Street

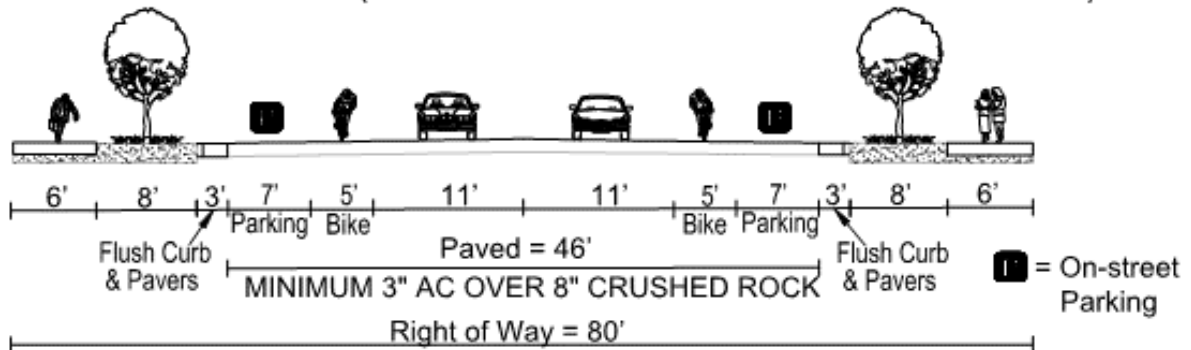
The proposed improvements included wide sidewalks and a 'woonerf'-style shared space cross section. Figure 5-2 shows the project extent of proposed improvements to be funded by the grant, and Figure 5-3 illustrates the proposed cross section for Washington Street. It should be noted that the proposed cross section for Washington Street does not meet the standard for the proposed neighborhood route cross section in Figure 7-4 due to an effort to balance project costs with existing corridor conditions (e.g., paved width), which will require a design exception from the City Engineer. Though these improvements are not located on the Highway, they do provide options for cyclists and pedestrians of all ages and abilities to travel in safety and comfort along parallel routes.

Prior to implementing improvements to Washington Avenue, the City should perform a parking and access analysis of the corridor to evaluate how the proposed cross-section would serve existing and anticipated uses along the street.



Figure 5-2: Proposed Pedestrian-Bicycle Improvement Grant Project Extent

NEIGHBORHOOD ROUTE (WASHINGTON AVE - PINE ST TO LOCUST ST)



NOTE: CURB EXTENSIONS REQUIRED ON WASHINGTON AVE - PINE ST TO LOCUST ST. SEE DWG NO. 2-5.

Figure 5-3: Proposed Washington Avenue Cross Section

Project Costs

This section summarizes planning-level cost estimates associated with the recommended pedestrian improvement projects. The estimates were based on similar Pedestrian Improvement Plans as well as experience in other communities.

Unit cost estimates for individual pedestrian treatments (e.g., sidewalk cost per linear foot) are summarized in Appendix P, while Table 5-1 summarizes the overall cost for each project and relative priority. Table 5-2 shows recently completed projects that were part of the 2010 TSP. The



cost estimates for all projects include contingency and construction management costs. A breakdown of the unit cost estimate assumptions used for the projects is given in Appendix M.

Table 5-1: Pedestrian Master Plan Projects

Location	Description	Priority	Cost (\$1,000's)
High Priority Capital Improvements			
Intersection of Hwy 20 and Locust St	Install high visibility crosswalks, pedestrian warning signs, and signalized crossing. Integrate with traffic signal or roundabout, if present. <i>Address with Eastside Refinement.</i>	High	28
South leg of Locust St/E. Cascade Ave Intersection	Install a high visibility crosswalk and pedestrian warning signs. Also, install a pedestrian refuge island in conjunction with the installation of a southbound left-turn lane. This crossing will take the place of the mid-block crossing to the south. <i>Address with Eastside Refinement.</i>	High	20
Intersection of Barclay Dr and Pine St	Install high visibility crosswalks and pedestrian warning signs. Should occur in conjunction with alternate route development.	High	20
Intersection of Locust St and Barclay Dr	Install high visibility N/S crosswalk and pedestrian warning signs. Should occur in conjunction with alternate route development.	High	10
Intersection of Hwy 20 and Hwy 126	Install high visibility crosswalks and pedestrian warning signs. <i>Address with Eastside Refinement.</i>	High	30
Washington Ave from Pine St to Locust St	Construct new sidewalks and/or fill in existing sidewalk gaps in conjunction with development of Bicycle Blvd (<i>Partially Complete</i>) Conduct parking and access analysis as part of project implementation.	High	300
Adams Ave Streetscape Improvements	Develop and install a comprehensive streetscape design including sidewalks for the Adams Ave corridor from Pine St. to Cedar St	High	925
Hood Ave from Hwy 20 to Cedar St	Construct new sidewalks and/or fill in existing sidewalk gaps (<i>Partially Complete</i>)	High	20
Pine St from Barclay Dr to Main Ave	Construct new multi-use path along west side in conjunction with redevelopment. Crossing improvements should focus on east/west movements.	High	250
McKinney Butte Rd from Sisters High School to N Freemont St	Fill in existing multi-use path gaps at time of development.	High	30
Downtown Commercial and Multi-Family Core – Sidewalk Infill	Fill in existing sidewalk gaps within the Downtown Commercial/Multi-Family core (Adams Ave to Washington Ave, Pine St to Locust St)	High	840



Location	Description	Priority	Cost (\$1,000's)
Citywide Spot Improvement Program	Fund an annual Spot Improvement Program to address ongoing pedestrian system needs	High	
Medium Priority Capital Improvements			
Locust St from E Cascade Ave to Barclay Dr	Construct new multi-use path (west side) to occur with development.	Medium	100
Barclay Dr from Hwy 20 to Camp Polk Rd	Construct new sidewalks/multi-use paths and/or fill in existing sidewalk gaps. Perform in conjunction with alternate route.	Medium	360
Elm St from Jefferson Ave to southern city limits	Construct new multi-use path (eastside)	Medium	80
Citywide ADA Transition Plan	Develop an ADA Transition Plan identifying specific projects and strategies for bringing existing sidewalks and other pedestrian facilities into compliance with ADA standards.	Medium	50
Brooks Camp Rd from Hwy 242 to Rail Way	Construct new sidewalks (west side) and construct multi-use path (east side) at time of development.	Medium	160
Low Priority Capital Improvements			
Mid-block crossing of Hwy at Buckaroo Trail	Install high visibility crosswalks and pedestrian warning signs. Should be constructed in conjunction with multi-use paths. May require additional feasibility study based on current traffic levels. <i>Address with Eastside Refinement.</i>	Low	50
Intersection improvements at Hwy 20 and Jefferson Ave	Install high visibility crosswalks and pedestrian warning signs. Should be constructed in conjunction with multi-use paths. May require additional feasibility study based on current traffic levels. <i>Address with Eastside Refinement.</i>	Low	50
Intersection improvements at Camp Polk Rd and Sun Ranch Dr	Install high visibility crosswalks and pedestrian warning signs	Low	10
Rail Way from Trinity Way to Hwy 20	Construct new sidewalks along north in conjunction with development.	Low	Dev.
Sun Ranch Dr from Barclay Dr to Camp Polk Rd	Construct new concrete sidewalks and/or fill in existing sidewalk gaps in conjunction with development.	Low	Dev
Camp Polk Rd from Barclay Dr to Sun Ranch Dr	Construct new multi-use path (west side) in conjunction with development.	Low	Dev
Creekside Dr from Creekside Ct to Hwy 126	Complete multi-use path (eastside)	Low	60
Black Butte Ave from Tamarack St to Larch St	Construct new multi-use path (including new mid-block connection) in conjunction with development.	Low	Dev
Locust St from Southern city limits to Hwy 20	Construct new multi-use path/ fill in gaps (west side).	Low	125



Location	Description	Priority	Cost (\$1,000's)
Citywide Sidewalk Infill Program	Fund an annual Sidewalk Infill Program to complete sidewalk gaps on existing streets, Overall estimate (includes projects not specifically mentioned in this list)	Low	250

Table 5-2: Completed Pedestrian Projects

Location	Description	Priority
Completed TSP Pedestrian Projects		
Hwy 20 from Pine St to Locust St	<p>Widen sidewalks and narrow vehicle travel lanes along length of corridor. At intersections, install high visibility crosswalks, pedestrian warning signs, and curb extensions. Install all but the curb extensions at Pine St (due to left-turn lanes). Improvements at Pine Street should focus on east/west crossing enhancements.</p> <p>This project and associated bicycle improvements correlate with the Cascade Ave Streetscape Improvements from the Downtown Sisters Urban Renewal Plan. All costs are accounted for in this pedestrian plan.</p> <p>Construct off-street parking facilities to mitigate removal of on-street parking.</p>	High
Main Ave from Pine St to Locust St	<p>Widen sidewalks and narrow vehicle travel lanes along length of corridor. In addition, install high visibility crosswalks and pedestrian warning signs at Pine St and Elm St.</p> <p>This project and associated bicycle improvements correlate with the Main Ave Streetscape Improvements from the Downtown Sisters Urban Renewal Plan. All costs are accounted for in this pedestrian plan.</p>	High
Mid-block crossing of Locust St between E. Cascade Ave and Hwy 20	Install high visibility crosswalk and school crosswalk signs. This crossing should be closed after improvements occur at the E. Cascade Ave/Locust St intersection.	High
Intersection of Hood Ave and Hwy 20	Install high visibility crosswalk and school crosswalk signs. The city should move the designated school crossing to the intersection of Locust St and Hwy 20 upon installation of a traffic signal or roundabout.	High
Intersection improvements along Pine St at Hood Ave, Adams Ave, and Main Ave	Install high visibility crosswalks and pedestrian warning signs. Integrate with traffic signal or roundabout, if present.	High
Intersection improvements at McKinney Butte Rd and the Tollgate Trail	Install high visibility crosswalks, pedestrian warning signs.	High
Intersection Improvements at Hwy 242 intersections with McKinney Butte Rd and Hood St	Install high visibility crosswalks and pedestrian warning signs. Should occur in conjunction with construction of multi-use trail.	High
Intersection of Elm St and Hood Ave	Install high visibility crosswalks and pedestrian warning signs	High
Intersection of Larch St and Hood Ave	Install high visibility crosswalks and pedestrian warning signs	High



Location	Description	Priority
E. Cascade Ave from Locust St to eastern city limits	Construct new sidewalks and/or fill in existing sidewalk gaps	High
*Intersection of Barclay Dr and Hwy 20 ^a	Install high visibility crosswalks, pedestrian warning signs, and signalized crossing. Integrate with traffic signal, if present.	High
Rope St from Cascade Ave to Timber Pine Dr	Construct new sidewalks and/or fill in existing sidewalk gaps in conjunction with fronting development	Low
Timber Pine Dr from Rope St to eastern terminus (Creekside Ct)	Construct new sidewalks and/or fill in existing sidewalk gaps	Low



Chapter 6. Bicycle Plan

Introduction

The recommended bicycle network includes a diverse set of bicycling facilities connecting key destinations throughout Sisters. System improvements include filling on-street bikeway gaps, upgrading intersections for safer bicycle crossings, expanding the shared-use path network, and other infrastructure projects to encourage and facilitate bicycling. Suggested improvements include low-cost measures yielding immediate results, such as striping bicycle lanes where sufficient street width already exists. Other suggested improvements, such as expanding the local trail system, represent longer-term strategies for transforming Sisters into a truly bicycle-friendly community.

The 2018 refinement included textual and project list updates to reflect completed projects.

Facilities

Sisters benefits from a relatively well-connected street grid, which can serve as the basis for creating a community-wide bicycle system. Some bicycle facilities already exist, including striped lanes on Camp Polk Road, Lundgren Mill Drive, Highway 242, portions of Barclay Drive and a shared-use path near Sisters Middle School. Sisters has also made some provisions for end-of-trip facilities, including standards for both long- and short-term bicycle parking at new developments. For a comprehensive discussion, see the Existing Conditions Report for Bicycles and Pedestrians contained in Appendix H.

Strategies

This TSP proposes the following strategies to help Sisters become a truly bikeable community. Strategies requiring additional explanation are addressed after this list. Several strategies include both bicycle and pedestrian elements. In each case where this occurs, the bicycle-related elements of the project will be discussed here, and pedestrian-related elements will be discussed in the Pedestrian Chapter (Chapter 5). Cost estimates for integrated programs are found in the project table at the end of this chapter.

Bikeable Community Strategies for Sisters

- Continue to support policies that promote bicycling. Specific suggestions include:



- Establish bicycle facility construction standards and incorporate them into the City's Public Works Standards and Development Code
- Retrofit existing bicycle facilities to current standards to promote safety, connectivity, and consistency, as adjacent development occurs, as funds become available, or as roads are replaced or reconstructed
- Require that all bikeways be constructed in a manner that addresses environmental conditions, such as natural, cultural, and historical features
- Require continuous bicycle connections and corridors within and between developments to provide convenience and safety for bicyclists.
- Develop and fund a Spot Improvement Program to respond quickly to location-specific bicycle infrastructure improvement needs. This program integrates with spot improvement programs for pedestrian infrastructure needs, discussed in Chapter 5.
- Establish a bicycle network signing program to determine sign placement locations and sign content (e.g., locations, distance, and travel time). The City should consider using custom signage to complement Sisters' Western-themed downtown and existing street signs. See the design guidelines contained in Appendix K for proposed designs for Sisters' bikeway signs.
- Establish a routine maintenance schedule for bicycle facilities (e.g., repairing/restriping damaged bike lanes). This program integrates with suggested routine maintenance for pedestrian facilities, discussed in Chapter 5.
- Continue implementation of the recommendations made by the Safe Routes to School Plan included with this TSP as Appendix J. Coordinate with the Sisters School District to establish and strengthen Safe Routes to School (SR2S) Programs at the Elementary School, Middle School, and High School and to ensure long term, successful programs at each school. Prioritize facility improvements throughout the city on SR2S travel corridors. Develop education programs to increase the awareness of bicyclist needs and rights. See Appendix L for specific program recommendations.
- Develop encouragement programs to promote bicycling as a convenient, healthy, safe, and viable transportation mode. See Appendix L for specific program recommendations.
- Develop enforcement programs to ensure that pedestrians, bicyclists, and motorists obey traffic laws. See Appendix L for specific program recommendations.
- Identify and apply for state and federal grant funding opportunities to fund the system improvements identified in the Bicycle Master Plan. Specific funding opportunities are discussed later in the chapter on finance.
- Continue to seek funding for Washington Avenue multi modal corridor improvements through grants or other funding mechanisms.
- Create safe, comfortable, and convenient facilities parallel to Highway 20 for pedestrians and bicyclists of all ages and abilities.

Policies to Promote Bicycling

Those strategies listed above that require additional explanation are addressed below.



Bicycle Facility Construction Standards

Bicycle parking facility standards can be found in Title 12 of the Development Code and the Public Works Design Standards. The Development Code discusses bicycle parking requirements for new development; this TSP proposes additional design guidance for bicycle parking. While the Public Works Design Standards mention that streets built along designated bikeways require additional pavement width, they do not explicitly require signing of a bicycle facility or require striping of a bike lane. This TSP proposes adopting a standard bike lane width of 6 feet to reflect ODOT guidelines, clarifying existing guidance for bikeways in City design guidelines. This TSP also proposes bike lanes on all new arterial and collector streets as well as retrofitting bike lanes with major roadway reconstruction on existing arterial and collector streets. New standards identified in this TSP should be codified in the appropriate Development, Municipal Code, and Public Works Design Standards.

Spot Improvement Program

A Spot Improvement Program provides a set amount of money each year to implement low-cost, one-time fixes to the bicycle system. Having the ability to respond quickly to the requests of bicyclists will enhance Sisters' standing as a bicycle-friendly community. A Spot Improvement Program could be funded with grants or general funds dedicated to smaller spot improvements identified by City staff and residents. Such improvements might include:

- Striping and signing of a particular route to increase safety and path user compliance along a heavily-used path
- Adding bicycle parking to locations that currently lack appropriate parking, such as areas along Cascade Avenue at the library and schools
- Adding appropriate directional and informational signage along paths and bicycle routes
- Re-striping of bicycle lanes where the striping has worn away

Bikeway Maintenance

Maintaining and improving bicycle facilities is as important as building the system. The City should regularly inventory the existing bikeway network to identify needed maintenance and dedicate resources on an ongoing basis to address these problem areas.

On- and off-street bikeways require regular maintenance and repair. On-street bikeways are typically maintained as part of normal roadway maintenance programs, with particular emphasis on keeping bike lanes and roadway shoulders clear of debris and keeping vegetation overgrowth from blocking visibility or encroaching into the roadway. Shared-use path maintenance activities typically include trash removal, trimming of trees and limbs extending into the pathway, and addressing pavement deterioration. Sisters should regularly evaluate its bicycle facilities and promptly address maintenance needs. The design guidelines contained in Appendix K provide recommendations for maintenance activities and their frequency.



Needs

As summarized in the future needs memo in Appendix H, future growth in Sisters may lead to increasing conflicts between motor vehicles, cyclists, and pedestrians. These conflicts include turning movements, crossing difficulties due to a decreasing number of traffic gaps, and competition for space within the right-of-way. Future expansion of the multi-modal transportation network in Sisters may help address and mitigate these future conflicts such as comprehensive bicycle design standards and expansion of the shared-use path network.

Bicycle Master Plan and Action Plan

In order to become a place where ‘people can do without their car,’ the City is embarking on a plan to make Sisters a place where bicycling is a safe, attractive, and viable form of transportation that works seamlessly with other modes of travel. The proposed physical improvements and supporting programs will help Sisters reach its goal of safe and effective multi-modal transportation.

Bicycle Facilities

Although Sisters currently lacks a connected comprehensive bikeway network, however, the City has potential to create an excellent system. The recommended bicycle network builds upon the system of bike lanes, shoulder bikeways, and shared-use paths already in place and also takes advantage of many lower-volume bicycle-friendly streets. Depicted on the Proposed Bicycle System Map in Figure 6-1, the recommended projects aim to fill system gaps and develop a more complete network appropriate for bicyclists of all ages and abilities. The proposed system includes an expanded bike lane network on streets where bicyclists would benefit from delineated separation from motorists, while shared-use paths are recommended in wide right-of-ways along several cross-town routes. The recommended network also includes a Bicycle Boulevard and or shared streets, taking advantage of Sisters’ extensive network of lower-volume streets.

The recommended network was developed based on input from previous planning efforts as well as input from the Project Advisory Group (PAC), city leaders, and Sisters residents. The sections below discuss specific bicycle facilities in greater detail, while **Error! Reference source not found.** and **Error! Reference source not found.** at the end of this chapter present the project list.

Bike Lanes

Several streets in Sisters lack dedicated bike lanes. Safely accommodating bicyclists on major roadways is important for several reasons. First, major streets generally offer the most direct routes between destinations while providing better connectivity compared with lower-order streets. Commuter cyclists and those traveling longer distances often gravitate to these routes. Second, the commercial character of major streets (e.g., employment, shopping, etc.) makes these corridors destinations in and of themselves.



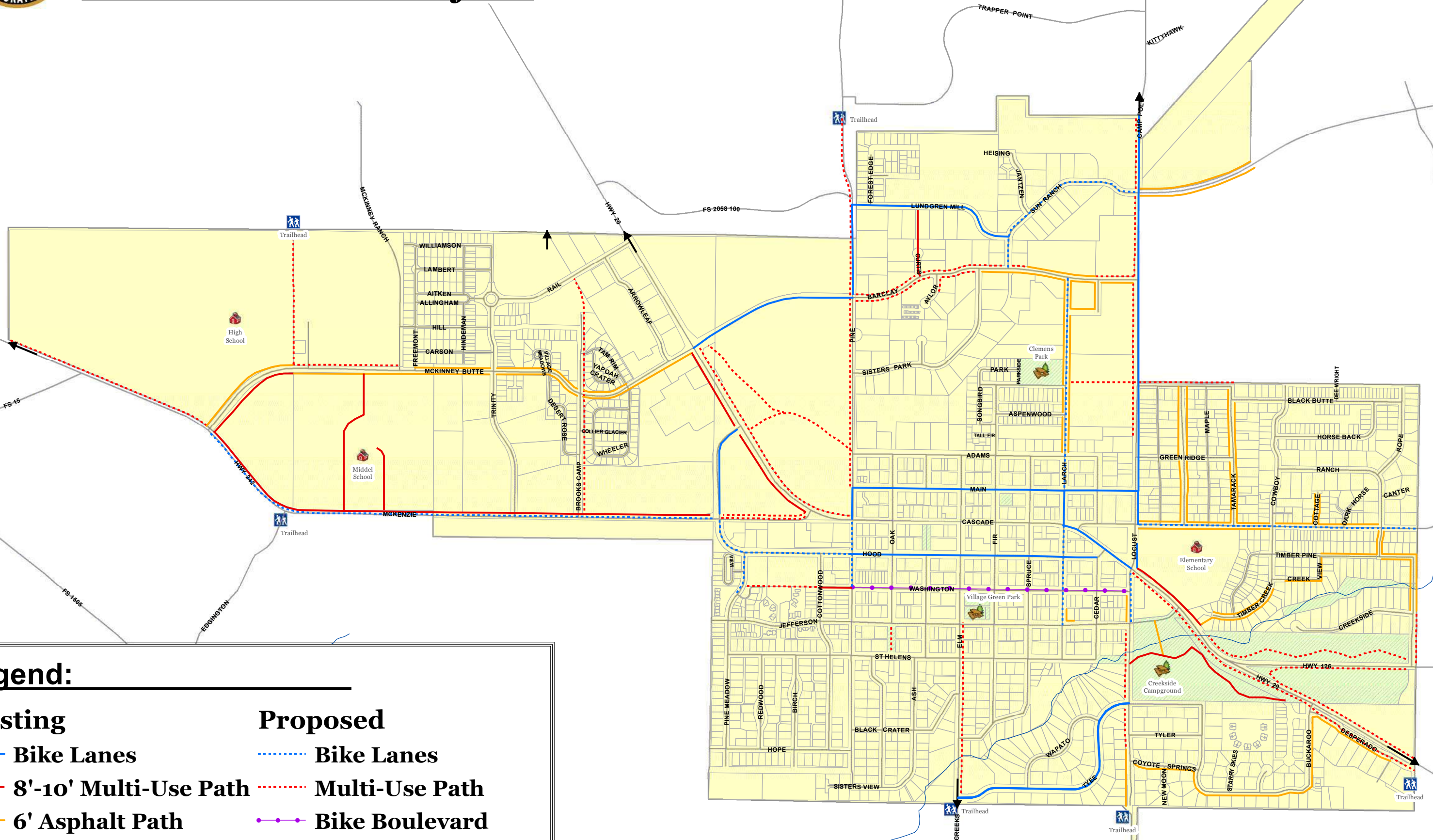
To safely accommodate bicyclists on corridors with current or anticipated high vehicular traffic volumes, bike lanes are proposed on several major streets in Sisters. In developing the proposed bike lane network, consideration was given to several factors, including:

- Gaps in the existing bike lane system
- Previous and on-going planning efforts identifying the need for bike lanes on specific streets
- Planned street improvements that will include bike lanes as part of construction
- Whether an existing street could be retrofitted to include bike lanes
- Planned land development projects with the potential to generate bicycle travel demand on major streets

Implementation of the bike lane projects depicted on the Proposed Bicycle System Map would primarily occur through new street construction, widening of existing streets, or roadway re-striping. The following sections describe these approaches in greater detail.



City of Sisters TSP Bike Master Plan Projects



Legend:

	Existing Bike Lanes		Proposed Bike Lanes
	8'-10' Multi-Use Path		Proposed Multi-Use Path
	6' Asphalt Path		Proposed Bike Boulevard
	Future Connections		





Bike Lanes as Part of New Street Construction

Bike lanes should be included as part of new arterial and collector street construction. The Motor Vehicle Chapter 7 identifies several planned new major streets, including Barclay Drive from Pine Street to Camp Polk Road (this route is planned as part of the Alternate Route)

The Motor Vehicle Chapter (Chapter 7) does not explicitly list bike lanes as part of these new street projects, however their Collector and/or Arterial status (and associated traffic volumes) indicate the need for dedicated bike lanes. This is consistent with the City’s street design standards, which requires additional pavement width on roadways within designated bike corridors (but does not clarify the need for this additional pavement width). As recommended earlier in this chapter, the Development Code and Public Works Standards should clarify what this additional width is for and also require the installation of design treatments associated with the designated bikeway facility type (e.g., striping and signage for a bike lane).

Bike Lanes as Part of Roadway Widening Projects

Continued residential and commercial expansion on Sisters’ outskirts could alter the role of existing rural roadways. As these roadways transition to serve predominantly urban traffic, roadway widening may be necessary to address vehicle capacity and safety needs. Even without vehicle capacity expansion, roadway widening may be necessary to provide greater separation between bicyclists and increasing vehicle traffic volumes (e.g., by adding dedicated bike lanes). In Sisters, example corridors include:

- Portions of Barclay Drive (also to include mixed-use paths)
- McKinney Butte Road
- Portions of Camp Polk Road

Bicycle Boulevards/Shared Streets

Several areas in Sisters benefit from a generally well-connected system of lower-volume streets that – with the addition of moderate treatments – could become good bicycling routes for riders of all ages and skills. These streets (commonly referred to as “Bicycle Boulevards” or Shared Streets) accommodate bicyclists and motorists in the same travel lanes, usually with no bicycle lane delineation. Traffic controls along a Bicycle Boulevard assign priority to through cyclist movement while encouraging through vehicle traffic to use alternate parallel routes. Traffic calming, on street parking and other treatments along the corridor reduce vehicle speeds so that motorists and bicyclists generally travel at the same speed, creating a safer and more comfortable environment for all users. Boulevards also incorporate treatments to facilitate safe and convenient crossings where bicyclists must traverse major streets. Bicycle Boulevards work best in well-connected street grids, where riders can follow reasonably direct and logical routes with few “twists and turns.” Boulevards also work best when higher-order parallel streets exist to serve through vehicle traffic.

Bicycle boulevards are comfortable and attractive places to cycle. There are few motor vehicles and those on the road travel at low speeds reducing pressure on cyclists to hug the edge of the



roadway. Intersections are designed to reduce the need for cyclists to stop frequently and are improved to allow convenient and safe crossings of major roadways. Clearly marked routes lead cyclists to the multiple destinations they need and want to go while clearly indicating to motorists that the street is intended for bicycle travel. Due to these conditions, bicycle boulevards attract cyclists of all ages and abilities. Research indicates that there is a strong preference by cyclists for bicycle boulevards, and suggests that they may be a key tool for attracting new cyclists who are typically less comfortable riding in traffic.¹⁸ In addition, these low-speed and low-volume facilities are also pleasant places for pedestrians and other non-motorized users.

Bicycle boulevards also allow creation of bikeways along corridors where other bikeway treatments may not be feasible due to right of way or funding constraints. Although the cost of construction will vary depending on the specific traffic calming and intersection treatments implemented, bicycle boulevards can be relatively inexpensive compared to other bicycle facility improvements, particularly when the design builds upon existing traffic calming features.

Bicycle boulevard treatments typically fall into one of five “application levels”. Treatments at each level provide an increase in treatment intensity. For example, level one and two treatments include relatively small-scale improvements such as pavement markings and signage while level five treatments include diversion of motor vehicle traffic. This TSP proposes level one and two treatments for all bicycle boulevard/shared street facilities, which allow the implementation of bicycle boulevards with the standard street cross sections shown in Chapter 7. Studies of specific corridors should be performed as necessary to determine the appropriate intensity of boulevard treatments. Additional treatments should be considered for future implementation along these routes as warranted by increased motor vehicle traffic, as funding allows, or greater emphasis on bicycle travel is desired. For detailed guidance on bicycle boulevards, see the design guidelines contained in Appendix K.

Shared use Paths

Today, Sisters has the foundation of what could be a community-wide interconnected path system. Several notable paths comprise the base of the existing system, including the Tollgate Trail, internal paths within city parks, and informal trails connecting many parts of the city. Many of the trails proposed by this TSP will provide linkages to facilities existing and proposed in the *Sisters Community Trails Plan* and other existing and proposed trails in Deschutes County. The City is also actively pursuing path development opportunities, as shown by recent efforts to secure ‘Quick-fix’ funding for the Highway 242 path, and publication of the *Sisters Community Trails Plan*, designed to connect the city with outlying areas and the Deschutes County trail

¹⁸ Professor Jennifer Dill of Portland State University (Oregon) led a study researching how the built environment influences cycling behavior using Geographic Positioning Systems (GPSs). The study was funded by the Robert Wood Johnson Foundation Active Living Research program and the Oregon Transportation Research and Education Consortium (OTREC). Preliminary analysis of the GPS data indicated that half of all cycling trips occurred on bicycle infrastructure (bike paths, bike lanes, bike routes, and bicycle boulevards) although bicycle infrastructure only accounts for 15% of the total roadway network available to cyclists in the Portland area. Notably, 10% of miles biked occurred on bicycle boulevards, a facility that accounts for less than 1% of the total bicycle infrastructure in the region.



system. The City should keep this momentum going by pursuing path development opportunities.

Opportunities to Formalize/Enhance Existing Paths

The City has opportunities to improve the existing shared-use path system by upgrading and repaving path segments, such as the Tollgate Trail (which currently consists of packed gravel). Today, users have created informal demand paths to access the Tollgate Trail from nearby residential neighborhoods; these could be paved. The City could also improve path/roadway crossings that currently pose difficulties for non-motorized users. Specific problem areas include intersections along McKinney Butte Road and the intersection of McKinney Butte Road and Highway 242.

New Path Corridors

This TSP proposes several shared-use path corridors to help improve connectivity. These corridors are conceptual, and exact alignments should be determined after additional study. Proposed paths include a connection from Barclay Drive to Highway 20. Another proposed path extends along the south side of Adams Avenue from Cedar Street to Pine Street. Several other path proposals are contained in the project table, located at the end of this chapter.

Bicycle Wayfinding Signage

Signage for bicyclists can serve both wayfinding and safety purposes, including the following:

- Helping to familiarize users with the bikeway system
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping overcome a “barrier to entry” for people who don’t bicycle much (e.g., the “interested but concerned” crowd)

Placing signs throughout the city indicating to bicyclists their direction of travel, location of destinations, and the riding time/distance to those destinations will increase users’ comfort and accessibility to the bicycle system. Wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists and pedestrians, rather than per vehicle signage standards.

National guidance on wayfinding signage is found in section 9B.20 of the *Manual on Uniform Traffic Control Devices* (MUTCD) and the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*. Oregon State guidelines come from the Oregon Department of Transportation. The City of Portland has developed and employed a bicycle wayfinding system for many years. Many jurisdictions have



based bicycling wayfinding signage designs off the Portland’s example. Appendix K contains proposed wayfinding signage that fits well with Sisters’ existing street signs.

Determining the desirable signed destinations will help determine ideal sign placement and location. Potential destinations include the following:

- Downtown Sisters
- Other commercial centers
- Schools
- City and County parks and trails
- Connections to public transit
- Civic and community destinations (e.g., Sisters City Hall)

Parking Requirements

Field visits and discussions with Sisters residents indicate that more bicycle parking is needed in some areas, including downtown and at the Elementary and Middle Schools. As shown in Table 6-1, section 3.3.400 of Sisters Development Code specifies minimum bicycle parking requirements for multi-family housing as well as parking lots, schools, colleges and trade schools, commercial, and multiple use buildings. Multi-family residences with three or fewer units do not have to provide bicycle parking, nor do developments with fewer than ten motor vehicle parking spaces.

Table 6-1: Existing Bike Parking Requirements

Land Use	Standard
Multi-Family Residence	1 per unit when the development has 4 or more dwelling units. All spaces must be sheltered.
Parking Lots	1 for every ten motor vehicle spaces
Schools	1 for every ten staff and students (elementary and middle); 1 for every 5 staff and students (high school). All spaces must be sheltered.
Colleges and Trade Schools	1 for every ten motor vehicle spaces. All spaces must be sheltered.
Commercial District	1 space per use
Multiple Uses	1 space for every ten motor vehicle spaces



Although the Development Code's requirements ensure a minimum number of bicycle parking spaces for most developments, the requirements may not fully address parking demand for some land uses. Though the standard number of one bicycle space for every 10 parking spaces provides some bicycle parking, the City should consider increasing this requirement if they wish to become a truly bicycle-friendly City. Recommended parking guidelines can be outlined in ODOT's *Model Development Code and User's Guide for Small Cities*.

Sisters would also benefit from long-term bicycle parking in the commercial district and other end-of-trip facilities. Long-term bicycle parking facilities include bicycle lockers, attended facilities, and/or other secure provisions, while other end-of-trip facilities include showers and changing areas.

Development Code enforcement holds equal importance. The City should undertake a bicycle parking analysis to determine whether all of the bicycle parking required by the Code is provided, and if so, that it is sited in locations that are convenient, visible, and free of obstacles. It should also be noted that the Code only establishes parking minimums, and new developments should be encouraged to exceed these standards. In areas of high potential demand (e.g., commercial districts) where new development or redevelopment is not expected to occur within a reasonably short time, the City should consider installing bike parking rather than waiting.

Facility Design Requirements

The Development Code provides bicycle parking location and design guidance. The requirements include lighting, visibility and security, storage options, reserved areas, and storage. The design guidelines contained in this TSP provide additional suggestions for secure and well-designed bike parking.

Project Prioritization and Action Plan

Several evaluation criteria were developed to identify and prioritize projects for improving Sisters' bicycling environment. Specifically, the criteria were applied in two ways:

- To lay out the best possible future bicycling network by identifying the features of a network most important to the residents of Sisters. Identified priorities include:
 - improving connections to destinations
 - complete gaps in the bike lane system
 - signage (directional, guidance, and safety signage)
- To rank projects against each other as an indication of their relative importance

Using the above criteria, the consultant team ranked each project based on information obtained from site visits, field work, City officials, and the public. Then, the consultant team grouped the projects into high, medium, and low priorities. The high, medium, and low priorities may change according to available funds, changing priorities, new roadway projects, new development, and redevelopment opportunities, or other factors. It should be noted that the purpose of this exercise



is to understand the relative priority of the projects so that the City may apportion available funding to the highest priority projects. Medium low priority projects are also important and may be implemented at any point in time as part of a development or public works project. The ranked list should be considered a “living document” and should be frequently reviewed to ensure it reflects current Sisters priorities.

The list of proposed bicycle projects (and relative prioritization) is located at the end of this chapter. The Master Plan refers to the list of projects the City would like to construct if there were no financial constraints. However, until implementation measures are taken (such as an update to the City’s Capital Improvement Plan and implementation of necessary funding mechanisms), the Master Plan projects are not considered “reasonably likely to be funded” for Transportation Planning Rule (TPR) OAR 060 purposes.

Selected Sisters Bicycle Projects

This TSP is intended to examine transportation conditions and facilities throughout the Sisters and recommend general improvements. However, the following section discusses several projects in greater detail due to high priority, special design treatments, or project complexity.

Cascade Avenue

The selection of Barclay/Locust as an alternative highway route affords the City of Sisters an excellent opportunity to enhance the Cascade Avenue streetscape and improve bicycle (and pedestrian) crossing conditions. The recommend improvements for Cascade Avenue include: sidewalk widening (from five feet to eight feet), narrowing of parking lanes (from ten feet to eight feet), adding extended curb extensions (removing one on-street parking space each) at intersections without left turn pockets (or at desired mid-block locations) to further reduce the pedestrian/bicycle crossing distance; and narrowing the curb-to-curb width from 50 feet to 44 feet, and 32 feet at curb extensions.¹⁹

The City has obtained a design exception for Highway 20 to implement the proposed cross section.

Cyclists wishing to use lower traffic parallel streets can utilize bike lanes on Main Avenue or Hood Avenue one block to the north or south, respectively.

Cascade Avenue (Highway 20), Sisters' Main Avenue, has obtained a design exception to adequately address the needs of all user groups. The design exception addresses the following:

- Limited right-of-way, freight, and capacity issues
- The need to retain on-street parking, as required by ODOT
- And trade-offs between bike lanes and wider sidewalks

¹⁹ These represent minimum sidewalk widths for the proposed cross section. Sisters may choose to seek ODOT approval to further decrease these widths. For more information, see the Motor Vehicle chapter.



Though bicycle and pedestrian facilities are recognized by the *Oregon Highway Plan* (1999) as important design treatments, it is not possible to accommodate all uses within the existing corridor while meeting freight and mobility needs.

Travel lane narrowing, curb extension installation, and sidewalk widening will improve the pedestrian realm and crossing conditions. Bicyclists on Cascade Avenue will be accommodated through shared lane markings and signing. Though these improvements favor pedestrians on Cascade Avenue, cyclists are accommodated one block to the north and south on Hood Avenue and Main Avenue. Additionally, they can use lower traffic shared streets (Adams Street or Washington Avenue) running parallel to Cascade Avenue two blocks to the north or south. Alternative travel corridors are especially important as they provide choices for bicycles and pedestrians of all ages and abilities to travel in conditions that feel safer and comfortable.

Multi-Modal Transportation Corridors

The Proposed Bicycle System Map depicts several high priority multi-modal corridors in Sisters. These corridors (two running east-west and two running north-south) form the base of the proposed non-motorized transportation system in Sisters. Each corridor contains recommended projects of varying facility types designed to address identified needs, community desires, and available right-of-way. These corridors will emphasize pedestrian and bicycle travel while accommodating all modes of transportation. The design guidelines in Appendix K contain a description of multi-modal facility types and treatments. These corridors include:

- Pine Street from Lundgren Mill Drive to Main Avenue: Improvements include a shared-use path along the western shoulder of Pine Street and intersection improvements.
- Larch Street from Washington Avenue to Barclay Drive: Improvements include sidewalk infill and intersection improvements.
- Northern cross-town connector. This route utilizes several streets including Highway 20, a shared-use path running between Highway 20 and Adams/Main Street, and Main Street itself to form a west/east running multi-modal transportation corridor on the north side of Cascade Avenue. Improvements include shared street treatments, shared use path treatments, intersection improvements, and sidewalk infill. Main Street is the identified east/west connector for bicycles and includes striped bicycle lanes as well as complete sidewalks. Adams Ave is identified as a future pedestrian northern cross-town connector. The City should consider using the cross section proposed for Washington Avenue along Adams Street.
- Southern cross-town connector. This route utilizes several streets including Highway 242, Hood Avenue, Washington Avenue, Cedar Street, and Highway 20 to form a west/east running multi-modal transportation corridor on the south side of Cascade Avenue. Improvements include crossing treatments, sidewalk infill, shared street treatments, and wide sidewalks.



In June 2008, the City applied for a grant from the ODOT Pedestrian-Bicycle Improvement Grant Program for several improvements including sidewalks, bike lane striping, streetscape infrastructure, shared street treatments, and crossing improvements for several of the streets comprising the Southern cross-town connector. Improvements are proposed for:

- Pine Street between Washington Avenue and Highway 20
- Cedar Street between Washington Avenue and Highway 20
- Locust Street between Washington Avenue and Highway 2
- Washington Avenue between Pine Street and Locust Street

The proposed improvements included wide sidewalks and a 'woonerf'-style shared space cross section. Figure 6-2 shows the project extent of proposed improvements to be funded by the grant, and Figure 6-3 illustrates the proposed cross section for Washington Street. It should be noted that the proposed cross section for Washington Street does not meet the standard for the proposed neighborhood route cross section in Figure 7-4 due to an effort to balance project costs with existing corridor conditions (e.g., paved width), which will require a design exception from the City Engineer. The City should consider applying this cross section to other low traffic shared-streets with a wide right of way, such as Adams Street. Though these improvements are not located on the Highway, they do provide options for cyclists and pedestrians of all ages and abilities to travel in safety and comfort along parallel routes.



Figure 6-2: Proposed Pedestrian-Bicycle Improvement Grant Project Extent

NEIGHBORHOOD ROUTE (WASHINGTON AVE - PINE ST TO LOCUST ST)

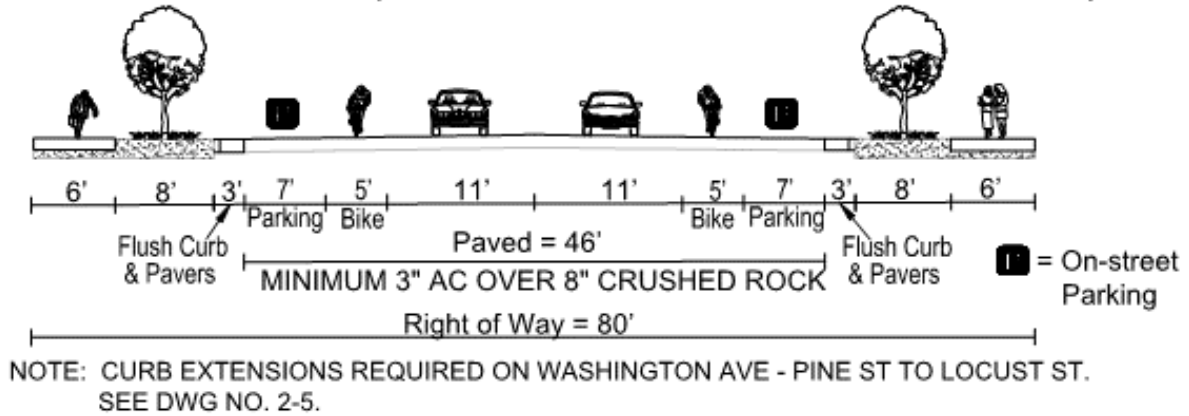


Figure 6-3: Proposed Washington Avenue Cross Section

Shared Use Pathway along the South Side of Highway 242

The proposed bikeway system calls for the addition of a shared use pathway along the south side of Highway 242, similar to the existing pathway on the north side. This pathway would increase the future travel capacity and reduce potential conflicts between bi-directional bicycle and pedestrian traffic along this corridor. As the population of Sisters increases, it is expected that further development is likely to occur in the western and south-western portions of town. It is likely that a second shared-use facility will increase non-motorized use along this corridor and enhance user safety and comfort.

Several north/south crossings of Highway 242 would complete this project. At this time a detailed proposal for crossing locations does not exist. City staff has indicated safety concerns for crossings along this corridor due to high traffic-volume on Highway 242 (particularly between September and June when the schools are in session) and the close proximity of schools to the paths adjacent to the highway. Therefore, a safety study shall be undertaken before any design and/or construction of a pedestrian, bicycle, or multi-modal pathway is contemplated along the south side of Highway 242. The safety study shall be reviewed and accepted by the Public Works Director and/or City Engineer at the discretion of the Public Works Director.

Project Costs

This section summarizes planning-level cost estimates associated with the recommended pedestrian improvement projects. The estimates were based on similar Bicycle Improvement Plans as well as experience in other communities. Unit cost estimates for individual bicycle treatments (e.g., bike lane striping cost per linear foot) are found in Appendix P while Table 6-2 summarizes the overall cost for each project. Table 6-3 shows recently completed projects that were part of the 2010 TSP. The cost estimates for all projects include contingency and



construction management costs. A breakdown of the unit cost estimate assumptions used for the projects is given in Appendix M.

Table 6-2: Bicycle Master Plan Projects

Project	Description	Priority	Cost (\$1,000's)
HIGH PRIORITY CAPITAL IMPROVEMENTS			
Hood Ave from Pine St to Hwy 242	Stripe bike lanes, and incorporate sharrows approaching Hood and Hwy 242 intersection for northbound left turns	High	5
Washington Ave from Locust St to Pine St	Develop Bike Boulevard (<i>see cross-section</i>) and include bicycle route signage.	High	900
Washington Ave from Cottonwood St to Pine Meadow St	Construct a multi-use path that is a consistent extension of the Washington Ave Bike Blvd. To occur in conjunction with development.	High	50
Pine St from Cascade Ave to Washington Ave	Stripe bike lanes	High	1
Pine St from Main St north to trailhead	Construct a multi-use path along west side.	High	250
E. Cascade Ave from Locust St to east city limits	Stripe bike lanes in conjunction with roadway widening and upgrade to collector cross section	High	60
Larch St from Jefferson Ave to Barclay Drive	Stripe bike lanes in conjunction with roadway widening.	High	40
McKinney Butte Rd from Sisters High School to N Fremont St	Construct remaining multi-use path along the north side of McKinney Butte Road in conjunction with development.	High	30
Hwy 20 Pathway from Barclay/Hwy 20 Roundabout to Pine St.	Construct a multi-use pathway along northeast side of Hwy 20. Construction should occur in conjunction with development.	High	160
Mutli-Use Connector Path from Hwy 20/Barclay Intersection to Pine St/Adams Ave Intersection	Construct a multi-use path between Pine St and Hwy 20/Barclay Dr. Alignment to be determined. Design and construction should occur in conjunction with development of Forest Service Property.	High	175
Brooks Camp Dr from Rail Way to Hwy 242	Construct a multi-use path along the eastside.	High	80
Hwy 242	Develop standard bike lanes (ODOT)	High	ODOT
HIGH PRIORITY PROGRAMS			
Bicycle Wayfinding Signage Plan	Develop a cohesive and consistent citywide bicycle wayfinding signage plan with specifications and appropriate locations for signs, destinations to be highlighted on each sign, and approximate distance and riding time to each destination. Include signage in future projects.	High	25



Project	Description	Priority	Cost (\$1,000's)
Network Connections	Work with community partners to support greater connectivity and routes to existing and future bicycle facilities including trail heads, trail networks, and on road bicycle facilities.	High	
MEDIUM PRIORITY CAPITAL IMPROVEMENTS			
Barclay Dr from Hwy 20 to Locust/Camp Polk Rd	Construct a curb-tight multi-use path along Barclay in conjunction with realignment/new development.	Medium	360
Locust St from Northern City limits to Green Ridge Ave	Construct a multi-use path along western frontage in conjunction with development.	<i>Medium</i>	100
Elm St from south city limits to Jefferson Ave	Install multi-use path on east side.	<i>Medium</i>	80
Locust St from Hwy 20 to Jefferson Ave	Stripe bike lanes in conjunction with roadway widening at time of adjacent development. Address with Eastside Refinement.	Medium	20
Locust St from Jefferson Ave to south city limits	Construct a multi-use path along east side.	Medium	85
Desperado Spur Trail from Intersection of Hwy 20/126 to east city limits	Construct a multi-use path from intersection of Hwy 20/126 to east city limits. This includes a spur towards Desperado Trail. Alignment to be determined. Construction should occur in conjunction with development. Address with Eastside Refinement.	Medium	110
Hwy 20 from east city limits to Buckaroo Trail	Construct a multi-use path along south side of Hwy 20. Address with Eastside Refinement.	Medium	125
Hwy 20 from Hwy 126 to Northwest side of Bridge	Construct a multi-use path along north side of Hwy 20 (PARTIALLY COMPLETE). Address with Eastside Refinement.	Medium	35
Hwy 126 from Eastern city limits to Hwy 20	Construct a multi-use path along north side of Hwy 126. Address with Eastside Refinement.	Medium	100
Sisters High School Pathway from Tollgate Path to McKinney Butte Rd	Support construction of a multi-use path extension from the Tollgate Path to McKinney Butte Rd. (STA)	Medium	SSD
LOW PRIORITY CAPITAL IMPROVEMENTS			
Creekside Dr from Creekside Ct to Hwy 126.	Construct a multi-use path along east side.	Low	30
Sun Ranch Dr from Barclay Dr to Camp Polk Rd	Stripe bike lanes	Low	5
Hwy 242 from Hood Avenue to Pine Ave	Construct 10' wide multi-use connector pathway on north side of roadway.	Low	50
Hwy 20 from Buckaroo Trail to Locust St	Construct multi-use path along south side of Hwy 20. Takes the place of sidewalks and bike lanes. Address with Eastside Refinement.	Low	300



Table 6-3: Completed Bicycle TSP Projects

Project	Description	Priority
COMPLETED BICYCLE PROJECTS		
Main Ave from Pine St to Locus St	Stripe bike lanes. This project and associated pedestrian improvements correlate with the Main Ave Streetscape Improvements from the Downtown Sisters Urban Renewal Plan. Costs are accounted for in the pedestrian plan.	High
Whychus Creek Trail from Along Whychus Creek from Locust St to Hwy 20	Construct a multi-use path along Whychus Creek. Path will connect a developer provided pathway at the eastern terminus. The City is currently seeking grant funding for this project.	High
Zoning Ordinance update to include bicycle parking requirements	Update Zoning Ordinance to establish short-term bicycle parking requirements for individual land uses and to establish long-term parking requirements.	High
Bikeway/Walkway Maintenance Program	Develop and implement an annual maintenance program to providing regularly-scheduled maintenance activities for the on- and off-street bikeway and walkway system	High
Hwy 20 from Larch St to Locust St	Stripe bike lanes	Medium
Tyee Dr from Three Creeks Rd to Locust St	Stripe bike lanes (currently a marked wide shoulder)	Low
Hood Ave from Pine St to Hwy 20	Stripe bike lanes	High
McKinney Butte Rd from Sisters High School to Sisters Middle School	Construct a multi-use path along south side of McKinney Butte Rd	Low
Sisters Middle School Pathway from McKinney Butte Rd to Hwy 242	Construct a multi-use path running north/south through school grounds	Low
Hwy 20 from Rail Way to Pine St	Construct a multi-use path along west side of Hwy 20. Takes the place of sidewalks and bike lanes	Low
McKinney Butte Rd from Hwy 242 to Hwy 20	(SEPARATED 6-8' PATHS INSTALLED)	Medium
Main Ave from Cedar St to Locust St	Develop Bike Boulevard. An additional study to determine the appropriate intensity of boulevard development may be conducted	High
McKinney Butte Rd from Hwy 242 to Sisters Middle School	Construct multi-use path along the north side of McKinney Butte Road. (PARTIALLY COMPLETE)	High



Chapter 7. Motor Vehicle Plan

Introduction

This chapter summarizes the motor vehicle system plan elements that will serve the City of Sisters. The plan elements consist of a master plan map, a list of improvement projects and programs, and related design standards that implement the transportation goals and policies established by the community. The facilities have been selected and designed to balance the traveling needs of the residents, merchants, and visitors of Sisters, while also providing services for regional auto and freight traffic.

The following sections outline the strategies used to develop the Motor Vehicle improvement plans and roadway standards. The resulting Motor Vehicle plan is consistent with other jurisdictional plans including the Deschutes County Transportation System Plan and the Oregon Department of Transportation (ODOT) Highway Plan.

The 2018 refinement included textual and project list updates to reflect completed projects. Additional detail on the 2018 refinement of the Motor Vehicle Plan is included in this chapter and in Appendix S.

System Needs

Highway 20 facilities provide inadequate mobility during peak travel days. Heavy congestion on this primary route through Sisters impacts local circulation and access for all travel modes in the downtown area. Recurring congestion and vehicle queues adversely impact local circulation at major cross streets including Locust Avenue, Elm Street, Pine Street and Barclay Drive. As volumes grow from regional and local development, the frequency and severity of these heavy congestion events on Highway 20 will increase. Growth trends and findings about future system capacity deficiencies are outlined in the Future Needs chapter (Chapter 4). That analysis demonstrated that the short-term improvements already programmed on Highway 20 will be far below what is needed to serve growth through 2030. The impact of future traffic growth will be severe without additional investment in transportation improvements along the Highway 20 corridor.

Aside from the Highway 20 corridor, the motor vehicle system needs in Sisters are more focused on integration with other travel modes, to promote better safety and access for non-motor vehicle travel. The specific projects and plans to meet these objectives are addressed in the Pedestrian and Bicycle Plans. In addition, several strategies related to system management and design standards are identified in the following sections.



Strategies

To meet performance standards and manage the forecasted travel demand for all modes, the transportation system within the City of Sisters needs significant multi-modal improvements. The transportation improvements will be more sustainable and the associated financial investments will yield greater returns by following a variety of management and capital improvement strategies, including:

- Perform Transportation System Management (TSM) – Improve management of the existing transportation system through one or more measures, including:
 - Neighborhood Traffic Management
 - Functional Classification
 - Cross-section standards
 - Access Management
 - Local Street Connectivity
- Perform Transportation Demand Management (TDM) – Encourage other transportation modes during the peak travel demand period besides single occupant vehicles.
- Develop a Motor Vehicle Improvement Plan that provides the necessary capacity and circulation improvements.
- Designate local Truck Routes through Sisters in addition to the state highway freight route.

Transportation System Management (TSM)

Transportation System Management (TSM) focuses on low cost strategies to enhance transportation system performance by seeking solutions that better manage facilities, maximize mobility, and treat all modes of travel as a coordinated system. Through better management and operation of transportation facilities, existing and future transportation infrastructure will have a longer design life by providing improved traffic flow, system accessibility, and safety. In the City of Sisters, there are five TSM measures that will be addressed:

- Neighborhood Traffic Management (NTM)
- Functional Classification
- Cross-section standards
- Access Management
- Local Street Connectivity

These measures are described in detail in the following sections.



Neighborhood Traffic Management

Neighborhood Traffic Management (NTM) is a term that has been used to describe traffic control devices typically used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic. NTM is descriptively called traffic calming due to its ability to improve neighborhood livability. The City of Sisters currently has limited neighborhood traffic management elements, mainly the use of narrow road widths that manage vehicle speed. As traffic congestion increases in the future, protecting the livability of neighborhoods may become an increasing need that requires the ability to mitigate impact.

To address neighborhood impacts, Sisters will require that in addition to assessing impacts to the entire transportation network, traffic studies for new developments will also assess impacts to residential streets and identify mitigation for developments that are anticipated to add significant traffic volumes or increase vehicle speeds on nearby residential streets. The threshold used to determine if this additional analysis is needed is if the proposed project is expected to increase volumes on a residential street (classified as either local or neighborhood route) by more than 30 vehicles in a peak hour or 300 vehicles per day. Once the analysis is performed, thresholds used to determine if residential streets are impacted will be:

- Local residential street volumes should not increase above 1,200 average daily trips
- Local residential street speeds should not exceed 28 miles per hour (85th percentile speed)

Mitigation measures for neighborhood traffic impact must balance the need to manage vehicle speeds and volumes with the need to maintain mobility, circulation, and function for service providers (e.g. emergency response). Table 7-1 lists common NTM applications and suggests which devices may be supported by the Sisters – Camp Sherman Fire District (descriptions of common traffic calming measures can be found in Appendix O). Any NTM project should include coordination with emergency agency staff to ensure public safety is not compromised.



Table 7-1: Allowed Traffic Calming Measures by Roadway Functional Classification

Traffic Calming Measure	Is Measure Supported? (per Roadway Classification) ^a		
	<i>Arterial</i>	<i>Collector</i>	<i>Neighborhood Route/ Local Street</i>
Curb Extensions	Supported	Supported	
Roundabouts	Supported	Supported	
Medians and Pedestrian Islands	Supported	Supported	
Pavement Texture ^b	Supported	Supported	Calming measures are supported on lesser response routes that have connectivity (more than two accesses) and are accepted and field tested by the Sisters – Camp Sherman Fire District.
Speed Hump	Not Supported	Not Supported	
Raised Crosswalk	Not Supported	Not Supported	
Speed Cushion (provides emergency pass-through with no vertical deflection)	Not Supported	Not Supported	
Choker	Not Supported	Not Supported	
Traffic Circle	Not Supported	Not Supported	
Diverter (with emergency vehicle pass through)	Not Supported	Supported	
Chicanes	Not Supported	Not Supported	

^a Traffic calming measures are supported with the qualification that they meet Sisters – Camp Sherman Fire District guidelines including minimum street width, emergency vehicle turning radius, and accessibility/connectivity.

^b Pavement texture is not supported for crosswalks located in the Downtown District.

Neighborhood traffic management (NTM) may be considered for State facilities but it would be required to meet ODOT standards, including any ODOT approved design exceptions. For example, pavement textures, chokers, and traffic circles are generally prohibited on state highways.



Street Functional Classification

The street functional classification map for streets in Sisters is shown in Figure 7-1. Any street not designated as an arterial, collector or neighborhood route is considered a local street. The functional classes, updated classifications, and criteria for future classification changes for Sisters roadways are explained in the following sections.

Arterial Streets

Arterial streets serve to interconnect the City. These streets link major commercial, residential, industrial and institutional areas. Arterial streets are typically spaced about one mile apart to assure accessibility and reduce the incidence of traffic using collectors or local streets for through traffic in lieu of a well placed arterial street. The maximum interval for arterial spacing within the City should be 3,000 feet. Access control is the key feature of an arterial route. Arterials are typically multiple miles in length.

Collector Streets

Collector streets provide both access and circulation within and between residential and commercial/industrial areas. Collectors differ from arterials in that they provide more of a citywide circulation function, do not require as extensive control of access (compared to arterials) and penetrate residential neighborhoods, distributing trips from the neighborhood and local street system. The maximum interval for collector roadways should be 1,500 feet. Collectors are typically greater than 0.5 to 1.0 miles in length.

Neighborhood Routes

Neighborhood routes are usually long relative to local streets and provide connectivity to collectors or arterials. Because neighborhood routes have greater connectivity, they generally have more traffic than local streets and are used by residents in the area to get into and out of the neighborhood, but do not serve citywide/large area circulation. They are typically about a quarter to a half-mile in total length. Traffic from cul-de-sacs and other local streets may drain onto neighborhood routes to gain access to collectors or arterials. Because traffic needs are greater than a local street, certain measures should be considered to retain the neighborhood character and livability of these routes. Neighborhood traffic management measures are often appropriate (including devices such as speed humps, traffic circles and other devices). However, it should **not** be construed that neighborhood routes automatically get speed humps or any other measures. While these routes have special needs, neighborhood traffic management is only one means of retaining neighborhood character and vitality.

Local Streets

Local streets have the sole function of providing immediate access to adjacent land. Service to through traffic movements on local streets is deliberately discouraged by design. All other city streets in the City of Sisters that are not designated as arterial streets, collector streets, or neighborhood routes are considered to be local streets.

City of Sisters Transportation System Plan

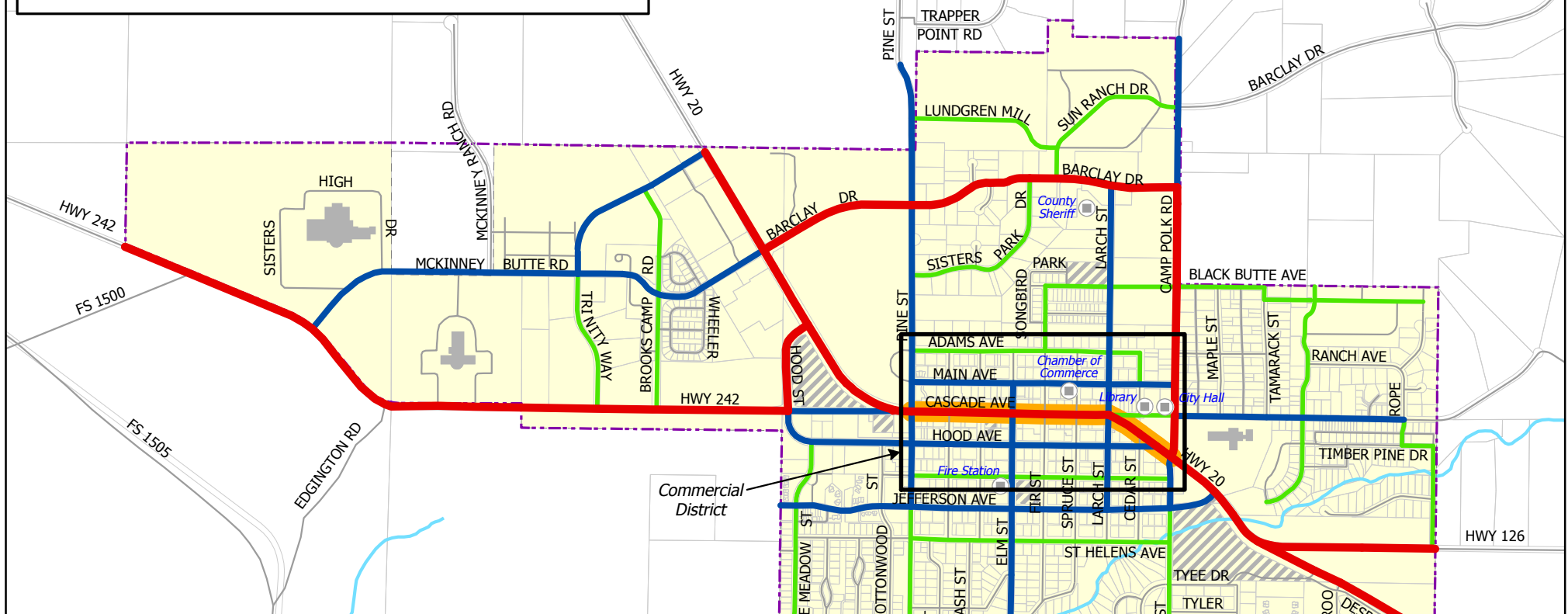
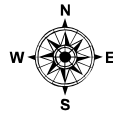


FIGURE 7-1

FUNCTIONAL CLASSIFICATION

Legend

Functional Classification

- Arterial
- Collector
- Neighborhood Route
- Local
- Pursuing STA Designation

- Civic/Government
- School
- Water
- Park
- Urban Growth Boundary
- City Limit
- Parcels



Criteria for Changes to Functional Classification

The criteria used to assess functional classification have two components: the extent of connectivity and the frequency of the facility type. Maps can be used to determine regional, city/district and neighborhood connections. The frequency or need for facilities of certain classifications is not routine or easy to package into a single criterion. While planning textbooks call for arterial spacing of a mile, collector spacing of a quarter to a half-mile, and neighborhood connections at an eighth to a sixteenth of a mile, this does not form the only basis for defining functional classification.

Changes in land use, environmental issues or barriers, topographic constraints, and demand for facilities can change the frequency for routes of certain functional classifications. While spacing standards can be a guide, they must consider other features and potential long term uses in the area (some areas would not experience significant changes in demand, where others will). It is acceptable for the city to re-classify street functional designations to have different naming conventions, however, the general intent and purpose of the facility, whatever the name, should be consistent with regional, state and federal guidelines.

By planning an effective functional classification of Sisters streets, the City can manage public facilities pragmatically and cost effectively. These classifications do not mean that because a route is an arterial it is large and has lots of traffic. Nor do the definitions dictate that a local street should only be small with little traffic. Identification of connectivity does not dictate land use or demand for facilities. The demand for streets is directly related to the land use. The highest level connected streets have the greatest potential for higher traffic volumes, but do not necessarily have to have high volumes as an outcome, depending upon land uses in the area. Typically, a significant reason for high traffic volumes on surface streets at any point can be related to the level of land use intensity within a mile or two. Many arterials with the highest level of connectivity have only 35 to 65 percent “through traffic”. Without the connectivity provided by arterials and collectors, the impact of traffic intruding into neighborhoods and local streets goes up substantially.

Functional Classification Changes in Sisters

Updated functional classifications of City of Sisters roadways will provide a framework for improving network design, circulation, and mobility. The key changes include (1) increasing the number of arterial roadways to improve citywide circulation, (2) maintaining and updating the collector system to reflect recent and expected land use development, and (3) providing neighborhood routes that serve clear connections between neighborhoods and the collector and arterial network. The updated functional classifications for City of Sisters roadways are shown in Figure 7-1. The revised classifications include:

- Adams Avenue from Pine Street to Cedar Street is upgraded from a local street to a neighborhood route
- Barclay Drive is upgraded from a collector to an arterial



- Black Butte Avenue from Larch Street to east City limits is upgraded from a local street to a neighborhood route
- Brooks Camp Road is upgraded from a local street to a neighborhood route
- Camp Polk Road/Locust Street from Highway 20 to Barclay Drive is upgraded from a collector to an arterial
- Cedar Street from Main Avenue to Adams Avenue should be upgraded from a local street to a neighborhood route
- Cowboy Street from Black Butte Avenue to East Cascade Avenue is upgraded from a local street to a neighborhood route
- East Cascade Avenue from Cascade Avenue to Rope Street is upgraded from a local street to a collector
- Jefferson Avenue from Pine Street to west City limits is upgraded from a local street to a collector
- Larch Street from Jefferson Avenue to Barclay Drive is upgraded from a local street to a collector
- Locust Street from Jefferson Avenue to south City limits is downgraded from a collector to a neighborhood route
- Lundgren Mill is upgraded from a local street to a neighborhood route
- McKinney Butte Road is upgraded from a local street to a collector
- Pine Street from Jefferson Avenue to south City limits is upgraded from a local street to a neighborhood route
- Pine Meadow Street is upgraded from a local street to a neighborhood route
- Rail Way is upgraded from a local street to a collector
- Rope Street from East Cascade Avenue to Timber Pine Drive is upgraded from a local street to a neighborhood route
- Sisters Park Drive is upgraded from a local street to a neighborhood route
- St. Helens Avenue from Locust Street to Pine Street is upgraded from a local street to a neighborhood route
- Sun Ranch Drive is upgraded from a local street to a neighborhood route
- Timber Creek Drive is upgraded from a local street to a neighborhood route
- Timber Pine Drive from Rope Street to Highway 126 is upgraded from a local street to a neighborhood route
- Trinity Way is upgraded from a local street to a neighborhood route
- Tyee Drive from Elm Street to Locust Street is downgraded from a collector to a local street
- Washington Street from Locust Street to Pine Street is upgraded from a local street to a neighborhood route



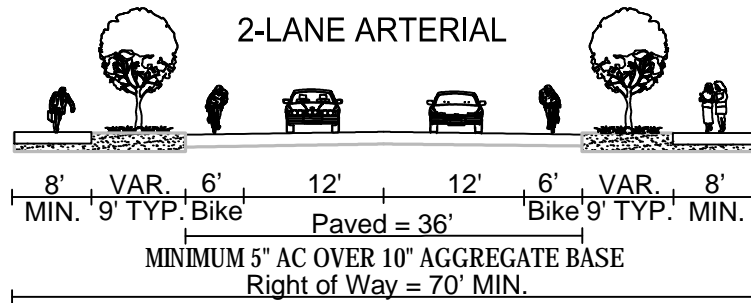
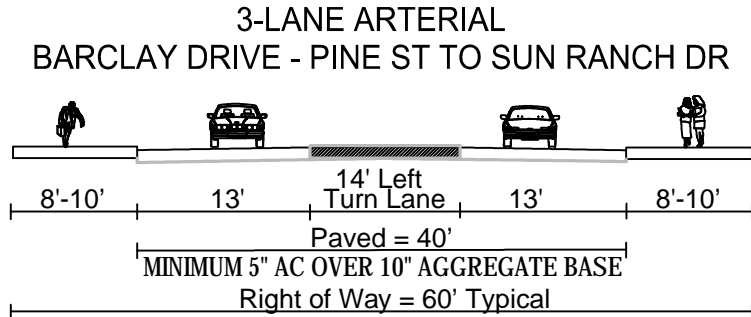
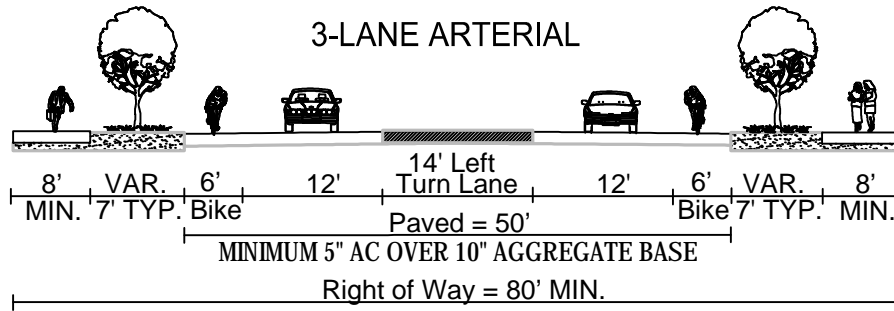
Cross-Section Standards

Street cross-section standards consist of minimum, maximum, and/or typical cross-sections that are required for City roadways based on their functional classification. The purposes of the cross-section standards are to ensure that the City roadways can meet the multi-modal function and demand associated with their functional classification and to provide consistency throughout the City. Because the actual design of a roadway can vary from segment to segment due to adjacent land uses and other factors (e.g., truck routes, bike routes, pedestrian corridors, etc.), flexibility has been built in to the standards; this is why ranges of required components are provided for each functional class. In addition, multimodal access may be provided in various ways when constrained by right-of-way or other barriers. For example, a multiuse path may be provided in lieu of a bike lane and sidewalk in some instances. Variations require approval by the Public Works Director.

Along arterial and collector corridors, additional right of way may likely be needed to implement improvements to meet the standard cross section. The City should update the development code to require new development to dedicate right of way to the ultimate planned street cross section in order to avoid building impacts and right of way negotiating and purchasing at a later time.

Additional design considerations are required for state highways. These state highway design considerations are defined in the *Oregon Highway Plan (OHP)* and in the *Highway Design Manual (HDM)*. Any deviation from these standards requires approval of a design exception.

The cross-section standards are provided in Figure 7-2 for arterial streets, Figure 7-3 for collector streets, Figure 7-4 for neighborhood routes, and Figure 7-5 for local streets. In order to ensure suitability for roadway improvements, final cross-section designs must be coordinated with the City of Sisters and are subject to City Staff approval; cross-sections of state highways are also subject to Oregon Department of Transportation (ODOT) approval.



NOTES RELATING TO ALL ARTERIAL STREETS:

1. HIGHWAYS UNDER ODOT JURISDICTION ARE SUBJECT TO ODOT DESIGN STANDARDS.
2. TURN LANE WARRANTS SHALL BE REVIEWED USING HIGHWAY RESEARCH RECORD NO. 211, NCHRP REPORT NO. 279 OR OTHER UPDATED/SUPERSEDING REFERENCE.
3. ODOT HIGHWAY DESIGN MANUAL REQUIREMENTS SUPERCEDE CITY STANDARDS.
4. BIKE LANES MAY NOT BE REQUIRED IF A PARALLEL ALTERNATIVE ROUTE IS APPROVED BY THE CITY ENGINEER.

DRAFT



City of Sisters • Standard Detail

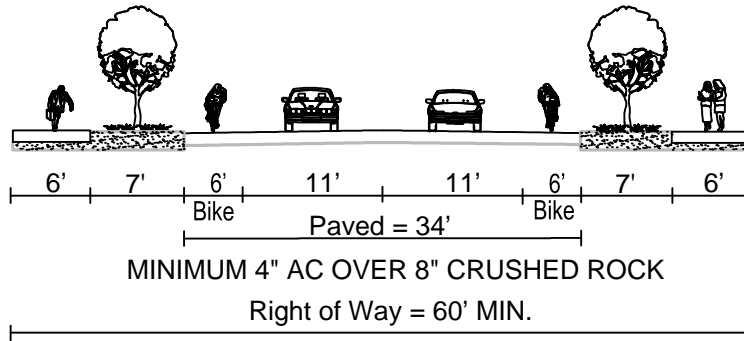
TYPICAL STREET SECTIONS
ARTERIALS

SCALE:	NONE
DRAWN BY:	EJH
APPROVED BY:	COS
REVISION DATE:	4/11/2018

DRAWING NO.

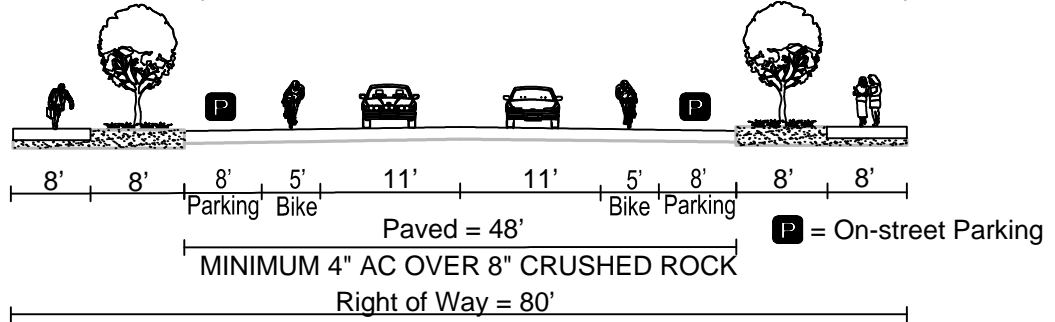
7-2

STANDARD COLLECTOR



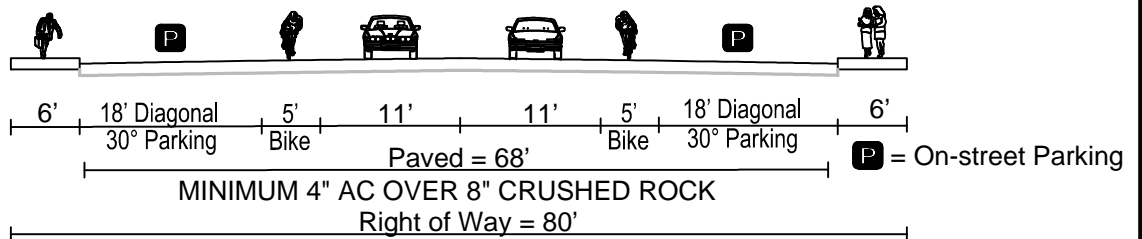
NOTE: WHEN 8' OR 10' MULTI-USE PATHS ARE REQUIRED BY THE TRANSPORTATION SYSTEM PLAN, THE 6' BICYCLE LANE SHALL BE REPLACED WITH A 2' PAVED SHOULDER AND THE PATH SHALL BE A MINIMUM 7' FROM EDGE OF PAVEMENT.

COLLECTOR (COMMERCIAL DISTRICT - PARALLEL PARKING)



NOTE: CURBS REQUIRED IN COMMERCIAL DISTRICT.
CURB EXTENSIONS REQUIRED IN COMMERCIAL DISTRICT. SEE DWG NO. 2-5.

COLLECTOR (COMMERCIAL DISTRICT - DIAGONAL PARKING)



NOTE: CURBS REQUIRED IN COMMERCIAL DISTRICT.
CURB EXTENSIONS REQUIRED IN COMMERCIAL DISTRICT. SEE DWG NO. 2-5.

DRAFT



City of Sisters • Standard Detail

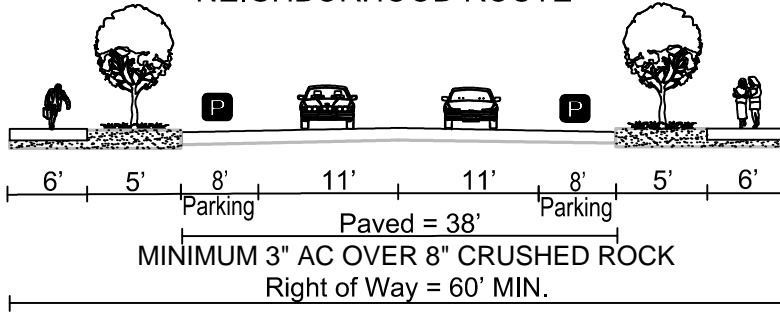
TYPICAL STREET SECTIONS
COLLECTORS

SCALE:	NONE
DRAWN BY:	EJH
APPROVED BY:	COS
REVISION DATE:	4/11/2018

DRAWING NO.

7-3

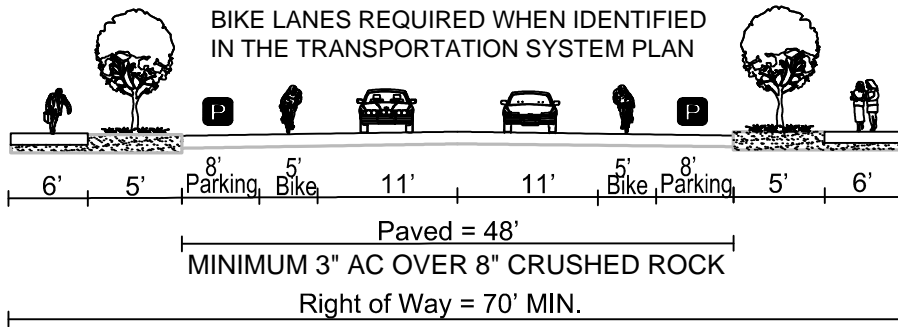
NEIGHBORHOOD ROUTE



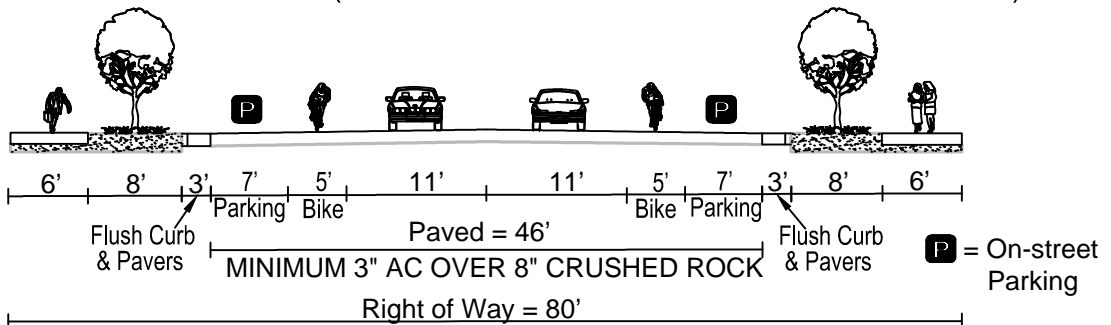
NOTE: WHEN 8' MULTI-USE PATHS ARE REQUIRED BY THE TRANSPORTATION SYSTEM PLAN, THE 8' PARKING LANE MAY BE REDUCED TO 7' MINIMUM AND THE 5' LANDSCAPE/ SWALE STRIP MAY BE REDUCED TO 4' MINIMUM.
 WHEN 10' MULTI-USE PATHS ARE REQUIRED BY THE TRANSPORTATION SYSTEM PLAN, AN ADDITIONAL 4' MINIMUM RIGHT OF WAY DEDICATION OR PUBLIC ACCESS EASEMENT SHALL BE PROVIDED TO THE PUBLIC.

NEIGHBORHOOD ROUTE WITH BIKE LANES

BIKE LANES REQUIRED WHEN IDENTIFIED IN THE TRANSPORTATION SYSTEM PLAN



NEIGHBORHOOD ROUTE (WASHINGTON AVE - PINE ST TO LOCUST ST)



NOTE: CURB EXTENSIONS REQUIRED ON WASHINGTON AVE - PINE ST TO LOCUST ST. SEE DWG NO. 2-5.

DRAFT



City of Sisters • Standard Detail

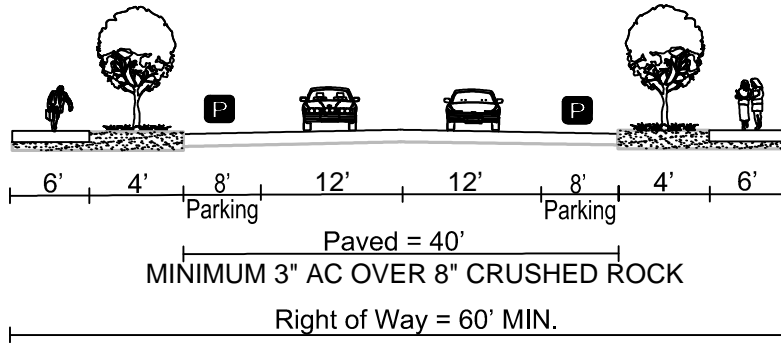
TYPICAL STREET SECTIONS
NEIGHBORHOOD ROUTES

SCALE:	NONE
DRAWN BY:	EH
APPROVED BY:	PB
REVISION DATE:	4/11/2018

DRAWING NO.

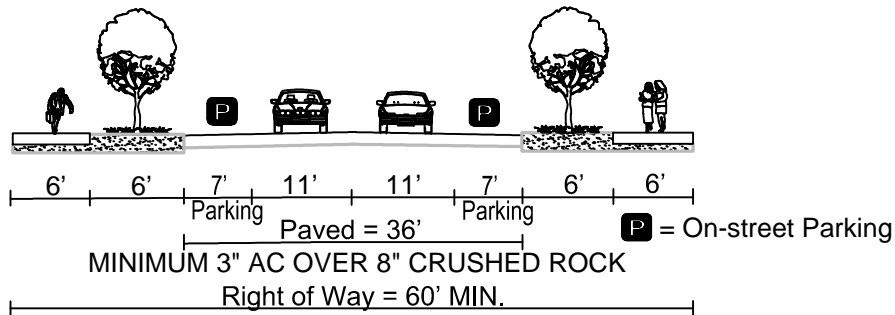
7-4

COMMERCIAL/INDUSTRIAL LOCAL STREET

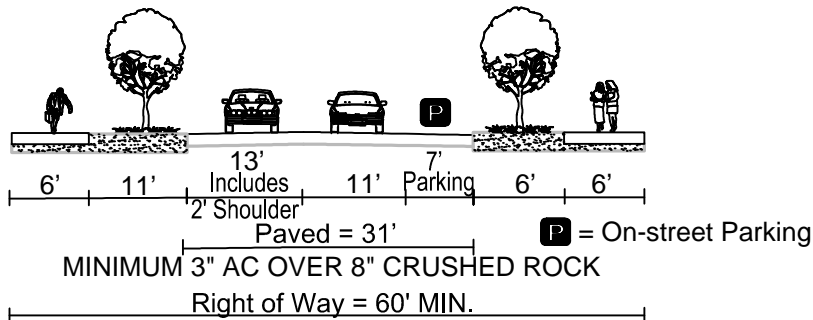


NOTE: CURBS REQUIRED IN COMMERCIAL DISTRICT.
 CURB EXTENSIONS REQUIRED IN COMMERCIAL DISTRICT. SEE DWG NO. 2-5.
 LOCAL COMMERCIAL STREETS ON ROADWAYS WITH 80' EXISTING RIGHT OF WAY
 WIDTH SHALL BE CONSTRUCTED TO COLLECTOR COMMERCIAL STANDARD.

RESIDENTIAL LOCAL STREET WITH PARKING ON BOTH SIDES



RESIDENTIAL LOCAL STREET WITH PARKING ON ONE SIDE



NOTES FOR RESIDENTIAL LOCAL STREET WITH PARKING ON ONE SIDE:

- STREETS THAT ALLOW PARKING ON ONE SIDE MAY ONLY BE USED IN LIMITED SITUATIONS, SUCH AS (1) ADJACENT TO A SCHOOL OR OTHER PUBLIC USE WHERE PARKING ON ONE SIDE IS INFEASIBLE OR UNDESIRABLE, OR (2) FOR LIMITED-LENGTH SPANS OF ONE BLOCK OR LESS ALONG ZONE BOUNDARIES (RESIDENTIAL/ COMMERCIAL, RESIDENTIAL/INDUSTRIAL, RESIDENTIAL/PUBLIC FACILITY ZONES) IN SITUATIONS WHERE PARKING ON BOTH SIDES IS INFEASIBLE OR UNDESIRABLE.
- STREETS THAT INCORPORATE PARKING LIMITED TO ONE SIDE OF THE STREET SHALL NOT BE USED IN PLACE OF STREETS THAT PROVIDE PARKING ON BOTH SIDES EXCEPT WHERE SUBSTANTIAL OFF-STREET PARKING IS AVAILABLE, AND AT THE DISCRETION OF THE PLANNING COMMISSION .

DRAFT



City of Sisters • Standard Detail

TYPICAL STREET SECTIONS
 LOCAL STREETS

SCALE:	NONE
DRAWN BY:	EJH
APPROVED BY:	COS
REVISION DATE:	4/11/2018

DRAWING NO.
7-5



Access Management

Access Management is a broad set of techniques that balance the need to provide efficient, safe and timely travel with the ability to allow access to the individual destination. Proper implementation of access management techniques will promote reduced congestion, reduced accident rates, less need for highway widening, conservation of energy, and reduced air pollution.

Access management involves the control or limiting of access on arterial and collector facilities to maximize their capacity and preserve their functional integrity. Numerous driveways erode the capacity of arterial and collector roadways and introduce a series of conflict points that present the potential for crashes and interfere with traffic flow. Preservation of capacity is particularly important on higher volume roadways for maintaining traffic flow and mobility. Whereas local and neighborhood streets primarily function to provide direct access, collector and arterial streets serve greater traffic volume with the objective of facilitating through travel. Sisters, as with every city, needs a balance of streets that provide access with streets that serve mobility. A balance can be achieved by implementing various access management strategies, such as those listed below:

- Work with land use development applications to consolidate driveways, provide crossover easements, and take access from lower class roads where feasible. Existing, non-conforming accesses would only be subject to review and revision upon site improvement or a land use application.
- Implement access spacing standards for new developments and construction, including the prohibition of private access onto arterial roadways and the prohibition of new single family residential access collectors unless no other access options are available. Parcels shall not be landlocked by access spacing policies.
- Establish City access spacing standards to prohibit the construction of access points within the influence area of intersections. The influence area is that area where queues of traffic commonly form on the approach to an intersection (typically within 150 feet). In a case where a project has less than 150 feet of frontage, the site would need to explore potential shared access, or if that were not practical, place driveways as far from the intersection as the frontage would allow (permitting for 5 feet from the property line). However, full access may not be permitted in these conditions (e.g. restriction to right-in/right-out access)
- Implement City access spacing standards for new construction on County facilities within the urban growth boundary
- Meet ODOT access requirements on State facilities
- Establish maximum access spacing standards to promote connectivity.
- Establish a street connectivity and block formation requirement to implement a street grid throughout Sisters. In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and large site developments should produce complete



blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:

- **Block Length and Perimeter.** The maximum block length shall not exceed 600 feet or 1,000 feet along an arterial.
- **Street Connectivity.** Public and private streets connectivity shall conform to the functional classification map (Figure 7-1) and the local street connectivity plan (Figure 7-6)
- **Exception.** Exceptions to the above standards may be granted when blocks are divided by one or more pathway(s). Pathways shall be located to minimize out-of-direction travel by pedestrians and may be designed to accommodate bicycles.

Many cities have historically struggled with the issue of limiting residential access to collector roadways. This is due to the desire to maintain the roadway as a public place that creates a friendly pedestrian and bicycle environment, as opposed to backing properties with fences that wall-off and isolate the roadway. To address this concern and implement the recommended access restrictions, the following measures shall be required:

- Provide a local street grid with 150-foot to 250-foot spacing that allows back-to-back lots along local streets with side yards to the collector roadway while discouraging the creation of double-frontage lots. In addition, prohibit the use of fences along lot lines that front the collector roadway, or
- Require lots with frontage along the collector roadway to orient the front of the home to the collector, but provide rear-alley or driveway motor vehicle access.

New development and roadway projects involving City street facilities should meet the access spacing standards summarized in Table 7-2. In cases where physical constraints or unique site characteristics limit the ability for the access spacing standards shown in Table 7-2 to be met, the City of Sisters should retain the right to grant an access spacing variance. All requests for an access spacing variance shall be required to complete an access management plan for review and approval by the Public Works Director or City Engineer, which should include at a minimum the following items. In addition, all requests for an access spacing exception shall be required to complete an access management plan for review and approval by the Public Works Director or City Engineer, which should include at a minimum the following items:

- Review of the existing access conditions within the study area (defined the property frontage plus the distance of the minimum access spacing requirement). This should include a review of the last three years of crash data, as well as collection of traffic volume information and intersection operations analysis.
- An analysis of the study area safety and operations with the proposed access configuration, as well as with a configuration that would meet access spacing standards.
- This scenario should also include consideration of the long-term redevelopment potential of the area and discussion of how access spacing standards may be achieved.



Parcels shall not be landlocked by access spacing policies. Opportunities should be explored to provide future access through neighboring parcels and an interim access may be granted. Non-conforming access (defined per Table 7-2) should work to achieve a condition as close to standard as possible. For example, a private access may be permitted to an arterial roadway if no other option (e.g. access to a side street) exists; however, the private access would then be required to meet the minimum driveway spacing of 330 feet listed in Table 7-2.

Table 7-2: Access Spacing Standards for City Street Facilities^a

Street Facility	Maximum spacing^b of roadways	Minimum spacing^b of roadways	Minimum spacing^b of roadway to driveway^c	Minimum Spacing^b driveway to driveway^c
Arterial	1,000 feet	660 feet	330 feet	330 feet or combine
Collector:	600 feet	330 feet	100 feet	100 feet or combine
Neighborhood/Local	600 feet	150 feet	50 feet	10 feet

^a Exceptions may be made in the downtown commercial district, if approved by the City Engineering or Public Works Department, where alleys and historic street grids do not conform to access spacing standards.

^b Measured centerline to centerline

^c Private access to arterial roadways shall only be granted through a requested variance of access spacing policies (which shall include an access management plan evaluation)

In addition to implementing access spacing standards, the City of Sisters should require an access report for new access points, proposed to serve commercial and industrial developments, stating that the driveway/roadway is safe as designed and meets adequate stacking, sight distance and deceleration requirements as set by ODOT, Deschutes County and American Association of State Highway and Transportation Officials (AASHTO). Generally, the need for an access report is triggered by land use actions, design reviews, or land divisions.

Any proposed accesses to State facilities must be approved by ODOT. The 1999 Oregon Highway Plan identifies access management objectives for all classifications of roadways under State jurisdiction. Highway 20 is classified as a Statewide Highway and Highway 242 is classified as a District Highway by ODOT, which maintain a management objective that balances the needs of through traffic movement with direct property access. Based on these objectives, ODOT has established access spacing standards for all highway classifications that vary with proximity to urbanized areas and changes in posted speeds. These standards are also provided in the 1999 Oregon Highway Plan. Table 7-3 identifies the ODOT access spacing standards that are applicable within the Sisters urban growth boundary. Note that the spacing standards below are only to be applied to accesses on the same side of the highway.



Table 7-3: ODOT Access Management Standards

Facility	Spacing Standard ^a per Posted Speed		
	45 mph	35 mph	≤25 mph
Statewide Highway ^b	990 ft	720 ft	520 ft
District Highway ^c	500 ft	350 ft	350 ft

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

^b The Santiam and McKenzie-Bend Highways are Statewide Highways, as is the segment of the McKenzie Highway east of Sisters.

^c The segment of the McKenzie Highway west of Sisters is a District Highway.

Source: 1999 Oregon Highway Plan.

Local Street Connectivity

The Local Street Connectivity Plan specifies the general location where new local streets should be installed as the nearby area is developed. The purpose of the plan is to ensure that new developments accommodate local circulation and improve connectivity for all modes of transportation.

New developments are often developed with limited opportunities for movement into and out of the developments, with some neighborhoods funneling all pedestrian, bicycle, and vehicular traffic onto a single street. This type of street network results in out-of-direction travel and contributes to increased congestion and decreased pedestrian/bicycle accessibility. This can result in the need for investments in wider roads, traffic signals, and turn lanes that could otherwise be avoided. By providing connectivity between neighborhoods, out-of-direction travel and vehicle miles traveled (VMT) can be reduced, accessibility between various travel modes can be enhanced, and traffic levels can be balanced out between various streets. In this way, some of these local connections can help mitigate network capacity deficiencies by improving traffic circulation. Additionally, public safety response time is reduced.

In the City of Sisters, several roadway connections will be needed within developable areas to reduce out of direction travel for vehicles, pedestrians, and bicyclists. This is most important in the areas where a significant amount of new development is possible. Figure 7-6 shows the Local Street Connectivity Plan for Sisters. In most cases, the connector alignments are not specific and are aimed at reducing potential neighborhood traffic impacts by better balancing traffic flows on neighborhood routes. The arrows shown in the figures represent *potential* connections and the general direction for the placement of the connection²⁰. In each case, the specific alignments and design should be determined as part of development review. The criteria used for providing connections are as follows:

- Pedestrian and bicycle connections should be provided every 330 feet
- Vehicle connections should be provided every 660 feet centerline to centerline

²⁰ Other local street connections may be required as the City conducts development review.

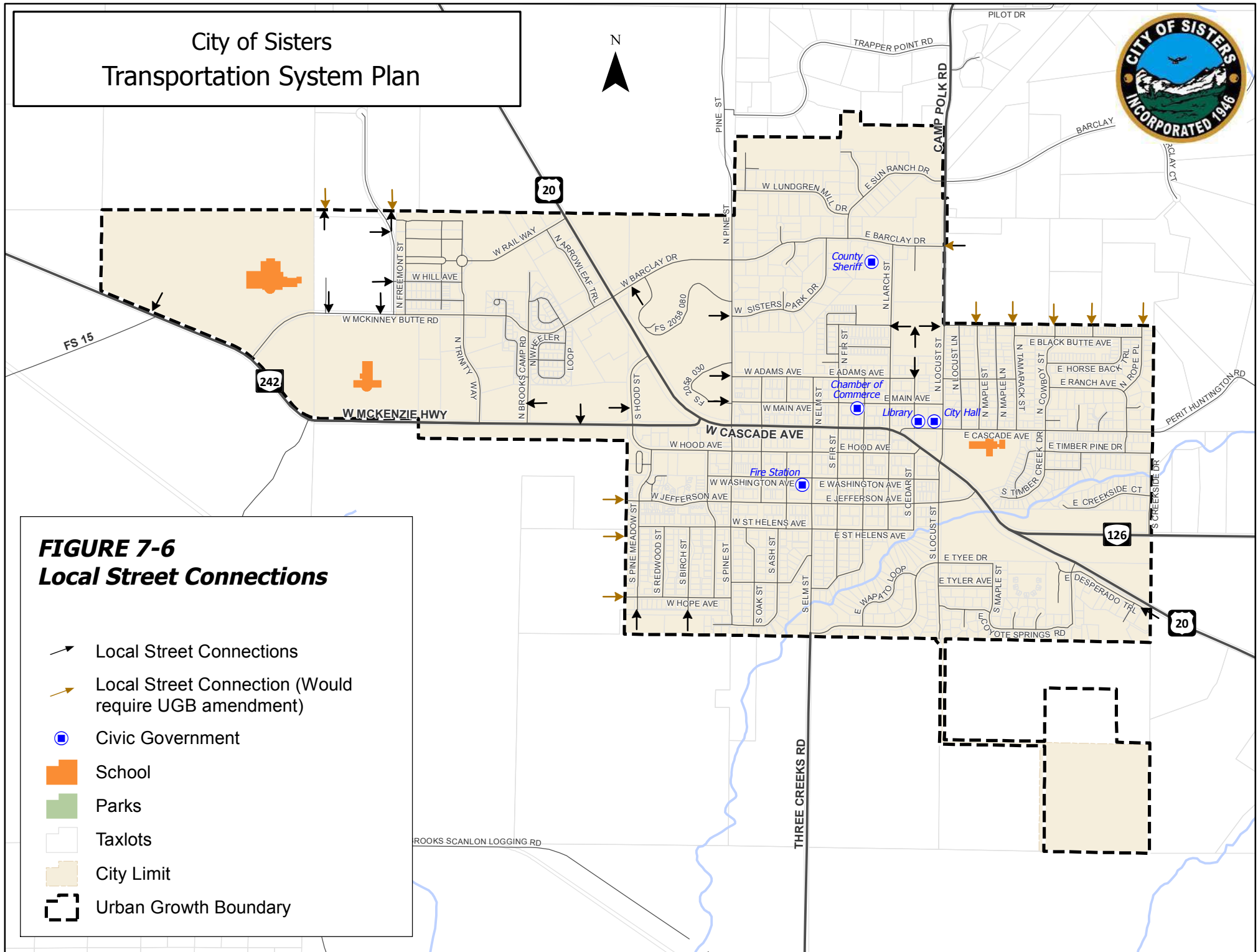


To protect existing neighborhoods from the potential traffic impacts caused by extending stub end streets, connector roadways should incorporate neighborhood traffic management into their design and construction. In addition, when a development constructs stub streets, they shall install signs indicating the potential for future connectivity to increase the awareness of residents.

In order to ensure that new developments meet the objectives of the local street plan, developments will be required to provide a proposed street map as part of the development approval process. The street map should be reviewed to ensure the development does the following:

- Provides full street connections with spacing of no more than 500 feet between connections, except where prevented by barriers
- Provides bike and pedestrian access ways with spacing of no more than 300 feet, except where prevented by barriers (bike and pedestrian access ways should be considered at the end of cul-de-sacs)
- Limits use of cul-de-sacs and other closed-end street systems to situations where barriers prevent full street connections or to locations where pedestrian/bike accesses are to be provided (approximately halfway between vehicular accesses)
- Includes no close-end street longer than 150 feet or having no more than 30 dwelling units
- Includes street cross-sections demonstrating dimensions of ROW improvements, with streets designed for posted or expected speed limits

City of Sisters Transportation System Plan



**FIGURE 7-6
Local Street Connections**

-  Local Street Connections
-  Local Street Connection (Would require UGB amendment)
-  Civic Government
-  School
-  Parks
-  Taxlots
-  City Limit
-  Urban Growth Boundary



Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. As growth in the Sisters area occurs, the number of vehicle trips and travel demand in the area will also increase. This growth can be best accommodated by encouraging the use of alternative mode choices for new and existing users.

When applied on a regional basis, TDM measures can be an effective tool in reducing vehicle miles traveled. Research has shown that a comprehensive set of complementary policies implemented over a large geographic area can have an effect on the number of vehicle miles traveled to/from that area.²¹ However, the same research indicates that in order for TDM measures to be effective, they should go beyond the low-cost, uncontroversial measures commonly used such as carpooling, transportation coordinators/associations, priority parking spaces, etc.

Many of the TDM strategies are tailored towards urban applications, where there are major employment generators and transit opportunities. TDM measures for more rural communities require special development, as compared to those that are implemented in urban areas. TDM measures in rural environments should focus on increasing travel options and creating an environment that is supportive for walking and cycling. The most effective TDM measures for Sisters include elements related to carpools, improved services for alternative modes of travel, and employer incentives. However, TDM includes a wide variety of actions that are specifically tailored to the individual needs of an area. Table 7-4 provides a list of several strategies that should be applied as appropriate within the City of Sisters.

While a comprehensive TDM program may not address the transportation operational issues in Sisters during the PM peak times, new employment development with more than 50 employees should be encouraged to implement a van pool program, flexible working hours or another transportation demand management strategy to help influence regional trips. These strategies will be implemented and administered by these large employers to reach motor vehicle trip reduction targets of 5%, similar to the process defined in OAR 340-20-047.

²¹ *The Potential for Land Use Demand Management Policies to Reduce Automobile Trips*, ODOT, by ECO Northwest, June 1992.



Table 7-4: Transportation Demand Management Strategies

Strategy	Description	Potential Trip Reduction
Telecommuting	Employees perform regular work duties at home or at a work center closer to home, rather than commuting from home to work. This can be full time or on selected workdays. This can require computer equipment to be most effective.	82-91% (Full Time) 14-36% (1-2 day/wk)
Compressed Work Week	Schedule where employees work their regular scheduled number of hours in fewer days per week.	7-9% (9 day/80 hr) 16-18% (4 day/40 hr) 32-36% (3 day/36 hr)
Alternative Mode Subsidy	For employees that commute to work by modes other than driving alone, the employer provides a monetary bonus to the employee.	21-34% (full subsidy of cost, high alternative modes) 2-4% (half subsidy of cost, medium alternative modes)
Bicycle Program	Provides support services to those employees that bicycle to work. Examples include: safe/secure bicycle storage, shower facilities and subsidy of commute bicycle purchase.	0-10%
On-site Rideshare Matching for HOVs	Employees who are interested in carpooling or vanpooling provide information to a transportation coordinator regarding their work hours, availability of a vehicle and place of residence. The coordinator then matches employees who can reasonably rideshare together.	1-2%
Provide Vanpools	Employees that live near each other are organized into a vanpool for their trip to work. The employer may subsidize the cost of operation and maintaining the van.	15-25% (company provided van with fee) 30-40% (subsidized van)
Gift/Awards for Alternative Mode Use	Employees are offered the opportunity to receive a gift or an award for using modes other than driving alone.	0-3%
Walking Program	Provide support services for those who walk to work. This could include buying walking shoes or providing lockers and showers.	0-3%
Company Cars for Business Travel	Employees are allowed to use company cars for business-related travel during the day	0-1%
Guaranteed Ride Home Program	A company owned or leased vehicle is provided in the case of an emergency for employees that use alternative modes.	1-3%
Time off with Pay for Alternative Mode Use	Employees are offered time off with pay as an incentive to use alternative modes.	1-2%

Source: Guidance for Estimating Trip Reductions from Commute Options, Oregon Department of Environmental Quality, August 1996



Motor Vehicle Improvement Plan

Analysis of future conditions with the current (no-build) roadway network in place was discussed in Chapter 4. The majority of existing and future motor vehicle needs identified relate to the operation and safety of the Highway 20 corridor. Therefore, one of the key focuses of the motor vehicle improvement plan for this TSP update was the development of a preferred Highway 20 alternative. Other considerations were also accounted for in the motor vehicle improvement plan. This section describes the Highway 20 alternative analysis findings and the projects, costs, and performance of the Motor Vehicle Improvement Plan that implement the preferred alternative (i.e., the Highway 20 Alternate Route).

Highway 20 Alternatives Analysis

Alternatives analysis was performed for Highway 20 and included detailed transportation analysis, community feedback, and Project Advisory Committee (PAC) review and decision making. The alternatives analysis process is documented in detail in Appendix N and summarized below.

Eleven possible alternatives were initially identified and included highway widening, alternate routes, couplets, and bypasses. These alternatives underwent a screening process, during which it was determined that both the Hood-Main Couplet and the Barclay-Locust Alternate Route alternatives would meet the forecasted long-term transportation needs of Highway 20 through the 2030 TPS horizon year. The PAC reviewed the alternatives analysis findings and unanimously selected the Barclay-Locust Alternate Route as the locally preferred alternative. This selection was made for four main reasons:

- Cascade Avenue will continue to operate as the principal roadway during the majority of the year, and the Alternate Route would act as a flexible relief valve during peak congestion periods, which makes it a much better match with Sisters' particular highly seasonal traffic patterns than would a couplet which permanently alters all traffic to deal with temporary congestion. While Cascade would continue to operate as the principle roadway, its safety would be enhanced by the proposed street and curb improvements.
- The Barclay-Locust Alternate Route alternative will have better flexibility in construction phasing and staging than the Hood-Main Couplet.
- The Barclay/Locust Alternate Route would best respect and preserve existing local traffic patterns while reducing congestion in the downtown core and improving pedestrian safety overall (and especially near the Elementary School) than would a couplet.
- The Barclay/Locust Alternate Route would best preserve the integrity and the pedestrian-friendly quality of the City's downtown core, whereas the couplet would double the number of highway roads bisecting the downtown core and double the barriers to north-south circulation through town.

In a community open house on October 29, 2008, the PAC presented their decision to select the Barclay-Locust Alternate Route as the preferred alternative, and the majority of the attendees completing comment forms indicated that they agreed with the Project Advisory Committee's



recommendation for the Alternate Route concept. The proposed Motor Vehicle Plan is based on implementation of the Highway 20 Alternate Route as the preferred Highway 20 solution.

Roadway Improvement Projects

The improvements identified to meet 2030 system demand in Sisters include a combination of projects developed through coordination with the Project Advisory Committee (PAC), ODOT, Deschutes County, public involvement, and key stakeholder interviews. These improvements incorporate the Barclay-Locust Alternate Route and are shown in Figure 7-7. The Motor Vehicle Master Plan was determined is listed in Table 7-5. The Master Plan refers to the list of projects the would like to construct if there were no financial constraint. However, until implementation measures are taken (such as an update to the City’s Capital Improvement Plan and implementation of necessary funding mechanisms), the Master Plan projects are not considered “reasonably likely to be funded” for Transportation Planning Rule (TPR) purposes.

The cost estimates shown in the table were estimated using standard assumptions for new facilities. Further refinements should be made of these estimates prior to capital budgeting. Inclusion of an improvement project in the TSP does not commit the City or ODOT to allow, construct or participate in funding the specific improvement. Projects on the State Highway System that are contained in the TSP are not normally considered reasonably likely to be funded projects until they are programmed into the Statewide Transportation Improvement Plan (STIP). As such, projects proposed in the TSP that are located on a State highway cannot normally be considered mitigation for future development or land use actions until they are programmed into the STIP. However, the unique solution to Highway 20 capacity needs in Sisters that utilizes an ODOT/City partnering in construction and funding significantly increases the likelihood of State funding of improvements. Therefore, this plan assumes that the Highway 20 improvements that complement the Alternate Route are reasonable for the purposes of meeting Transportation Planning Rule (TPR) requirements in the development of a TSP (see OAR 045); however, this should not be confused to mean this alternative is considered reasonably likely under OAR 060 for purposes such as rezone studies.

Unanticipated issues related to project funding, as well as the environment, land use, the economy, changes in the use of the transportation system, or other concerns may be causes for re-evaluation of alternatives discussed below and possible removal of a project from consideration for funding or construction. Highway projects that are programmed to be constructed may have to be altered or canceled at a later time to meet changing budgets or unanticipated conditions.



Table 7-5: Motor Vehicle Master Plan Projects

Project	Location	Description	Timeline	Agency	Cost (\$1,000's)
Intersection					
1	US 20/Barclay Dr	Install roundabout or traffic signal	Complete		
2a	US 20/Locust St	Install roundabout	2021-2030	City/ODOT	\$ 3,400 to 4,500
2b: Near Term Option		Install mini-roundabout	2018-2020	City/ODOT	\$ 550
3	US 20/OR 126	Combine intersection with Buckaroo Trail and construct a multilane roundabout.	2021-2030	City/ODOT	\$ 7,200
4	US 20/Pine St	Install eastbound and westbound left-turn lanes, restrict northbound and southbound approaches to right turns	Complete (The eastbound and westbound left-turn lanes were installed with the Cascade Avenue project. The intersection should be monitored to determine whether movement restrictions are necessary in the future.)		
5	Hwy 20/Oak St	Install northbound and southbound right-turn lanes	2021-2030	City/ODOT	\$ 20
6a	Barclay Dr/Locust St	Construct single-lane roundabout	Development Driven	City/ODOT	\$ 2,500
6b: Near Term Option		Realign Barclay Dr/Locust St to make continuous movement to/from west and south leg.	Development Driven	City/ODOT	\$ 300
7	US 20/Desperado Trail	Provide new local street connection	Development Driven	City/ODOT	TBD



Project	Location	Description	Timeline	Agency	Cost (\$1,000's)
Roadway					
8	Barclay Dr from US 20 to Locust St, Locust St from Barclay Dr to US 20	<p>Widen Barclay Drive to 3-lane arterial section between Pine and Locust, smooth curvature, adjust driveways, install a landscape buffer (including street trees) on Locust to screen fronting homes. Additional ROW may be needed on Barclay Drive to include a multi-use path, as identified in the Pedestrian Plan and Bicycle Plan.</p> <p>Near-term: The realignment of Barclay Drive may be completed in two phases if ROW for the multi-use path is not available. The first phase would complete the roadway realignment and the second phase would complete the multi-use path.</p>	2019-2030	City/ODOT	<p>Barclay Drive: \$ 750</p> <p>Locust Street: Development Driven</p>
Study					
9	Hwy 20/Barclay Dr and Hwy 20/Locust St	Roundabout feasibility study		Complete	
Total Costs					\$ \$15,270
Total City Project Cost					\$ 1,527
Total ODOT Project Cost					\$ 13,743



Eastside Circulation Refinement

In 2016, the City of Sisters initiated a refinement effort of this TSP to refine and add details to the projects that address transportation circulation on the east side of the City. The purpose of this refinement was to:

- Assess need for turn lanes at Pine Street and Larch Street along the Alternate Route
- Evaluate intersection improvement concepts at the following intersections:
 - Barclay Drive/Locust Street
 - US 20/Locust Street (note: also address need to close or not close south leg and influence on Locust Street/Cascade Avenue)
 - US 20/OR 126 (including potential to relocate existing truck scales and/or provide for access to Creekside Campground)
- Develop concept alternatives that address local circulation and access along US 20 and OR 126 east of Locust Street to City limits

To evaluate these objectives, the City engaged with a Project Advisory Committee (PAC) to review and comment on improvement alternatives. Further detail on this refinement effort, including the technical analysis conducted to evaluate alternatives and public feedback received, is included in Appendix S. The project concepts are also included at the end of this chapter within Figure 7-10 through Figure 7-20.

Key outcomes from the refinement effort include:

- **Alternate Route:** Confirmation of the need for a three-lane cross-section on Barclay Drive from Pine Street to Locust Street. The recommendation for a three-lane section on Locust Street between Barclay Drive and Highway 20 was refined to suggest the installation of left-turn lanes along the route as required by future development.
- **Intersection improvements:** Identification of the following improvements:
 - Barclay Drive/Locust Street
 - **Near-term: *Realign Barclay Dr/Locust St to make a continuous movement to/from west and south leg.*** This option should be explored if capacity improvements are needed at the intersection but demand from the north or a potential future east leg do not require a full intersection improvement
 - **Long-term: *Construct a single-lane roundabout.*** This option should be explored if capacity improvements are needed at the intersection and demand from the north or a potential future east leg require a full intersection improvement.
 - US 20/Locust Street
 - **Near-term: *Install a mini-roundabout.*** The City will work with ODOT on the evaluation and design of a mini-roundabout with the intent of addressing near-term capacity and safety deficiencies.
 - **Long-term: *Install a roundabout.*** The City and stakeholders prefer the installation of a roundabout at the intersection. Initial traffic forecasts and



analysis indicate that a single-lane roundabout would operate acceptably through 2030, though further refinement should be conducted at the time of design and construction. Several alignments of this roundabout have been contemplated based on varying right-of-way needs. The trade-offs amongst these options are discussed further in Appendix S. The preferred roundabout alignment should be confirmed at the time of design and construction.

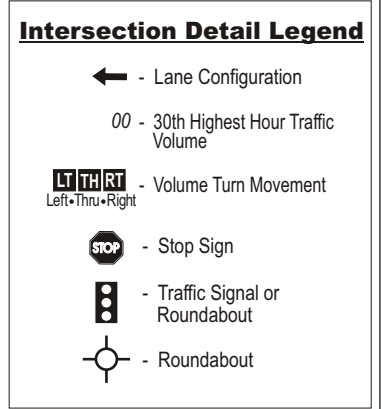
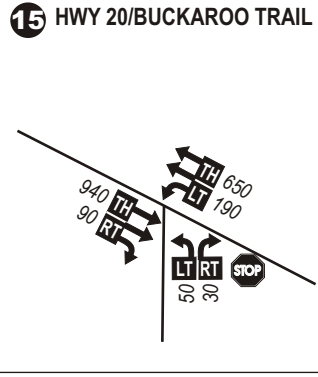
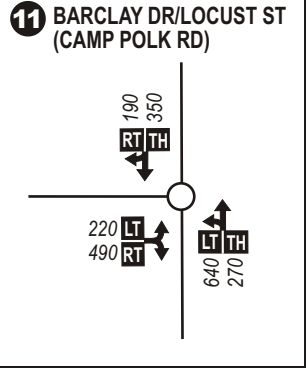
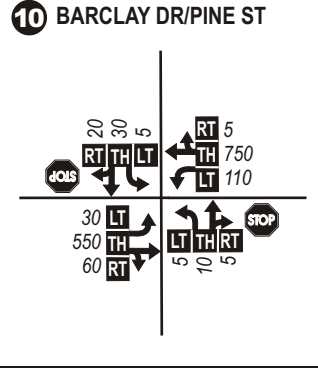
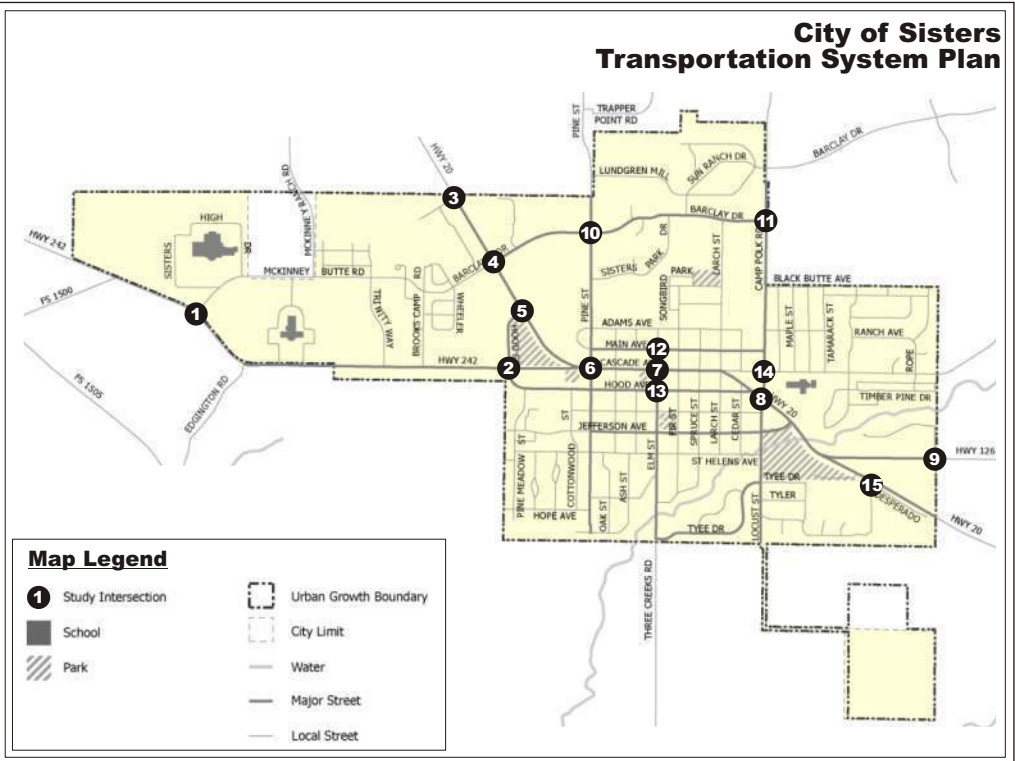
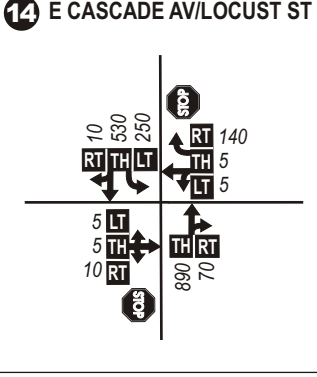
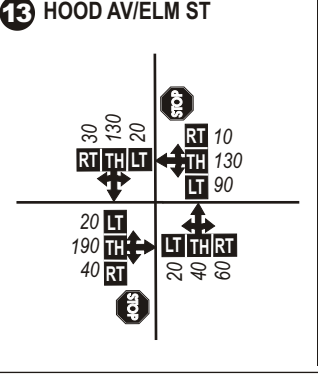
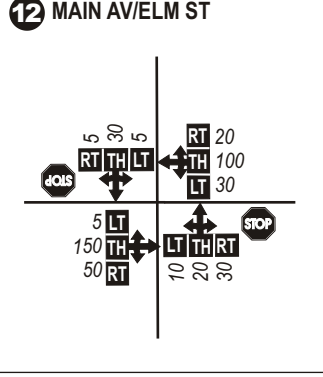
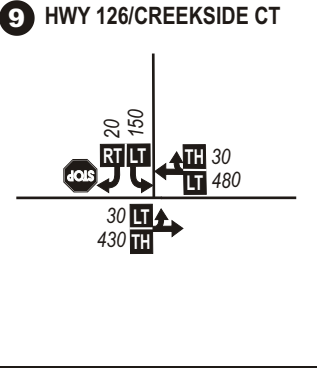
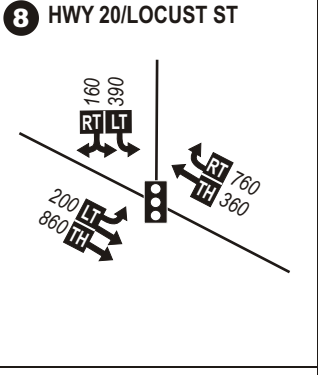
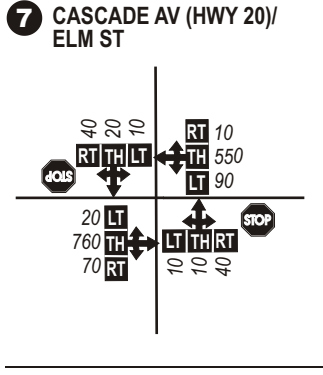
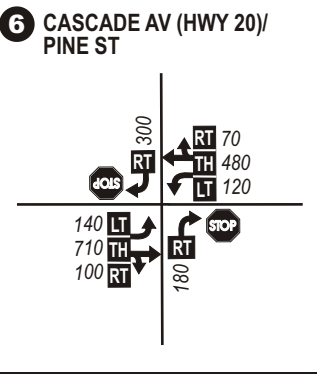
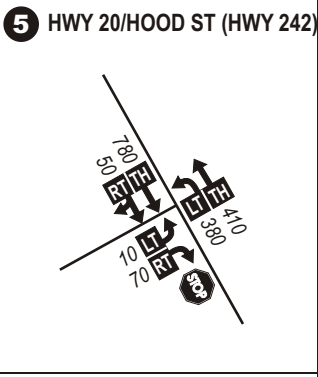
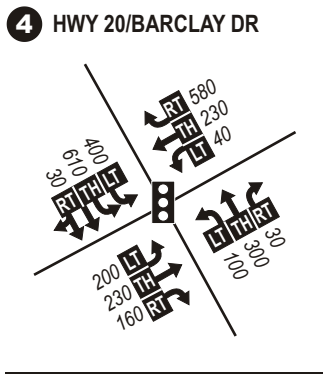
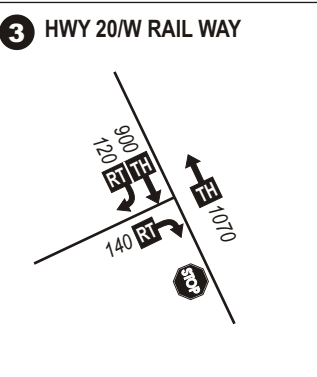
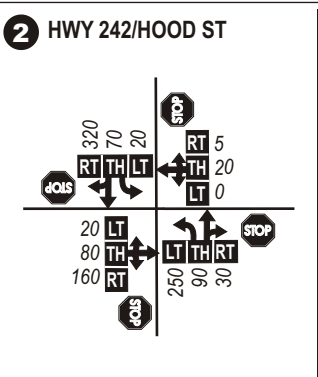
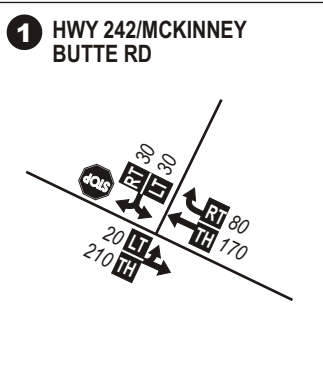
- **Retain south leg of intersection.** The 2010 version of this TSP planned for the closure of the southern leg of this intersection to accommodate phasing needs of a potential traffic signal. Stakeholder input and updated traffic forecasts suggest this closure is not needed or desired. As such, this closure is no long planned with the Sisters TSP.
- US 20/OR 126
 - **Long-term: Combine intersection with Buckaroo Trail and install a roundabout.** The combined intersection will simplify wayfinding for patrons of the businesses south of US 20 in the area. The roundabout will address long-term capacity needs for the intersection. Relocation of the truck scales to the west should be evaluated as part of further project development.
- US 20 Corridor: Key projects
 - Roadway does NOT require a 4-lane cross-section east of Locust Street. In conjunction with the long-term intersection improvement at US 20/Locust Street, the need for three travel lanes across the Whychus Creek bridge should be evaluated. Current traffic forecasts suggest a two-lane cross-section would meet travel projections.
 - A multi-use path should be provided on the north and south side of the corridor east of Locust Street to City limits.
 - A new local street connection should be evaluated on the south side of US 20 at the Desperado Trail right-of-way (near City limits). This connection would help with circulation into and out of the businesses on the south side of US 20. It is assumed this connection would be restricted to right-in, right-out.
 - Jefferson Street intersection
 - Access should be limited to right-in, right-out at the US 20/Jefferson Street intersection in conjunction with construction of the long-term improvement at the US 20/Locust Street intersection.
- Per direction from the Sisters City Council, back-in diagonal parking was removed from the TSP.
- Removed the desire to pursue an STA designation for the Cascade Avenue corridor. The outcome of the recent improvement project for the corridor accomplished what an STA designation was intended to achieve.



Motor Vehicle System Performance

Based on the improvement identified for the Motor Vehicle Improvement Plan, traffic volume and operating conditions for the future year 2030 30th-highest hour were analyzed to demonstrate compliance with ODOT, County, and City mobility standards. Figure 7-8 shows the forecasted traffic volumes, and Table 7-6 lists the resulting operations performance, which assumes that traffic signals are installed at the Highway 20/Barclay Drive and Highway 20/Locust Street intersections. The operating conditions of roundabouts at these intersections should be determined in the roundabout feasibility study. As listed in Table 7-6, each study intersection would meet mobility standards with the proposed improvements.

(2018 Update: Figure 7-8 and Table 7-6 reflect the volume and operational conditions forecasted at the time of the 2010 TSP. Updated volume and operational forecasts for the eight intersections evaluated as part of the 2018 refinement plan can be found in Appendix S.)



DKS Associates
TRANSPORTATION SOLUTIONS

Figure 7-8

2030 TRAFFIC VOLUMES FOR BARCLAY-LOCUST ALTERNATE ROUTE

NO SCALE



Table 7-6: Study Intersection 30th HV Operating Conditions

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	LOS	V/C
McKenzie HWY (OR 242)/McKinney Butte Rd	ODOT	≤ 0.80	10.9	A/B	0.11
McKenzie HWY (OR 242)/Hood St (OR 242)	ODOT	≤ 0.85	14.2	B ^a	0.64
Santiam HWY (US 20/OR 126)/Rail Wy	ODOT	≤ 0.70	27.9	A/D	0.69
Santiam HWY (US 20/OR 126)/Barclay Dr (McKinney Butte Rd)	ODOT	≤ 0.70	23.1	C ^a	0.67
Santiam HWY (US 20/OR 126)/Hood St (OR 242)	ODOT	≤ 0.80	17.1	B/F	0.52
Cascade Ave (US 20/OR 126)/Pine St	ODOT	≤ 0.80	30.0	B/D	0.67
Cascade Ave (US 20)/Elm St	ODOT	≤ 0.80	>50	A/F	0.61
McKenzie HWY (US 20/OR 126)/Locust St <i>(See Appendix S for 2018 update)</i>	ODOT	≤ 0.80			
McKenzie HWY (US 20/OR 126)/Buckaroo Trail <i>(See Appendix S for 2018 update)</i>	ODOT	≤ 0.70			
McKenzie HWY (OR 126) Creekside Ct <i>(See Appendix S for 2018 update)</i>	ODOT	≤ 0.70			
Barclay Dr/Pine St <i>(See Appendix S for 2018 update)</i>	City of Sisters	≤ 0.90			
Barclay Dr/Locust St <i>(See Appendix S for 2018 update)</i>	City of Sisters	D and ≤ 0.85			
Main Ave/Elm St	City of Sisters	≤ 0.90	12.3	A/B	0.10
Hood Ave/Elm St	City of Sisters	≤ 0.90	22.3	A/C	0.56
E Cascade Ave/Locust St	City of Sisters	≤ 0.90	>50	B/F	0.61

Delay = Average Stopped Delay per Vehicle (seconds) for worst approach

LOS = Level of Service (Major Street/Minor Street)

V/C = Volume/Capacity Ratio (of worst movement)
Bold Underlined values exceed standards

^a At all-way stop and signalized intersections, the LOS is reported for the entire intersection.

^b For a two-way stop controlled intersection, the major street has the free movement and the minor street is stop controlled.



Truck Route Designations

Efficient truck movement through Sisters plays a vital role in maintaining and developing Central Oregon's economic base as Highway 20 is a key freight corridor for the region. Well planned truck routes can provide for the economical movement of raw materials, finished products, and services. Trucks moving from industrial areas to regional highways or traveling through Sisters are different than trucks making local deliveries. The transportation system should be planned to accommodate this goods movement need. The establishment of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety and minimizing maintenance costs of the roadway system. The proposed truck routes, with the completion of the Alternate Route, are shown in Figure 7-9.

The plan is aimed at addressing the through movement of trucks, not local deliveries. The objective of this route designation is to allow these routes to focus on design criteria that is "truck friendly", (i.e. 12 foot travel lanes, longer access spacing, 35 foot (or larger) curb returns and pavement design that accommodates a larger share of trucks). While the truck routes are designated for both Highway 20 and the Alternate Route (Locust Street and Barclay Drive), the local preference would be to require trucks to use the Alternate Route in the future to allow more design flexibility on Cascade Avenue.

City of Sisters Transportation System Plan

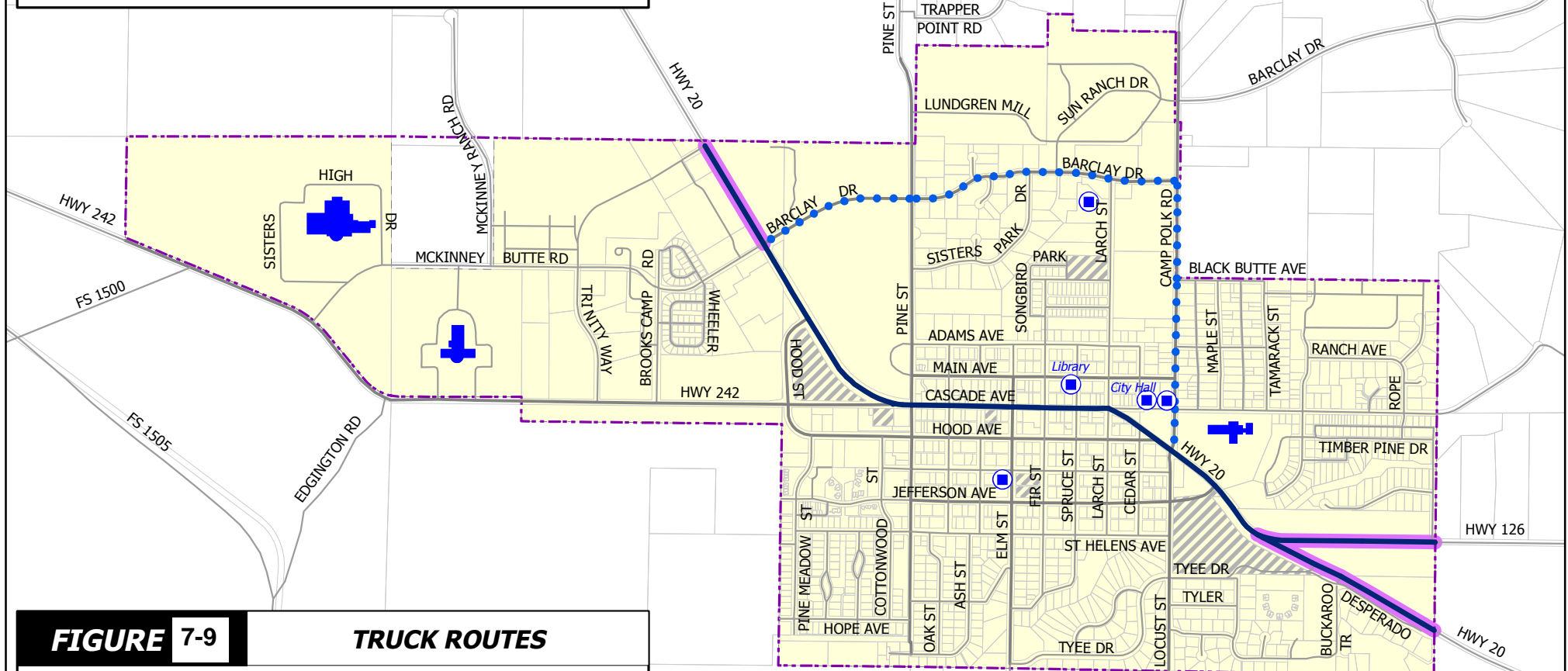
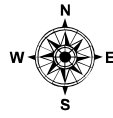


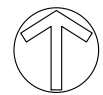
FIGURE 7-9

TRUCK ROUTES

Legend

- Truck Route
- Locally Designated Truck Route
- Expressway
- Civic/Government
- School
- Park
- Urban Growth Boundary
- City Limit
- Parcels
- Major Street
- Local Street

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SCALE
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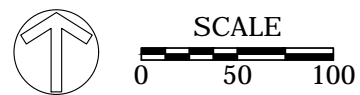
US20 Locust - Interim Concept
 Sisters, OR

Figure
 7-10

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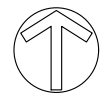
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US20 Locust - Long Term Concept 1
Sisters, OR

Figure
7-11

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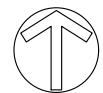
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US20 Locust - Long Term Concept 2
Sisters, OR

Figure
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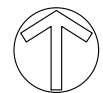
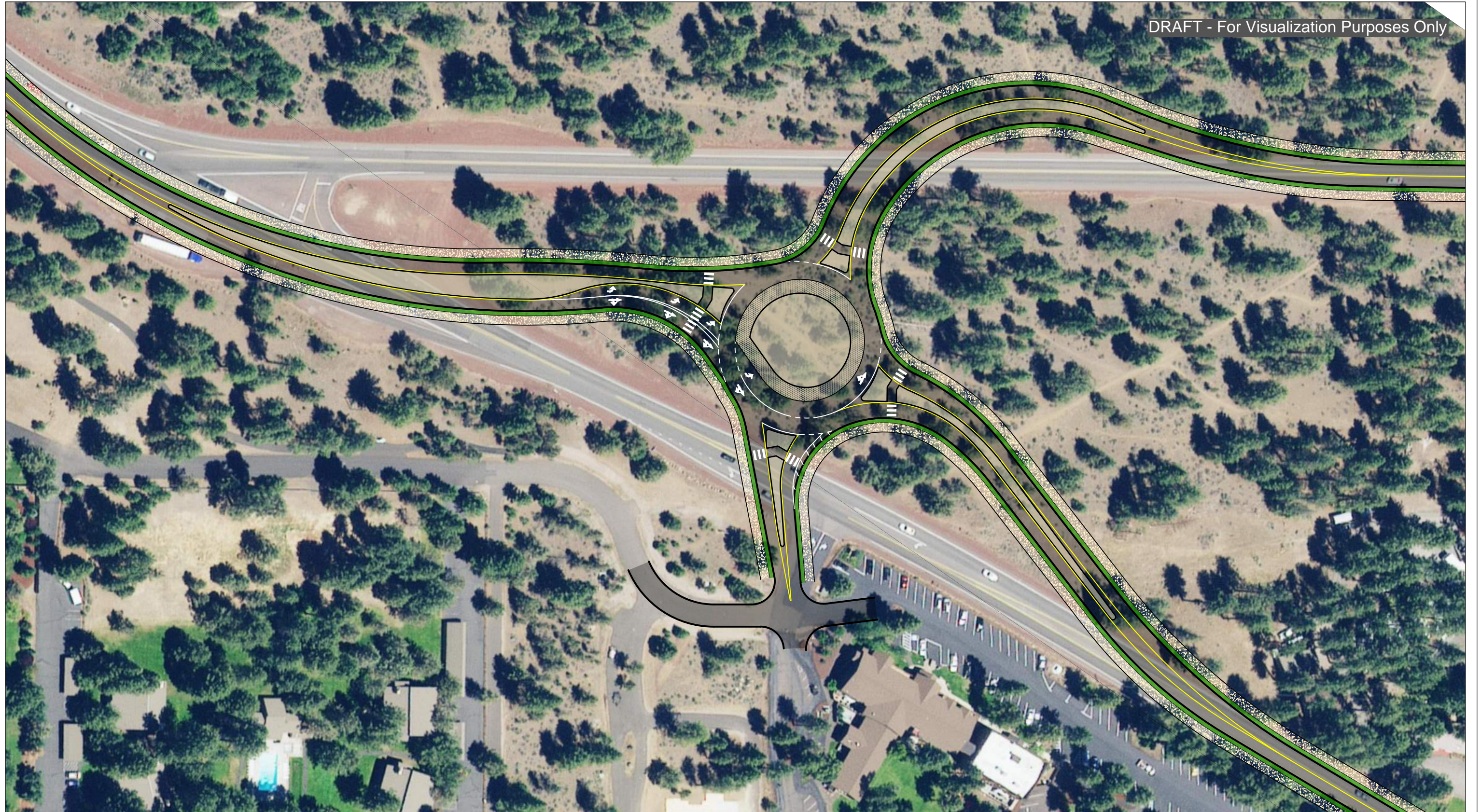
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US20 Locust - Long Term Concept 3
Sisters, OR

Figure
7-13

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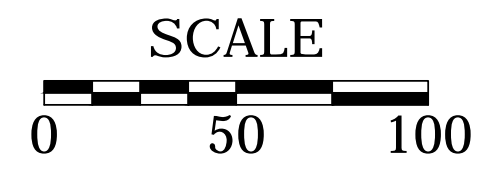
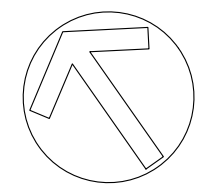
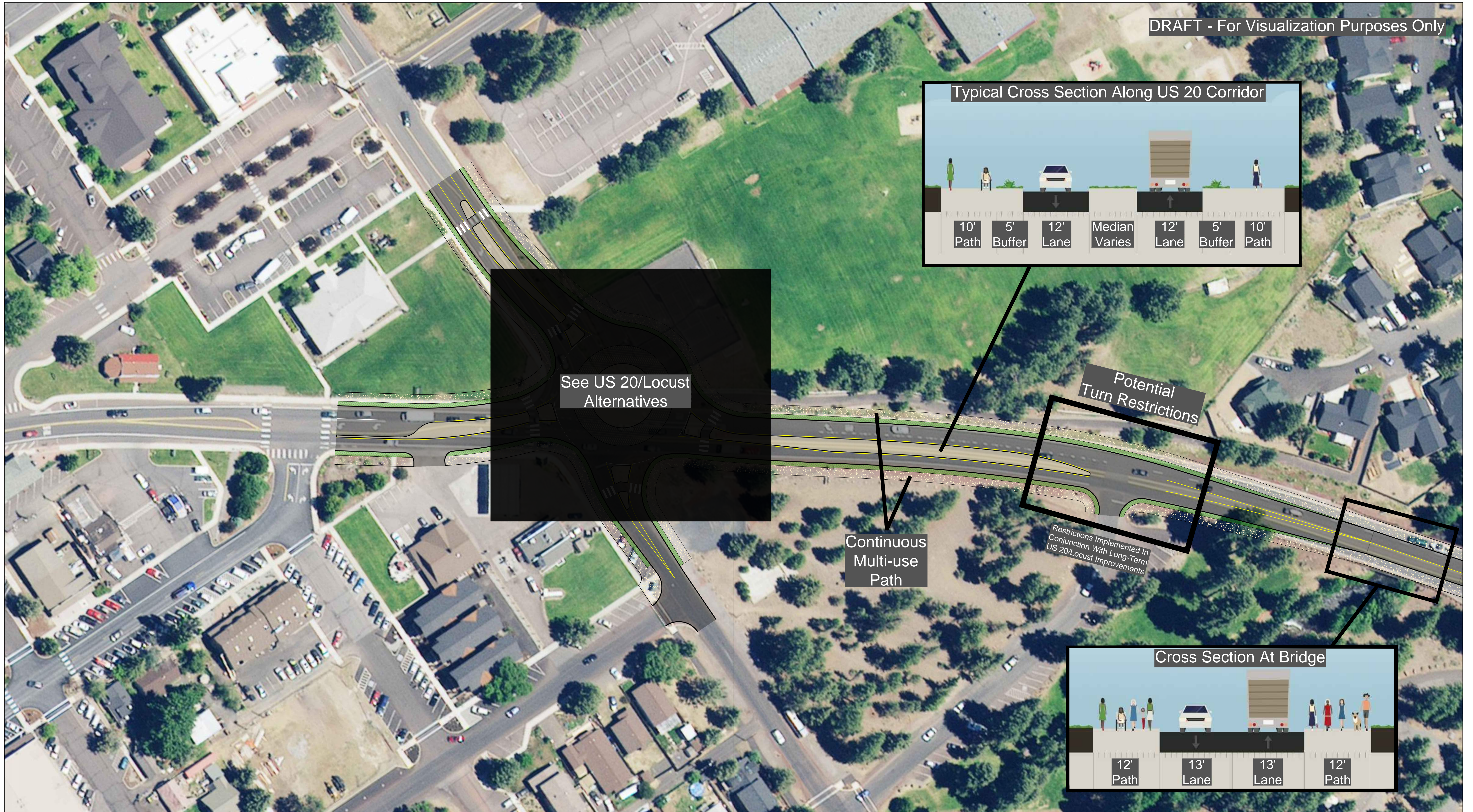
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US20 OR126 - Concept
Sisters, OR

Figure
7-14

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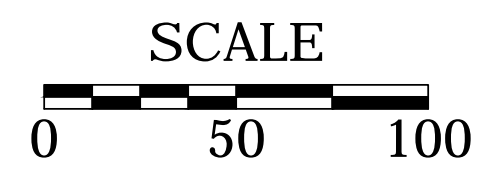
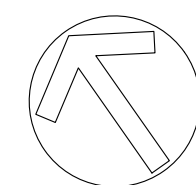
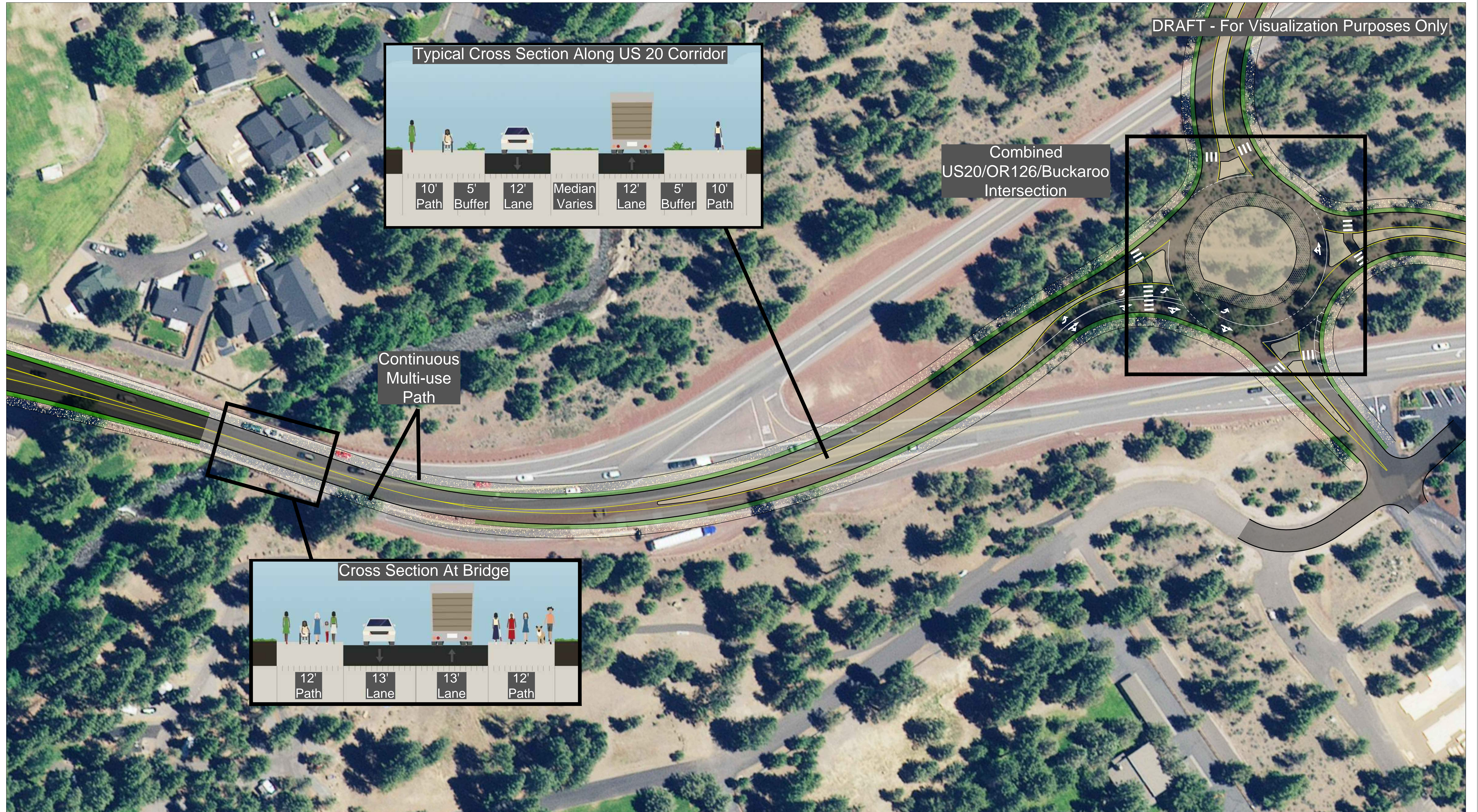
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US20 Corridor (1)
Sisters, OR

Figure
7-15

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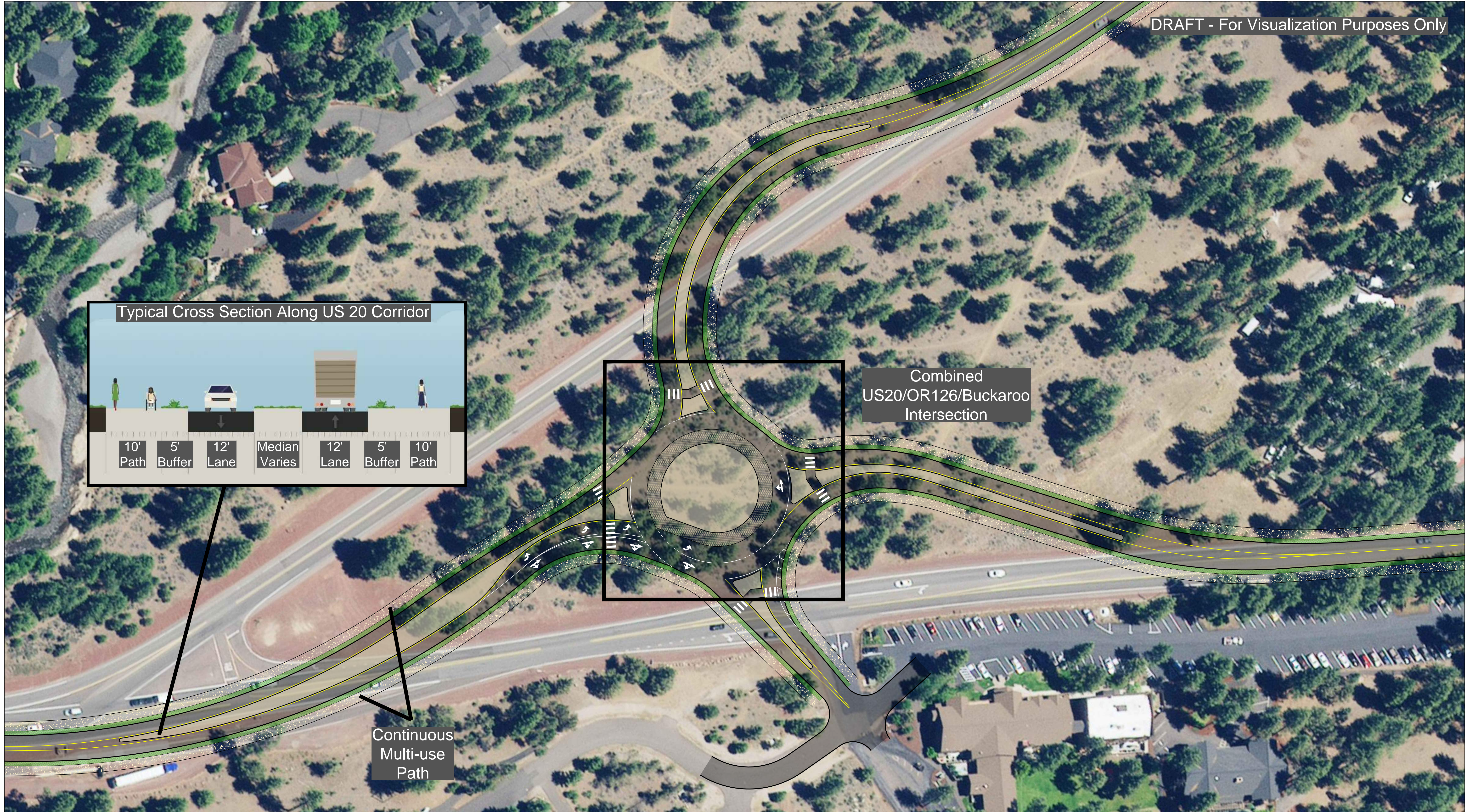


US20 Corridor (2)
Sisters, OR

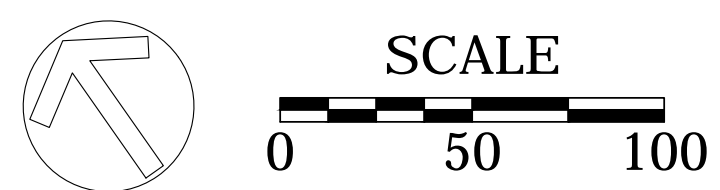
Figure
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US20 Corridor (3)
Sisters, OR

Figure
7-17

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Potential Future City Road Connection



US20 Corridor (4)
Sisters, OR

Figure
7-18

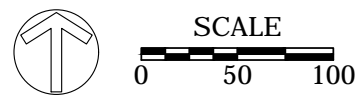
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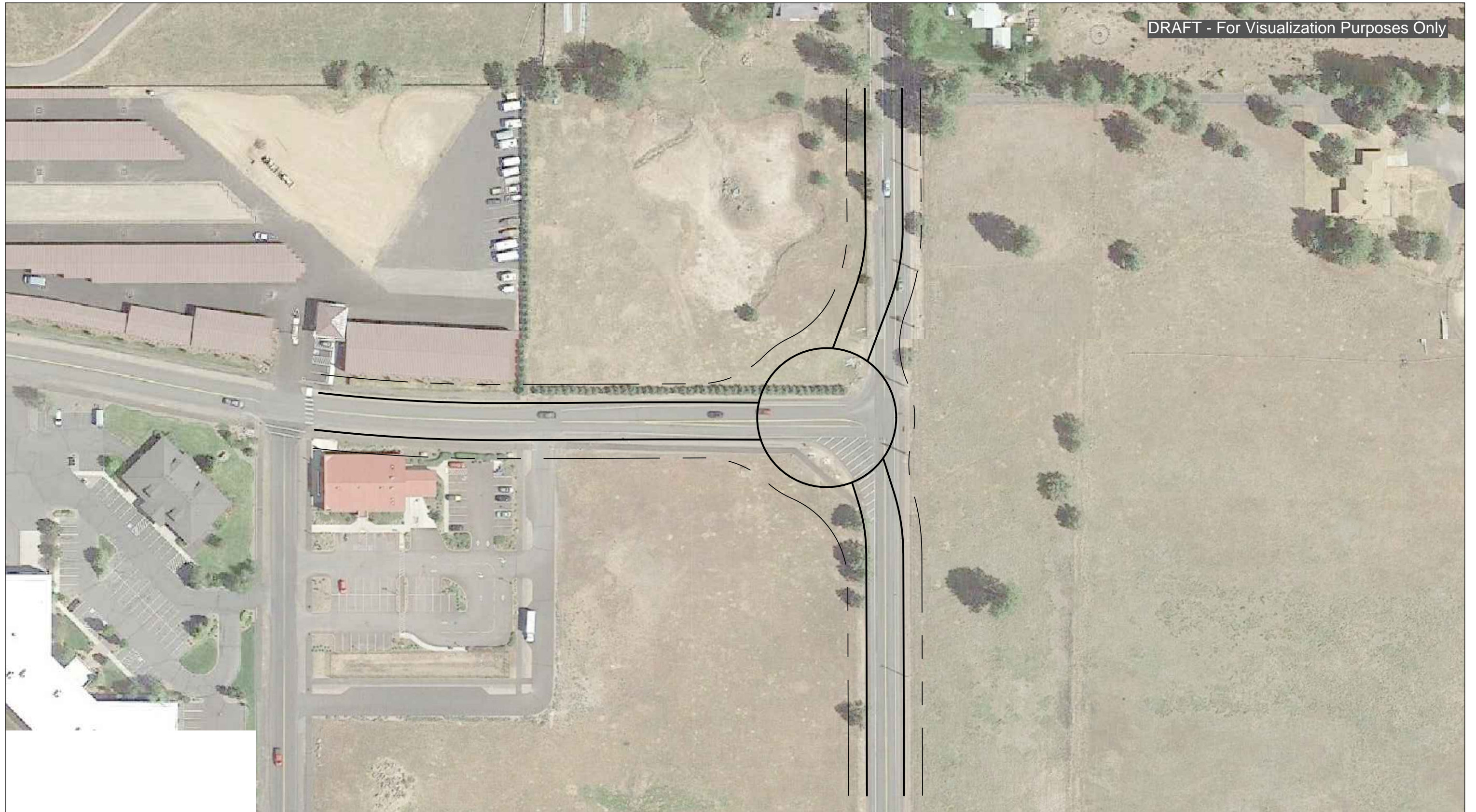
Barclay Drive Locust Street - Near Term Concept
Sisters, OR

Figure
7-19



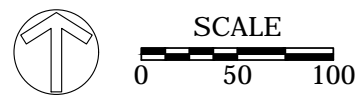
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Barclay Drive Locust Street - Long Term Concept
Sisters, OR

Figure
7-20



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Chapter 8. Other Modal Plans

Introduction

This chapter addresses transportation plans for three modes not covered in Chapters 5, 6, or 7. These three modes are transit, rail, and air.

Transit

Transit systems provide vehicular service to passengers who choose not to or are unable to travel in their own vehicles. CET has established fixed transit routes between Sisters and Bend and Sisters and Redmond. Additionally, CET provides dial-a-ride service to all residents of the Sisters area on a demand-responsive basis.

Due to the demand for transportation options for employees and residents needing to travel between Bend and Sisters and Redmond and Sisters transit service between Sisters and Bend and between Sisters and Redmond is considered essential. Public opinion should be sought on the issue and used for guidance in developing a future transit plan if needed to meet livability goals as growth continues. In addition, the City should continue to coordinate with Central Oregon Intergovernmental Council (COIC) to pursue grant funding as appropriate to provide additional options for new regional transit to other locations of interest including Black Butte Ranch, Camp Sherman, Suttle Lake, Hoodoo Ski Resort, and Santiam Pass. The Federal Lands Access Program (FLAP) is a potential funding source for transit service to these areas. Multi-jurisdictional support from COIC, City of Sisters, Deschutes County, Jefferson County, and Linn County as well as from ODOT, Chambers of Commerce and owners/tenants of these destinations would be necessary for a successful FLAP grant.

Additionally, House Bill 2017 developed the Statewide Transportation Improvement Fund (STIF), which provide funding for improvements to public transportation options.

Sisters will work with agency partners to improve transit service for area residents through local facilities and expansion of the Community Connector System.

Rail

There are no rail facilities planned in or near the City of Sisters. Therefore, no plan is needed.



Air

Air facilities provide a long-distance mode for traveling to and from the City of Sisters. The Sisters Eagle Air Airport is a privately owned airport located within City limits. The airport property was annexed in 2014. It is classified as a category 4 airport in the Oregon Aviation Plan²², is open to the public, and has a landing fee. In addition, the runway is in good condition. On average, the airport operates twenty-seven times a week with a majority of use coming from general aviation. Other passenger and freight air transportation is available in Redmond at the Roberts Field Airport and in Bend at the Bend Municipal Airport. Both airports are approximately 25 miles away. No additional facilities are considered necessary within Sisters.

²² *Oregon Aviation Plan*, Oregon Department of Transportation Aeronautics Division, February 2000.



Chapter 9. Financing

Introduction

This chapter discusses funding sources available to the City of Sisters for financing the construction and maintenance of its transportation infrastructure improvements. The costs for the elements of the transportation system plan are outlined and compared to the potential revenue sources. Options are discussed regarding how costs and revenues can be balanced.

Current Funding Sources

The City of Sisters currently uses various funding sources to pay for the maintenance and construction of its transportation infrastructure. These sources include the Street Fund, the Urban Renewal Fund, and Street SDC Fund.

Street Fund

The City of Sisters Street Fund includes state and local funding sources. The principal state source is the State Highway Trust Fund, which is made up of various taxes and fees on fuel, vehicle licenses, and permits that are collected by the State of Oregon. A portion of the fund is dispersed annually to cities and counties throughout the state based on a formula that accounts for the relative population size and number of registered vehicles. By statute, the money received from the State Highway Trust Fund must be used for road-related expenses.

The City Street Fund also includes local funding sources, which include a \$.03/gallon local gas tax and other fees (including utility franchise, inspection, and street permit fees). This money is principally used for maintenance and operations. If needed, the Street Fund can also receive transfers in from the City of Sisters General Fund, which receives revenue primarily from property taxes, franchises, business licenses, state shared revenues, user charges, and any other miscellaneous taxes and fees imposed by the City at the direction of the City Council

The street fund currently has revenues of approximately \$665,000 per year. This includes both state and local funding sources. With the passage of the HB 2017, the City expects to receive approximately \$20,000 more revenue in 2018/19 fiscal year and \$7,500 more revenue per year until 2027. The City also estimates that on average, it expects its revenue to increase at a rate of approximately 3 percent per year. Based on these projections, the Street Fund will have brought in approximately \$7.5 million in revenue by the year 2030, most of which will be used for ongoing program and operational costs and not for new construction. A detailed breakdown of the anticipated revenue stream for the City is provided in Appendix R.



Urban Renewal District

An Urban Renewal District (URD) is a tax-funded district within the city. The URD is funded with the incremental increases in property taxes that result from the construction of applicable improvements, some of which may be transportation related. As desired, the funds raised by a URD can be used for, but are not limited to, transportation projects.

The City of Sisters created an URD for its downtown core in 2003. The primary purpose in creating the URD was to make Sisters' downtown area more pedestrian and bicycle friendly (goals established in the City's 2001 TSP). Four of the URD goals address the downtown transportation network:

- Strengthen downtown Sisters' role as the heart of the community
- Improve vehicular and pedestrian circulation through and within the downtown to accommodate both through traffic and downtown patrons
- Promote a mix of commercial and residential uses oriented to pedestrians
- Enhance the pedestrian environment on streets and in public parks, a town square, and other public gathering places

The plan envisioned that of the \$9.7 million authorized, approximately \$3.5 million would be spent on streetscape and parking improvements. Of this \$3.5 million, approximately \$1.1 million was used for the two applicable TSP action plan projects (i.e., the Cascade Avenue and Main Avenue streetscape improvements listed in the pedestrian action plan which have been completed). An additional \$170,000 is estimated to be available for the Adams Avenue Streetscape Improvements. Some of the urban renewal funds have already been used for the recent East Cascade Avenue realignment project at the intersection of East Cascade Avenue and Highway 20. This improvement has vastly improved the pedestrian environment on the east end of the downtown core and corrected the problematic five-legged intersection.

Transportation System Development Charges

Transportation System Development Charge (SDC) fees are a funding source collected from new development. While the methodologies for determining the charge may vary, a commonly used method is to use the estimated p.m. peak hour vehicle trips generated by a proposed development. The revenue raised can be used to fund projects that increase the transportation system's capacity but not for projects that target maintenance or operations. The City of Sisters' current SDC rate is \$1,016 per p.m. peak hour trip. By comparison, the SDC rate for Redmond is \$3,876 per p.m. peak hour trip and for Bend is \$4,928 per p.m. peak hour trip.

In the 2017/18 fiscal year, the Sisters Transportation SDC fund budget is approximately \$850,000. Based on an estimated growth²³ of 4,470 p.m. peak vehicle trip ends generated in Sisters through the year 2030, the City can expect to receive \$1.2 million in SDC revenues over

²³ The trip growth in Sisters was estimated based on land use forecasts for full urban growth boundary (UGB) build-out.



the next 12 years if they maintain their current SDC rate. This is approximately \$ 100,000 per year. Therefore, a total of \$ 2.050 million would be available through 2030.

Summary

Under the above funding programs, the City of Sisters is expected to collect approximately \$10.3 million for street construction and repair over the next 12 years (i.e., through 2030). This includes the starting SDC balance of approximately \$ 850,000. Table 9-1 lists the current transportation funding levels by source, including recent annual revenues and any unallocated balances or available funds from previous years.

Table 9-1: Estimated Transportation Revenues through 2030 (2018 Dollars)

Funding Source	Estimated Revenues (in \$1,000's)		
	2018 Balance	Annual Amount	22-Year Total
Street Fund	\$ 95	\$ 665	\$ 8,075
Urban Renewal District			\$ 170
System Development Charges ^a	\$ 850	\$ 100	\$ 2,050
Total Revenues through 2030 (2008 Dollars)			\$ 10,295

^a Based on 4,470 new future peak hour trips generated within the City, for a total of 9,610 PM peak hour trips (see Appendix I).

Transportation Costs

This section presents the costs expected to be incurred by the City of Sisters in order to fund transportation infrastructure construction and maintenance through the year 2030. The costs of the projects and programs that are on the Pedestrian Action Plan, Bicycle Action Plan, and Motor Vehicle Action Plan are included in the estimates because they have the highest short-term need for implementation and are likely to be funded. However, additional implementation actions will be required (e.g., updating the City's CIP and SDC) to allow these projects to be considered reasonably likely for the purposes of such as rezone studies that must comply with OAR 060. In addition, the costs of planning, operations, and maintenance are included in the estimates. All estimates are in 2018 dollars and are considered "planning level" versus "design level." Each cost will need further refinement as time advances and projects are pursued.

Action Plan Costs

Motor vehicle, pedestrian, and bicycle Action Plan cost estimates are listed in Table 9-1. These costs account for the physical construction of the projects. More detailed costs (by project) are given previously by mode in Chapters 5, 6, and 7 in conjunction with Master and Action Plan listings. All estimates are based on 2018 dollars.



City Planning, Operations, and Maintenance Costs

On-going planning, operation, and maintenance costs are incurred by the City of Sisters as City staff work on transportation related projects and as the associated materials and services are purchased by the City. These transportation costs play the important role of ensuring continued serviceability of the transportation system. The City divides these costs into three categories: roadway maintenance, materials & services, and personnel services.

Roadway maintenance helps to provide continued roadway pavement quality, and it is estimated that approximately \$150,000 per year would allow the City to stay up-do-date on its roadway maintenance needs. Materials and services include roadway maintenance, snow removal, street cleaning, contracted services, and other miscellaneous costs; these costs are estimated to total approximately \$280,000 per year. Capital Outlay costs for overlays and other capital projects are estimated at \$130,000 per year. Personal services include City staff labor on transportation related projects; these costs are estimated at approximately \$260,000 per year. Overall, the City expects to incur approximately \$670,000 per year (and approximately \$8.04 million through the year 2030) to pay for transportation network planning, operations, and maintenance. These costs are shown in Table 9-2.

Total Transportation Costs

Total transportation costs expected to be incurred by the City of Sisters through the year 2030 are listed in Table 9-2. The estimated \$30.3million for both capital projects and maintenance costs exceeds the expected revenue estimate of \$10.3 million through 2030. Alternative sources to address this funding deficit for are discussed in the next section.



Table 9-2: Estimated Transportation Costs through 2030 (2018 Dollars)

Transportation Element (by Project Type)	Estimated Cost (in \$1,000's)
Action Plan Projects	
Motor Vehicle	\$ 15,270
Pedestrian	\$ 3,768
Bicycle	\$ 3,176
Total Capital Projects	\$ 22,214
Planning, Operations, and Maintenance Programs and Services	
Materials & Services (\$ 280,000 per year)	\$ 3,360
Capital Outlay (\$130,000 per year)	\$ 1,560
Personal Services (\$260,000 per year)	\$ 3,120
Total Planning, Operations, and Maintenance Programs	\$ 8,040
Total Costs through 2030 (2018 Dollars)	\$ 30,254

New Funding Sources

The City of Sisters must incorporate new (or increase its existing) funding sources in order to construct all of the transportation improvement projects listed in the Motor Vehicle, Pedestrian, and Bicycle Action Plans and to provide transportation maintenance and operations services through the year 2030. It is important to develop a consensus in the community that supports needed transportation improvements. In most communities where time is taken to build a consensus regarding a transportation plan, funding sources can be developed to meet the needs of the community.

Any potential funding source is constrained based on a variety of factors, including the willingness of local leadership and the electorate to burden citizens and businesses, the availability of local funds to be dedicated or diverted to transportation issues from other competing City programs, and the availability and competitiveness of state and federal funds. Nonetheless, it is important for the City to consider all of its options and understand where its power may exist to provide and enhance funding for its Transportation programs.

This section describes several potential sources, including local taxes, fees, assessments, direct appropriations, grants, and debt financing. Many of these sources have been used in the past by other agencies in Oregon, and in most cases, these funding sources, when used collectively, are sufficient to fund transportation improvements for local communities.



ODOT Contribution

Projects on the State Highway System that are contained in the TSP are not normally considered “reasonably likely” to be funded projects until they are programmed into the Statewide Transportation Improvement Plan (STIP). As such, projects proposed in the TSP that are located on a State highway cannot normally be considered mitigation for future development or land use actions until they are programmed into the STIP. However, the unique solution to Highway 20 capacity needs in Sisters that utilizes an ODOT/City partnering in construction and funding significantly increases the likelihood of State funding of improvements. Therefore, this plan assumes that the Highway 20 improvements that complement the Alternate Route are reasonable for the purposes of meeting Transportation Planning Rule (TPR) requirements in the development of a TSP (see OAR 045); however, this should not be confused to mean this alternative is considered reasonably likely under OAR 060 for purposes such as rezone studies. Additional implementation steps will be required by ODOT (with City coordination) to pursue adding the Alternate Route improvements to ODOT’s STIP or to identify other funding sources.

Employment Taxes

Employment taxes may be levied to raise additional funds. For example, in the Portland region, payroll and self employment taxes are used to generate approximately \$145 million annually. The City of Portland has chosen to earmark these funds for TriMet transit operations.

Local Gas Taxes

A local gas tax is another funding option that is currently used. This tax was adopted by a public vote. It is a means by which the City’s transportation program costs can be spread out among the most users. This is especially due to the geography and political boundaries of Sisters where so many residents live outside the city limits and given the large amount of tourist and visitor travel in and through Sisters.

Street Utility Fee

Street utility fees are recurring monthly or bi-monthly charges that are paid by all residential, commercial, industrial, and institutional owners and tenants for use of the road infrastructure. The fees are typically charged proportionate with the amount of traffic generated and are billed through an existing City utility billing system (e.g. water bills). Establishing user fees to fund applicable transportation activities and/or capital construction ensures that those who create the demand for service pay for it proportionately. The street utility fee could be a backbone of the City’s operations and maintenance funding approach because it can provide a stable source of dedicated revenue useable for transportation system operations and maintenance and/or capital construction. A street utility fee can be formed by Council action and does not require a public vote, but is also subject to a referendum.



Exactions

Exactions are roadway and/or intersection improvements that are funded by developers as conditions of development approval. Typically, all developers are required to improve the roadways along their frontage upon site redevelopment. In addition, when a site develops or redevelops, the developer may be required to provide off-site improvements depending upon the expected level of traffic generation and the resulting impact to the transportation system.

Assessments

Assessments are another source of transportation funding and include a Local Improvement District (LID) and other special assessments.

Local Improvement District

The City may set up Local Improvement Districts (LIDs) to fund specific capital improvement projects within defined geographic areas, or zones, of benefit. LIDs impose assessments on properties within its boundaries and may only be spent on capital projects within the geographic area. Because LIDs may not fund ongoing maintenance costs, they require separate accounting. Furthermore, because citizens representing 33 percent of the assessment can terminate a LID and overturn the planned projects, LID projects and costs must meet with broad approval of those within the LID boundaries.

Special Assessments

A variety of special assessments are available in Oregon to defray costs of sidewalks, curbs, gutters, street lighting, parking, and central business district (CBD) or commercial zone transportation improvements. These assessments would likely fall within the Measure 50 limitations.

Direct Appropriations

The City can also seek direct appropriations from the State Legislature and/or U.S. Congress for transportation capital improvements. There may be projects identified in the Plan for which the City may want to pursue these special, one-time appropriations.

Grants

The City of Sisters should actively pursue state or federal grants in particular to complete pedestrian and bicycle projects that are in the TSP's Action Plan. Grant opportunities include funding for pedestrian, bicycle, Intelligent Transportation System (ITS), and safe routes to school improvements. Appendix Q describes in detail grant opportunities that should be considered by the City to implement pedestrian and bicycle improvements. The list of these grant opportunities includes:

- Federal Funding Sources
- Highway Safety Improvement Program
- Transportation Enhancements



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- Recreational Trails Program
 - Safe Routes to School (SR2S)
 - New Freedom Initiative
 - Community Development Block Grants
 - Land and Water Conservation Fund
 - Transportation, Community and System Preservation Program
 - State Funding Sources
 - Oregon Transportation Infrastructure Bank
 - Oregon Special Transportation Fund
 - Oregon Bicycle and Pedestrian Program Grants
 - Oregon Pedestrian Safety Mini-Grant Program
 - Oregon Business Energy Tax Credits (BETC)
 - American Greenways Program
 - Bikes Belong Grant Program

Statewide Transportation Improvement Fund (STIF)

Oregon House Bill 2017 established a dedicated funding source for expanding transportation service in Oregon, referred to as the STIF. Funds from this program will be distributed to counties, but cities, such as Sisters, will be eligible to receive funding to improve public transportation options.

Debt Financing

While not a direct funding source, debt financing is another funding method. Through debt financing, the immediate impacts of significant capital improvement projects can be mitigated and project costs can be spread over the projects' useful lives. Though interest costs are incurred, the use of debt financing can serve not only as a practical means of funding major improvements, but is also viewed as an equitable funding source, spreading the burden of repayment over existing and future customers who will benefit from the projects. One caution in relying on debt service is that a funding source must still be identified to fulfill annual repayment obligations.

Two methods of debt financing are voter-approved general obligation bonds and revenue bonds.

Voter-Approved General Obligation Bonds

Subject to voter approval, the City can issue General Obligation (GO) bonds to debt finance capital improvement projects. GO bonds are backed by the increased taxing authority of the City, and the annual principal and interest repayment is funded through a new, voter-approved assessment on property throughout the City (i.e., a property tax increase). Depending on the critical nature of projects identified in the Transportation Plan and the willingness of the electorate to accept increased taxation for transportation improvements, voter-approved GO bonds may be a feasible funding option for specific projects. Proceeds may not be used for ongoing maintenance.



Revenue Bonds

Revenue bonds are debt instruments secured by rate revenue. In order for the City to issue revenue bonds for transportation projects, it would need to identify a stable source of ongoing rate funding. Interest costs for revenue bonds are slightly higher than for general obligation bonds due to the perceived stability offered by the “full faith and credit” of a jurisdiction.

Recommended New Sources

In order to fund the transportation projects on the Motor Vehicle, Pedestrian, and Bicycle Action Plans as well as ongoing operations and maintenance—and if the City desires to achieve its financial management goals of having the Street Fund self-sustaining—new revenue sources for transportation must be found.

It is recommended that the City consider updating its transportation SDC to cover the new City funded capital projects identified in the TSP. This would help to ensure that local growth pays its fair share of new transportation facilities that are required to serve this planned development.

In addition, the City should actively pursue grants and other special program funding in order to mitigate the costs to its citizens of transportation capital construction. Rate revenues are another option and can secure revenue bond debt if used to finance capital improvements. Developer exactions may also be considered as a funding mechanism for roadway improvements that are located along the frontage of a site where there is a potential for development or redevelopment.

The additional revenues raised from these recommended sources are shown in Appendix R. The total revenue raised would be expected to generate sufficient resources to fully fund the capital improvement projects listed in the Motor Vehicle, Pedestrian, and Bicycle Action Plans.



Chapter 10. Implementation

Introduction

This chapter will discuss the implementation plan for this Sisters Transportation Systems Plan (TSP). It will be completed at a future time by City of Sisters staff in conjunction with the code development process. On May 14, 2015, City Council approved revisions to this document which eliminates all policy references to back in diagonal parking.