Transportation System Plan

Sherman County Transportation System Plan

Sherman County, Oregon

Draft

August 2015

Transportation System Plan

Sherman County Transportation System Plan

Sherman County, Oregon

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PREFACE

The progress of this plan was guided by the Project Management Team (PMT) and the Project Advisory Committee (PAC). The PMT and PAC members are identified below, along with members of the consultant team. The PAC members devoted a substantial amount of time and effort to the development of the Sherman County Transportation System Plan (TSP), and their participation was instrumental in the development of this document. The Consultant Team and PMT believe that Sherman County's future transportation system will be better because of their commitment.

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Section 1
Introduction

INTRODUCTION

The Sherman County Transportation System Plan (TSP) documents the County, Cities, and ODOT's priority projects, policies, and programs that are to be carried forward for funding and implementation over the next 20 years. The TSP builds consensus among the Cities within Sherman County, the County, and ODOT on the transportation needs and priority projects for the communities, and is based on input from local citizens, stakeholders, staff, and appointed and elected City and County officials. The TSP is intended to be flexible to respond to changing community needs and revenue sources over the next 20 years and will be updated approximately every 10 years.

The previous TSP was developed in 2003. Since 2003, time, growth, and development patterns altered the County's forward vision. The following information provides context and illustrates the challenges, opportunities, and needs tied to the County's evolving transportation system:

- The incorporated cities of Rufus, Wasco, Moro, and Grass Valley completed the majority of the project lists identified in the 2003 TSP. In addition, revised zoning ordinances are not reflected in the 2003 TSP.
- The County has prioritized building livable, connected communities. This TSP Update includes strategies that promote accessibility and connectivity to preserve the local character of the Cities, including:
    - Networks that provide safe and more comfortable access for pedestrians and bicyclists to and from residential areas, schools, and downtown.
    - Balancing freight capacity and community accessibility and safety associated with the designated freight routes that bisect downtown neighborhoods and central business districts. The movement of freight is important to the County, as is providing safe, livable, and vibrant transportation corridors.
    - Revisions to the Cities' street development standards. The standards identified in the 2003 TSP, in particular, the "skinny street" residential standards have not been successfully implemented in Sherman County communities.
- Since the adoption of the 2003 TSP, land use patterns have changed within the County and Cities that requires planned transportation system projects, policies, and programs to support the emerging trends. Based on the recent declining population, the County and Cities would like to facilitate economic development to attract new residents to Sherman

County. Towards this effort, the following actions have occurred prior to publication of the TSP:

- The City of Rufus has developed a 60-acre industrial area that is shovel-ready within convenient access to I-84.
- The County is home to a growing wind turbine industry. The ability to transport turbines for both installation and servicing is central to the development of this industry.
- Two new residential developments in the County have been developed. These two subdivisions, one in Rufus and one in Wasco, are the first residential developments in over 40 years in the County. At the time of this TSP Update, the Wasco development had a few constructed homes, but no construction had moved forward in the Rufus subdivision. In addition, an existing residential subdivision on the west side of Wasco had available lots in addition to these new developments.

- The four Cities are widely dispersed and rely on a sizable and remote system of roadways for safe and effective travel. A number of these roadways are aging and could benefit from widened roadbeds, minimized grades, straightened curves, snow fencing, offset intersection/junction realignment, and/or bridge upgrades. These improvements address the basic transportation needs of these communities and their industries. Enhancement and preservation projects such as these would also bolster the system of the emergency routes available in the event of a natural disaster and school bus routes transporting the students.

TSP DEVELOPMENT PROCESS

The TSP was developed through a process that identified transportation needs, developed and analyzed potential alternative approaches for addressing those needs, and developed projects, programs, pilot projects, policies, and future studies as well as a finance plan that best address Sherman County's forecasted needs. The following steps were involved in the process:

- Reviewing state, regional, and local transportation plans and policies that the Sherman County TSP must either comply with or be consistent with.
- Providing public open houses to provide project information to, and gather feedback from, the public at key points during the TSP development process, establishing project advisory committees, and developing transportation plan goals and objectives.
- Identifying a detailed inventory of existing transportation facilities and services.
- Evaluating current transportation operations and deficiencies.
- Evaluating transportation needs in the 2035 forecast year with expected growth and without any additional transportation improvements beyond those already funded.
- Identifying and evaluating improvement alternatives intended to address Sherman County's future transportation needs.
- Developing a prioritized set of projects, programs, pilot projects, policies, and future studies that meet the plan goals and objectives.

- Estimating the revenue available for transportation projects through the year 2035 assuming reduced; however, relatively consistent transportation funding.
- Compiling the results of this work into this TSP document.
- Reviewing and adopting the TSP by the Sherman County Planning Commission and County Court, as well as the Wasco, Rufus, Moro, and Grass Valley Planning Commissions and City Councils.

PUBLIC INVOLVEMENT

The planning process was guided by a Project Advisory Committee (PAC) comprised of key stakeholder agencies and other community representatives. These included the Sherman County Planning Department, the Sherman County Roadmaster, the City of Moro, the City of Rufus, the City of Wasco, the City of Grass Valley, the Oregon Department of Transportation, the Oregon Department of Land Conservation and Development, Emergency Services, the Sherman County Sheriff Department, and other major employers in the County.

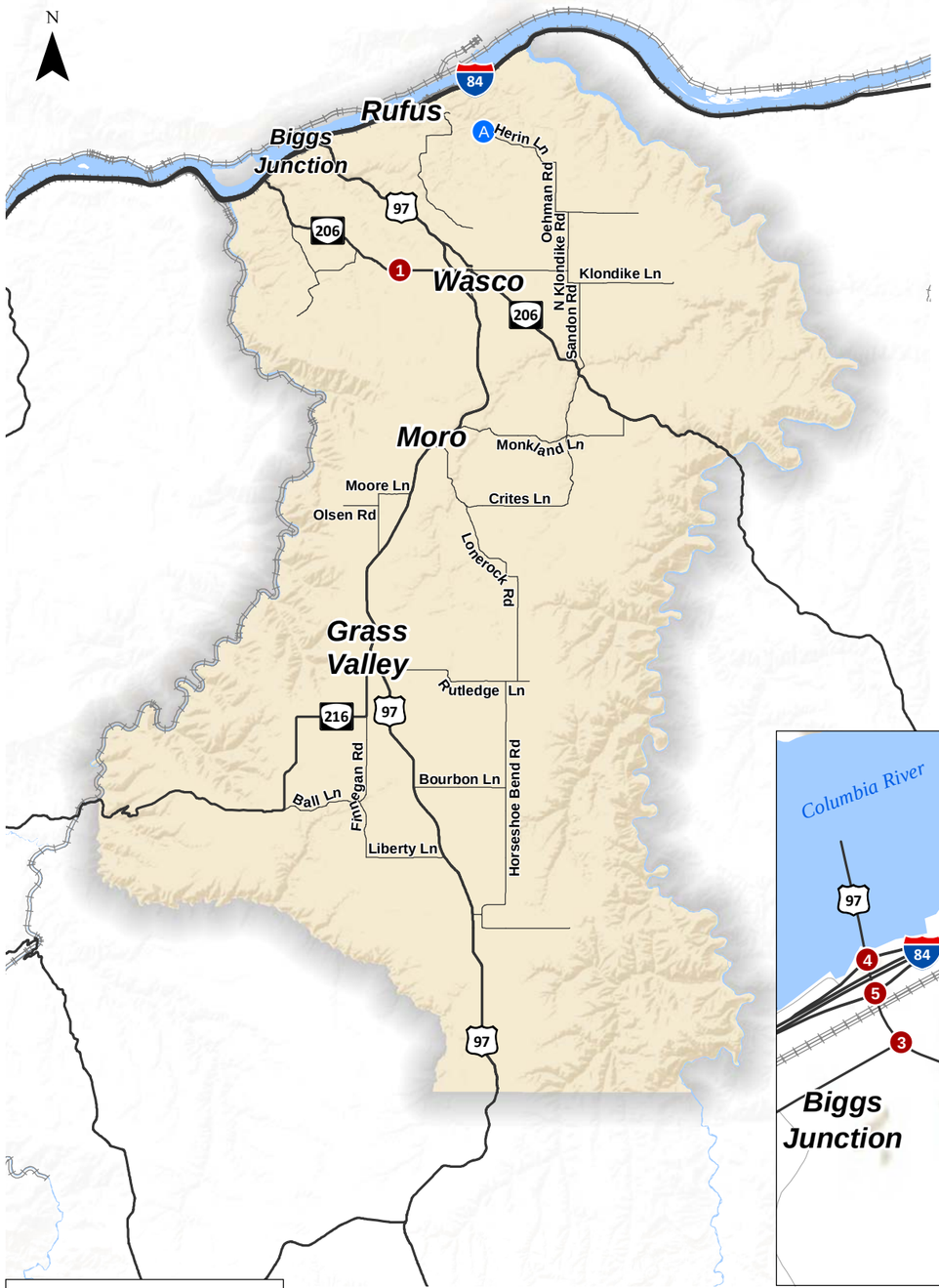
The PAC was responsible for reviewing the technical aspects of the TSP. The PAC reviewed several memoranda and convened at a total of three PAC meetings during the process of developing the TSP. The PAC meetings focused on all aspects of the TSP development including the review and presentation of existing deficiencies and forecast needs; alternative development; a preferred transportation and funding plan; and, recommended code amendments.

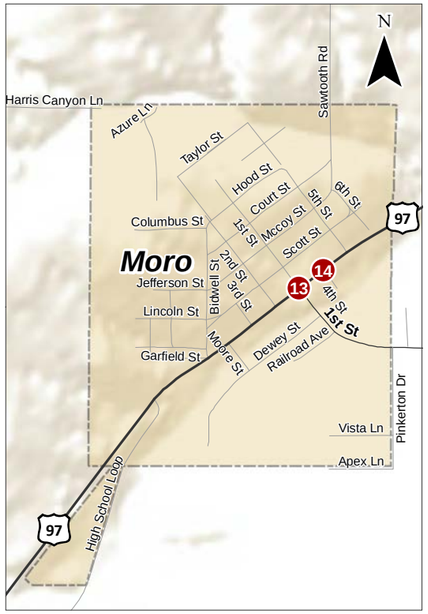
In addition to the established advisory committees, two public meetings were held at key junctures in the process to obtain public comment regarding transportation concerns, future transportation improvement projects, programs, pilot projects, policies, and future studies, and respective priorities of these plan elements. These meetings were held in the City of Moro. All comments were addressed in the alternatives analysis and final plan development. Finally, the draft plans were presented and discussed with the City Planning Commissions and Councils and the County Planning Commission and Court at public hearings.

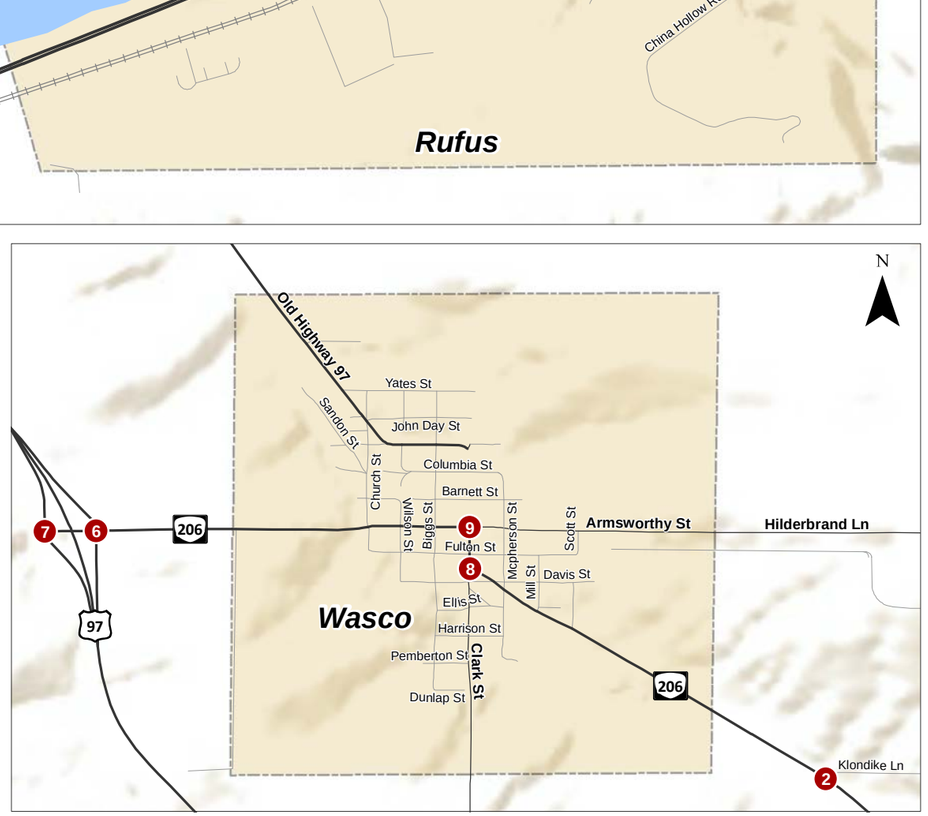
PLAN STUDY AREA

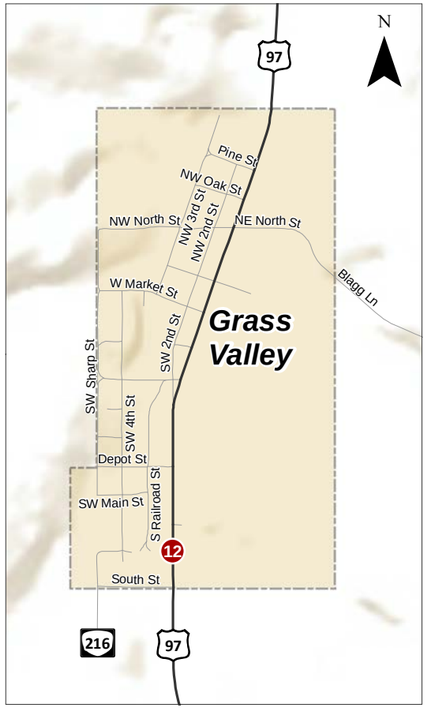
Sherman County is located in north-central Oregon and includes an area of 831 square miles. Figure 1-1 shows a map of Sherman County, including the boundaries of each incorporated city.

Based on the requirements of the Transportation Planning Rule, the study of County roadways and intersections is generally limited to those with the highest classifications – collectors and arterials – as well as state highways. However, local street issues such as street connectivity, design standards, and safety are also discussed where appropriate.









Study Area
Sherman County, Oregon

Figure
1-1

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KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County, Oregon Department of Transportation

TSP ORGANIZATION AND METHODOLOGY

Sherman County's TSP is based on review of local and statewide plans and policies that guide land use and transportation planning. The plan and policy review is presented in **Section 2**. Goals and objectives for the TSP, as developed in collaboration with the Project Advisory Committee (PAC), are presented in **Section 3.**

An inventory of the existing transportation system documented all major transportation-related facilities and services within the County. The transportation system inventory allowed for an objective assessment of the current system's operational performance, safety, and general function, which is summarized in **Section 4**.

Section 5 of this report details the anticipated long-term (year 2035) future transportation needs.

The preferred plan was based on transportation needs and alternative analysis summarized in **Section 6**. Transportation needs were identified based on system analysis and additional comments received from the PAC, City staff, County staff, Sherman County residents, and ODOT representatives.

Having identified a set of alternatives, the next phase of the planning process involved presenting and refining the individual elements of the TSP through a series of decisions and recommendations leading to the preferred plan. The preferred plan identified in **Section 7** includes a roadway plan and a pedestrian and bicycle plan, as well as plans for other transportation modes serving Sherman County.

Section 8 provides an analysis and summary of the alternative funding sources to finance the identified transportation system projects, programs, pilot projects, policies, and future studies. **Section 9** includes the recommended changes to development ordinances and local codes to achieve compliance with the Oregon Transportation Planning Rule (OAR 660 Division 12).

Sections 1 through 9 comprise Volume 1 of the TSP and provide the key elements of the plan. These are supplemented by Technical Appendices in Volume 2 which contains the technical memoranda documenting the existing conditions analysis, forecast needs, and alternatives analysis.

Section 2
Plans, Policies, and Standards Review

PLANS, POLICIES, AND STANDARDS REVIEW

One of the project objectives of the TSP Update is to provide consistency between the County's TSP and local, state, and federal transportation policies and standards. To meet these objectives, a review and evaluation of existing plans, policies, standards, and laws that are relevant to the TSP update was conducted. Detailed information from this review, including a complete list of the documents reviewed, can be found in Technical Memorandum #1 located in Volume 2 of the Technical Appendix.

The summary of federal, state, regional, and local documents as they relate to transportation planning in Sherman County, provided the policy framework for the TSP planning process. State documents and requirements were summarized as they applied to the Sherman County TSP, as were applicable local city policies and regulations that had potential impacts on the County transportation system.

Given the prominence of the Cities of Rufus, Wasco, Moro, and Grass Valley, a number of local documents were also reviewed for applicable policies that could have impacts to the Sherman County TSP. Reviewed documents included the 2007 Comprehensive Plan Updates for all four cities and the Wasco State Airport Layout Plan (2002).

This review of plans and policies identified the following key elements of the 2003 TSP that were updated to remain consistent with current State, County, and City plans and policies.

- Updated strategies to reduce reliance on any single travel mode (provide mode choice), facilitate movement of goods and people, develop a system hierarchy for orderly and efficient multimodal travel, and preserve and protect streets and highways for their intended function.
- Assessed and updated system inventory for all modes of travel, including capacity, access, and physical condition.
- Incorporated Safe Routes to School program recommendations, and identified new sidewalk and bike lane connections between pedestrian attractions such as parks and trails.
- Identified enhancements completed since the 2003 TSP and investments in engineering, education, enforcement, and emergency medical services to improve safety for all transportation system users.
- Classified roadways to reflect their purpose and balance between mobility and access.
- Addressed current revenue projections and responded to the need for a financially-constrained system.
- Identified gaps and needs, and the associated improvements to the transportation system to accommodate growth through 2035.
- Identified opportunities to improve freight mobility, consistent with the Oregon Freight Plan.
- Documented public transportation services available to residents that support the goals of the Public Transportation Plan.
- Accounted for revisions to the Oregon State Rail Plan.
- Included analysis that supports the Transportation Safety Action Plan (TSAP) Emphasis Areas, and identify performance goals consistent with the Oregon TSAP.

- Incorporated the amendments to OAR 734-051 through the adoption of Senate Bills 264 and 408 when establishing revised street design guidelines.

Section 3
Goals and Objectives

GOALS AND OBJECTIVES

The goals and objectives presented in this section guided the development of the Transportation System Plan in Sherman County. The goals relate to: Mobility and Connectivity; Multimodal Users; Safety; Environment; and, Planning and Funding. Objectives for each goal area are also provided, which identify the course of action intended to achieve each goal.

GOAL 1: MOBILITY AND CONNECTIVITY

Promote a transportation system within the County that links all four cities and serves existing and future needs for transporting goods and people throughout the County and within each City.

Objectives

- Accommodate developing or undeveloped areas without undermining the rural nature of the county by prioritizing maintenance, operations, management, and service improvements rather than large capital improvements.
- Maintain linkages between the dispersed cities of Moro, Wasco, Grass Valley, and Rufus by promoting:
    - an integrated system of principal highways that move goods and people throughout the County and connects to adjoining Counties,
    - a County road system that facilitates transportation between various areas of the County and between principal highways, and
    - a local road system that serves as access to commercial and residential areas.
- Preserve the function, operation, capacity, level of service, and safety of state highways and local roads in a manner consistent with adopted State and local plans.
- Balance truck freight on US 97 with automobile needs by providing adequate passing and climbing lanes, expanded pull out areas, and shoulders.
- Provide roadway cross section standards to balance the needs of all users and the primary purpose of the roadway. The County recognizes that automobiles will continue to be the primary mode of transportation between cities, given the rural nature of the County.
- Improve traffic circulation within the four cities, while maintaining the local character of each community.

- Balance local community and state goals for segments of US 97, OR 206, and OR 216that run through the Cities, by providing alternative solutions that preserve the function of the highway while addressing the needs of downtown businesses (access and visibility). Provide a transportation system that supports future industrial, commercial, and residential growth areas.
- Retain countywide school bus service.
- Provide roadway performance standards that support the efficient movement of people, goods, commodities, and commercial waste.
- Provide policies and standards that address street connectivity, spacing, and access management.
- Establish proper right-of-ways needed for new roads identified in the TSP.

GOAL 2: ECONOMIC DEVELOPMENT

Provide a transportation system that supports existing industry and encourages economic development in the County.

Objectives

- Develop and promote a multi-modal transportation network that supports the existing agriculture and wind turbine industries and supports economic diversification in the future.
- Identify the 20-year transportation system needs to accommodate developing or undeveloped areas without undermining the rural nature of the county.
- Promote railroad and waterway freight service when possible, and upgrade highways to intermodal terminals.
- Improve and maintain the key freight routes of US 97 and I-84.
- Identify truck routes to focus truck traffic to a limited number of roads in urban areas.
- Support connections to major agricultural distribution facilities in Biggs and Moro.
- Support truck access to industrial sites, including turn and acceleration/deceleration lanes where appropriate and improvements to the Biggs Junction Interchange with I-84.
- Retain and promote rail freight service along I-84 in a manner consistent with the Oregon Transportation Plan (OTP) and Oregon Rail Freight Plan.
- Ensure that the Wasco State Airport is adequately served by the transportation system and that the transportation system supports surrounding land uses at the airport.
- Protect the Wasco State Airport from the encroachment of incompatible land uses to ensure efficient aviation operations and to minimize the noise and safety problems for the general public in a manner consistent with the Oregon Aviation Plan.

- Actively encourage the development of enterprises and commerce in the Port at Biggs Junction.
    - Maintain travel times for the movement of freight through the corridor to port facilities.
    - Support improvements to access and intermodal connections to port facilities.
- Encourage bicycle tourism by promoting and upgrading recreational routes through the County.

GOAL 3: SAFETY

Provide a transportation system that promotes the safety of current and future travel modes for all users.

Objectives

- Promote a transportation system that facilitates the use of state highways for safe and efficient travel but also provides safe, livable, and vibrant multimodal corridors in the downtown neighborhoods and central business districts.
- Ensure that roadways are designed, constructed, and maintained to an appropriate standard for their expected use, vehicle speeds, and vehicle traffic.
- Reduce incidence and severity of motor vehicle crashes.
- Provide a transportation system that allows for adequate emergency vehicle access to all land uses.
- Provide access management and roadway cross-section standards for all county roads.

GOAL 4: MULTIMODAL USERS

Provide a multimodal transportation system that permits the safe and efficient transport of people and goods through active modes.

Objectives

- Promote alternative modes, transit/dial-a-ride service, and rideshare/carpool programs that reduce reliance on the automobile through community awareness and education.
- Increase the use of alternative modes of transportation (walking, bicycling, rideshare/carpooling, and dial-a-ride transit) through improved access, safety, and service within urban areas and rural service centers within the County.

- Encourage development to occur within existing urban areas and rural service centers where services are presently available to reduce the dependence on automotive transportation.
- Comply with the Americans with Disabilities Act.
- Promote an interconnected network of bicycle, pedestrian, and transit facilities throughout the County.
- Encourage active transportation to and from schools, downtown areas, grocery stores, government buildings, and healthcare facilities.
- Maximum connectivity between bicycle, pedestrian, transit, and vehicle routes and facilities, securing an intermodal network of safety and access for all types of users.
- Support maintenance of State highways as bicycle routes, with use of local parallel routes as alternative routes where feasible.
- Emphasize shoulder maintenance (surfacing, cleaning, vegetation removal), particularly in the peak summer cycling months.
- Support widening shoulders as for bicycle travel as part of roadway preservation and improvement projects or as separate projects.
- Provide pedestrian facilities that connect residential areas with important destinations such as parks, schools, commercial areas, and community buildings.
- Encourage development of connected sidewalk systems in commercial areas, and along arterials, and major and minor collectors within urban areas.
- Ensure that adequate services are provided for the transportation disadvantaged.
- Support the development of regional public transit opportunities.
- Provide paratransit, dial-a-ride service to all residents within the county matched to the availability of financial resources.

GOAL 5: ENVIRONMENT

Provide a transportation system that balances transportation services with the need to protect the environment.

Objectives

- Develop a multi-modal transportation system that avoids reliance upon one form of transportation as well as minimizes energy consumptions and air quality impacts.
- Encourage development patterns that decrease reliance on motor vehicles within cities.
- Provide design standards that support acquiring only the minimum right of way necessary for the roadway, including facilities for all users for the roadway classification.

- Provide a list of upgrades to transportation facilities that are consistent with the adopted Oregon Transportation Plan (OTP), the Oregon Highway Plan (OHP), and the Transportation Planning Rule (TPR), and ensure that valuable soil, water, scenic, historic, and cultural resources are not damaged or impaired.
- Comply with all applicable state and federal noise, air, water, and land quality regulations.
- Design all transportation improvements to preserve and enhance natural and scenic resources (i.e., new roads should not be constructed in areas identified as sensitive wildlife areas).

GOAL 6: PLANNING AND FUNDING

Maintain the safety, physical integrity, and function of the County's multi-modal transportation network, consistent with Goal 6 of the OTP. None of the cities in Sherman County contain a population of 2,500 or more; therefore, specific city transportation financing programs are not required as provided in OAR 660-12-0040.

Objectives

- Maintain long-term funding stability for transportation maintenance projects.
- Incorporate new innovative funding sources for transportation improvements.
- Ensure that the existing transportation network is conserved and enhanced through maintenance and preservation.
- Identify interim, short-term, and long-term transportation solutions that will encourage development within the existing city boundaries.
- Identify areas where refinement plans or interim measures would increase the life of a facility or delay the need for improvements.
- Continue and enhance relationships and improve coordination among Sherman County, ODOT, the Federal Highway Administration (FHWA), and local jurisdictions.
    - Cooperate with ODOT in the implementation of the Statewide Transportation Improvement Program (STIP);
    - Encourage the improvement of state highways;
    - Establish cooperative road improvement programs, funding alternatives, and schedules with local jurisdictions;
    - Establish the right-of-way needed from the County and Cities for new roads identified in the TSP;
    - Leverage federal and state highway funding programs; and
    - Encourage citizen involvement in identifying and solving local issues.

Section 4
Existing 2015 Transportation Conditions

EXISTING 2015 TRANSPORTATION CONDITIONS

Sherman County's transportation system provides facilities serving many different modes of transportation. This section documents the existing system, including the following modes:

- Streets and Highways(auto/truck)
- Pedestrian and Bicycle
- Public Transit
- Rail
- Marine
- Air
- Pipeline and Transmission System

STREET AND HIGHWAY SYSTEM

Sherman County is served by Interstate 84 (I-84), four state highways, and a network of arterials, collectors, and local streets maintained by the County. Primary roadway facilities, their characteristics, and existing operational performance are summarized below.

System Overview

Roadways within Sherman County fall under the jurisdiction of the state (ODOT), the County, or local cities. The following sections describe the jurisdiction and characteristics of the streets and highways.

State Highways

The state facilities within Sherman County provide interstate, statewide, and regional connectivity. These facilities include Interstate 84 (I-84), US Highway 97 (US 97), Oregon Highway 206 (OR 206), Oregon Highway 216 (OR 216), and Biggs-Rufus Highway. The state facilities serve all four cities in Sherman County. I-84 provides access to Rufus, Biggs-Rufus Highway provides alternate access to Rufus, US 97 provides a connection to Wasco and passes through Moro and Grass Valley, OR 216 connects Grass Valley with Highway 197 to the West, and OR 206 connects Wasco with Gilliam County to the east.

County Roadways

The County has jurisdiction over 127 roads that cover approximately 471 miles. Approximately 26.5 percent of these are paved, 62 percent are gravel, and 11.5 percent are dirt roads. The roads are

typically two lanes wide. Paved roads typically have two 12-foot travel lanes with two-foot gravel shoulders. Gravel roads are typically 20 feet wide.

Street System Characteristics

The State, County, and City roadways are categorized based on functional classification, which is based on the road's purpose and use characteristics. Volume 2 of the Technical Appendix summarizes the existing functional classification, roadway design standards, and access management standards based on the 2003 TSP. **Section 7** of this document summarizes the current functional classification, roadway design standards, and access management standards for each facility.

Street System Traffic Analysis

The focus of this section is to report the existing traffic operations for study intersections and roadway segments identified for the TSP update. The sub-sections below present information on the traffic count data used in the evaluation, the analysis methodology applied, the operational standards used to assess the results, and the traffic operations results for the study intersections. Technical Memorandum #3 located in Volume 2 of the Technical Appendix contains the traffic count data obtained from ODOT and used in the analysis, the Methodology Memorandum documenting the analysis method applied, and the existing conditions traffic operations and queuing analysis worksheets.

Analysis Methodology and Performance Standards

All operations analysis described in this report were performed in accordance with the procedures in the *2010 Highway Capacity Manual* (Reference 2).

Per the Methodology Memorandum and the ODOT *Analysis Procedures Manual* (APM) (Reference 3), intersection operational evaluations were conducted based on the peak 15-minute flow rate observed during the weekday peak hour. Using the peak 15-minute flow rate ensures this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are likely to occur for 15 minutes out of each average weekday peak hour. The transportation system will likely operate under conditions better than those described in this report during other typical time periods.

The operational results for study intersections and segments were compared with their corresponding mobility targets, summarized in Table 4-1 and Table 4-2, to assess performance and identify potential

areas for improvement. Sherman County does not have operational standards for roadway facilities. ODOT operational targets are identified in the Oregon Highway Plan (OHP, Reference 1) and are summarized below for the state highways within the County.

Table 4-1. Volume to Capacity Ratio Targets for Peak Hour Operation Conditions

Route Name	Facility Extents	Facility Designation	Inside UGB			Outside UGB	
			Non-STAs where posted speed <= 35 mph	Non-STAs where speed > 35 mph but <45 mph	Where speed limit >= 45 mph	Unincorporated Communities	Rural Lands
Interstate 84	Entire Section within County Limits	Interstate	N/A	N/A	0.80	0.70	**0.70**
	Rufus City Limits	Interstate	N/A	N/A	**0.80**	0.70	0.70
US 97 *(Freight Route)*	Outside City Limits	Statewide Highway	0.85	0.80	**0.80**	0.70	0.70
	Moro	Statewide Highway	**0.85**	**0.80**	**0.80**	0.70	0.70
	Grass Valley	Statewide Highway	**0.85**	**0.80**	**0.80**	0.70	0.70
	Biggs Junction & Kent (Unincorporated Communities)	Statewide Highway	0.85	0.80	0.80	**0.70**	0.70
OR 206	Outside of Wasco City Limits, East of Wasco	Regional Highway	0.90	0.85	**0.85**	0.75	0.70
	Within Wasco City Limits, East of Clark Road	Regional Highway	**0.90**	**0.85**	**0.85**	0.75	0.70
	Within Wasco City Limits, West of Clark Road	District Highway	**0.95**	**0.90**	**0.90**	0.80	0.75
	Outside Wasco City Limits, West of Wasco	District Highway	0.95	0.90	**0.90**	0.80	0.75
OR 216	Within Grass Valley City Limits	District Highway	**0.95**	0.90	0.90	0.80	0.75
	Outside of Grass Valley City Limits		0.95	0.90	**0.90**	0.80	0.75
Biggs – Rufus Highway	OR 206 to Biggs Junction	District Highway	**0.95**	**0.90**	**0.90**	0.80	0.75

Source: OHP, Table 6, modified for relevance

Table 4-2. Intersection Performance Standards

ID	Intersection Name	Location	Jurisdiction	Type of Intersection Control*	Performance Standard (v/c ratio)**
1	Van Gilder Rd / OR 206	Wasco	ODOT	TWSC	0.80 (OR 206)
2	Klondike / OR 206	Wasco	ODOT	TWSC	0.75 (OR 206)
3	Biggs-Rufus Hwy / US 97	Biggs Junction	ODOT	TWSC	0.70 for all approaches
4	I-84 WB / US 97	Biggs Junction	ODOT	TWSC	0.70 for all approaches
5	I-84 EB / US 97	Biggs Junction	ODOT	TWSC	0.70 for all approaches
6	OR 206 / US 97 NB	Wasco	ODOT	TWSC	0.75 for OR 206 approaches, 0.70 for US 97 approaches
7	OR 206 / US 97 SB	Wasco	ODOT	TWSC	0.75 for OR 206 approaches, 0.70 for US 97 approaches
8	Clark St / OR 206/Old Wasco-Heppner Hwy	Wasco	ODOT	TWSC	0.90 for EB (OR 206) approach; 0.85 for NB and SB approaches (OR 206)
9	Clark St / OR 206	Wasco	ODOT	TWSC	0.85 for WB approach; 0.85 for SB approach
10	I-84 WB / John Day Dam Rd	Rufus	ODOT	TWSC	0.70 for I-84 ramp approaches
11	I-84 EB / John Day Dam Rd	Rufus	ODOT	TWSC	0.70 for I-84 ramp approaches
12	Krusow St / OR 216	Grass Valley	ODOT	TWSC	0.90 for OR 216 approach; 0.80 for US 97 approaches
13	Lone Rock Rd / US 97	Moro	ODOT	TWSC	0.85 for US 97 approaches
14	4th St / US 97	Moro	ODOT	TWSC	0.85 for US 97 approaches

*TWSC = Two-way stop-controlled intersection

** v/c = volume-to-capacity ratio

Traffic Volumes

The following sub-sections discuss the weekday peak hour traffic volume development and the seasonal adjustment factor used to adjust the 2014 traffic counts.

Roadway Segment Hourly Traffic Profiles

Two study segments were identified throughout the County. Traffic volumes were collected for 48 hours between Tuesday October 21, 2014 and Thursday, October 23, 2014. These traffic volumes were used to conduct capacity analysis to determine how the facility operates under peak hour conditions. No vehicle classification information was collected during these counts. In addition, they were used to

illustrate the demand profile of the roadway by the time of day. Appendix D in Technical Memorandum #3, located in Volume 2 of the Technical Appendix, summarizes the hourly traffic volume profiles for the two roadway segments studied. Based on these counts, the hour with the highest traffic volume was identified as the peak hour for that facility. Two-lane highway capacity analysis was conducted for each roadway segment based on the peak hour traffic volumes. Table 4-3 summarizes the peak hour, traffic volumes, and volume-to-capacity ratio for each study segment. Although the County does not have operational targets for County facilities, the peak hour analysis reveals that all of the roadways currently operate below the roadway's capacity.

Table 4-3. Existing Roadway Segment Operations Analysis

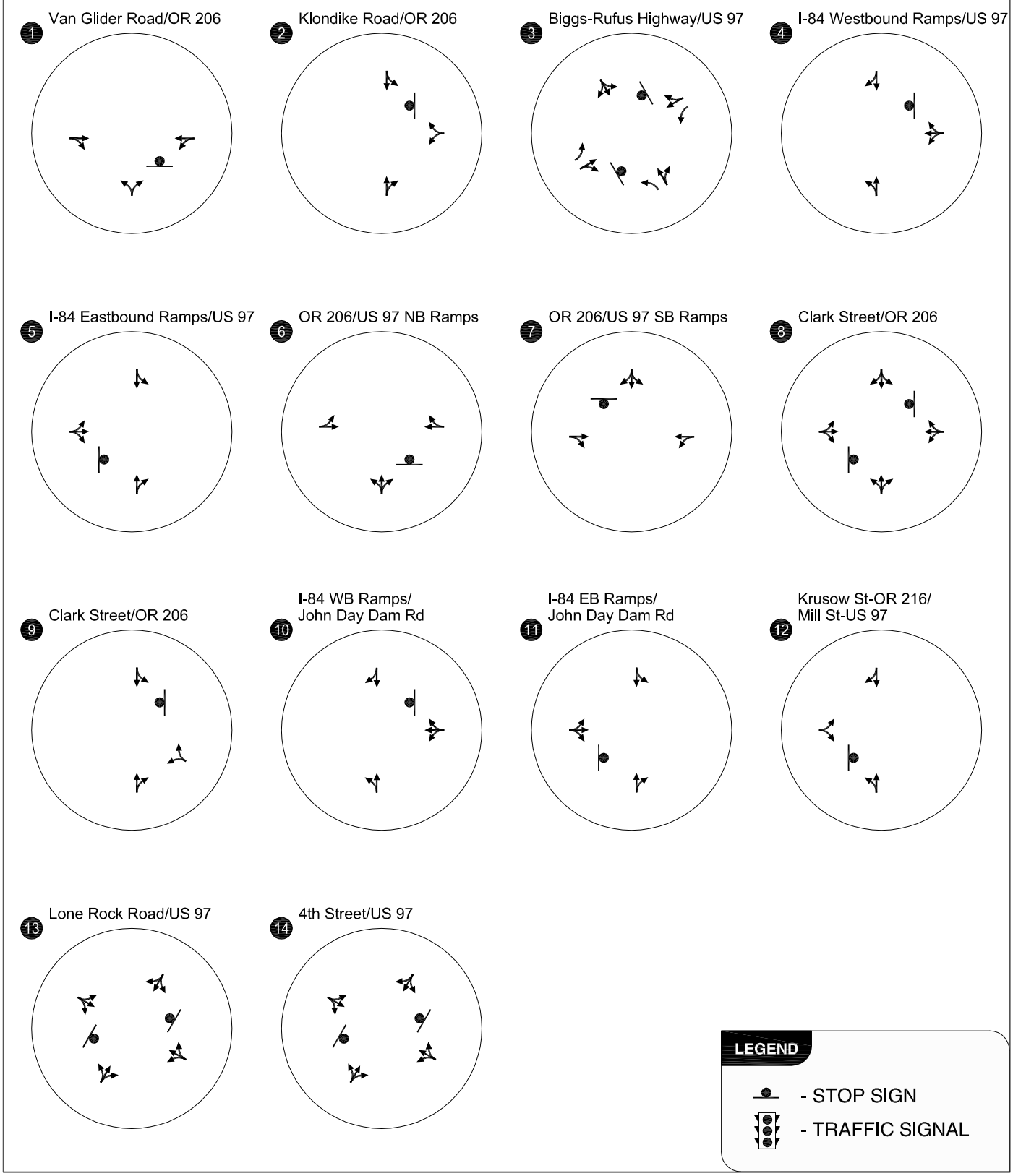
ID	Roadway	ADT from 2014 Traffic Counts	Peak Hour Time Period	Seasonally-Adjusted Peak Hour Count	PHF*	Two-Way Demand Flow	Critical Flow Rate	Units	Calculated V/C Ratio
A	Herin Lane, East of Scott Canyon Road	90	6:00 - 7:00 a.m.	16	0.67	26	3200	pc/h	0.0079
B	Main Street, South of 1st Street in Rufus	558	4:45 – 5:45 PM	58	0.83	74	3200	pc/h	0.0230

*PHF = peak hour factor

Weekday Peak Hour Volume Development for Intersections

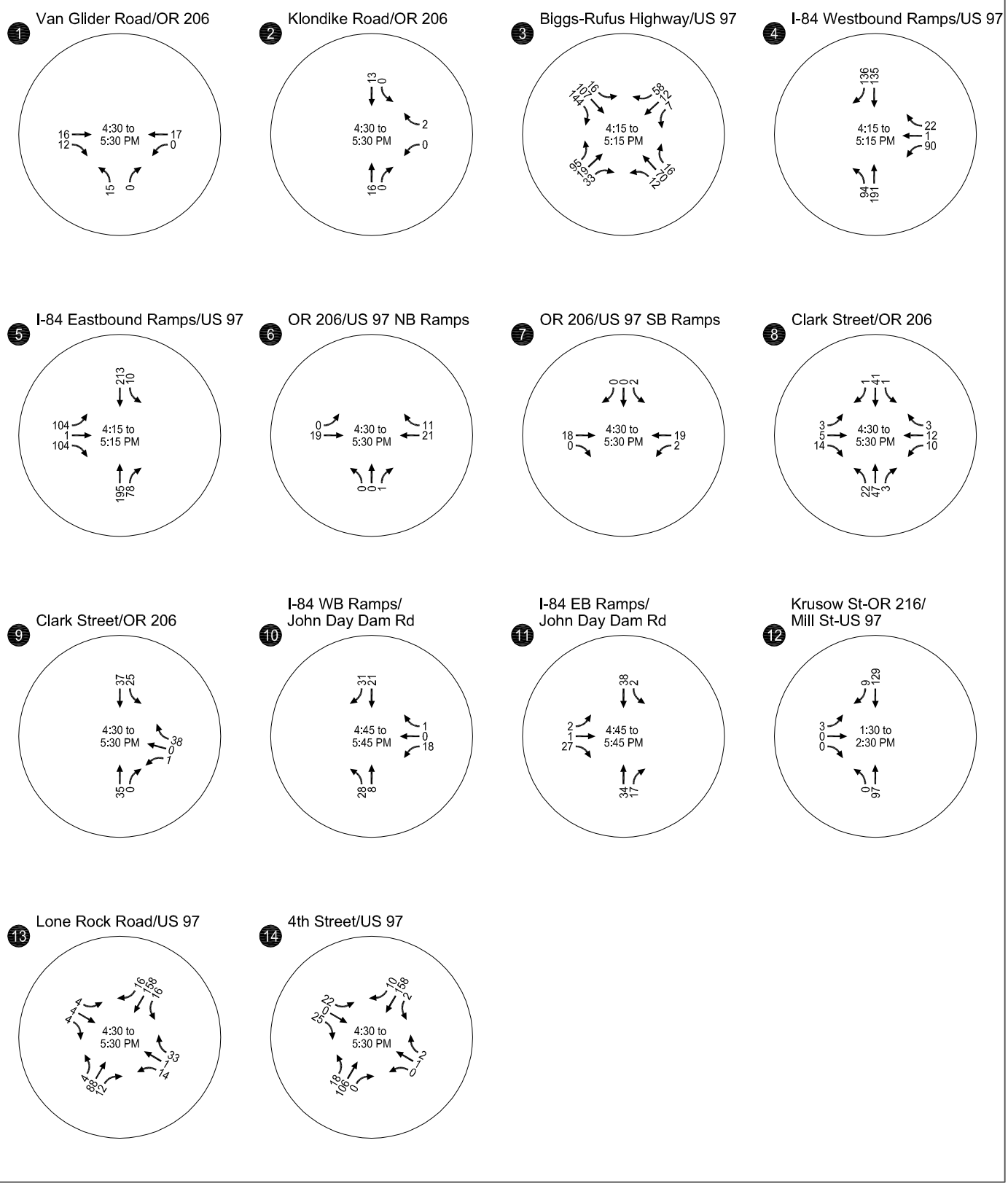
Traffic counts at the fourteen study intersections were completed on Tuesday, October 21, 2014 between the hours of 5:00 a.m. and 9:00 p.m. Traffic volumes typically peak during the evening commute period, between 4:00 and 6:00 p.m. However, traffic counts at the study intersections revealed that the peak hours for some of the study intersections occurred midday or during the afternoon, due to the rural nature of the County. Based on these counts, the peak hour and peak 15-minute period within each peak hour were identified for each intersection. System-wide peak hours were developed for each community rather than using a system-wide peak hour for the entire County due to the long distances between study intersections.

As summarized in the Methodology Memo, traffic volumes were adjusted to reflect seasonal fluctuation in traffic patterns. Figure 4-1 shows the existing intersection traffic control and lane configurations. Figure 4-1 summarizes the existing peak hour traffic volumes after seasonal adjustments were applied and the peak hour time period for each intersection.



Existing Lane Configurations and Traffic Control Devices
Sherman County, Oregon

Figure **4-1**



Existing Traffic Volumes and Peak Hours
Sherman County, Oregon

Figure **4-2**

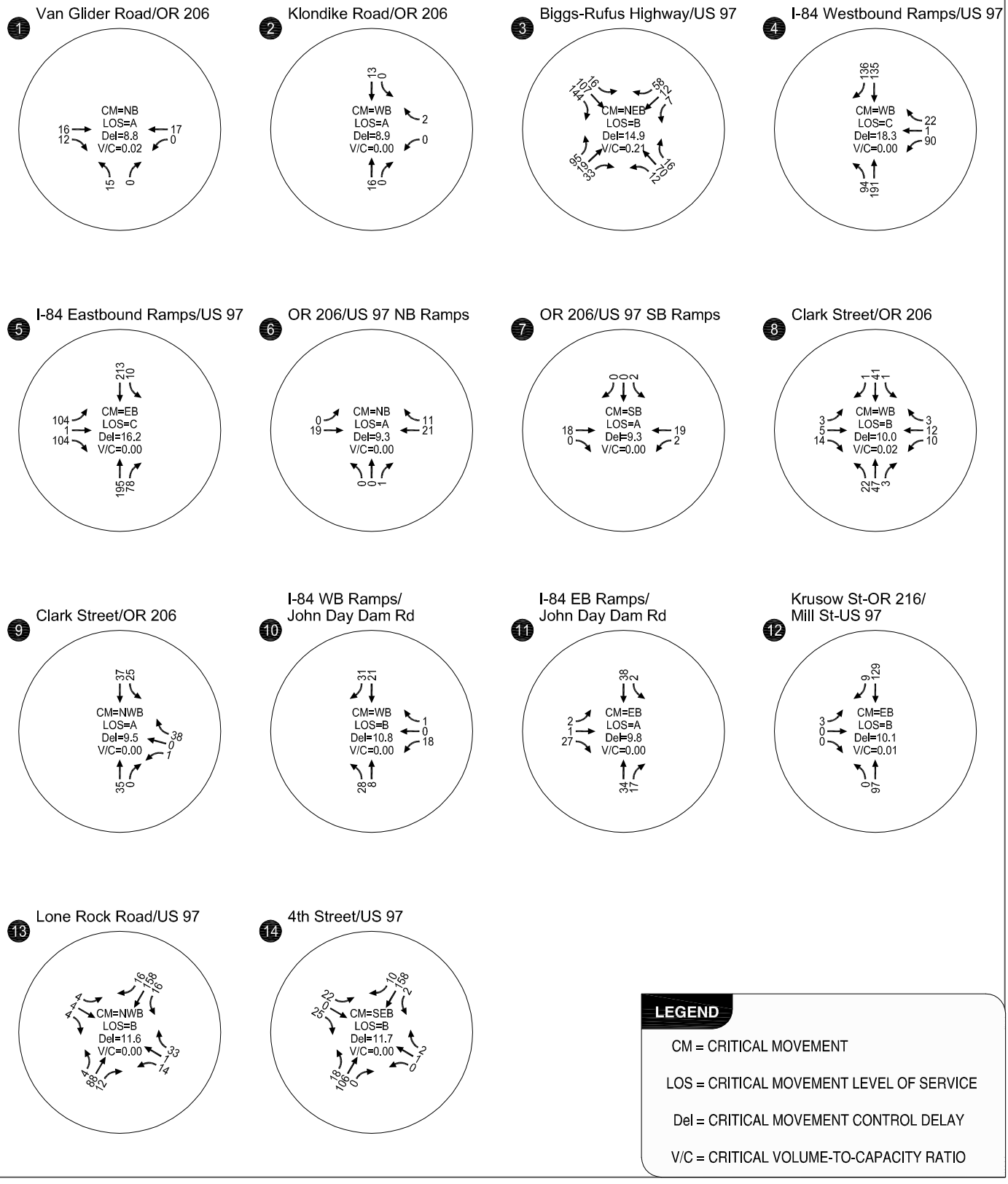
Intersection Traffic Operations Analysis Results

Level-of-service (LOS), volume-to-capacity (v/c) ratios, average delay, and 95th percentile queue lengths were calculated for each of the study intersections identified for the Sherman County TSP update. Queue lengths were calculated using ODOT's Two-Way Stop-Controlled method, and the remaining analysis were conducted using 2010 HCM methods with Vistro software. Table 4-4 summarizes the results of this analysis as well as whether the corresponding operational targets for the study intersections are met. Figure 4-3 summarizes the turning movement volumes and resulting operations at each intersection. As shown in the table, all fourteen study intersections currently operate acceptably. The 95th percentile queue lengths reflect the maximum queue length expected during the peak 15 minutes. The 95th percentile queue lengths do not exceed two vehicles in length at all study intersections.

Table 4-4. Existing Conditions Intersection Operational Analysis Results

ID	Name	Critical Movement	V/C Ratio	LOS	Delay (sec)	95th % Queue (# vehicles)	Performance Standard Met
1	Van Gilder/OR 206	NBL	0.021	A	8.8	1	Yes
2	Klondike Rd/OR 206	WBL	0.000	A	8.9	1	Yes
3	Biggs-Rufus Hwy/US 97	NEBL	0.211	B	14.9	1	Yes
4	I-84 WB/US 97	WBT	0.003	C	18.3	2	Yes
5	I-84 EB/US 97	EBT	0.002	C	16.2	2	Yes
6	OR 206/US 97 NB	NBT	0.000	A	9.3	1	Yes
7	OR 206/US 97 SB	SBT	0.000	A	9.3	1	Yes
8	Clark St/OR 206/Old Wasco-Heppner Hwy	WBT	0.018	B	10.0	1	Yes
9	Clark St/OR 206	NWBL	0.001	A	9.5	1	Yes
10	I-84 WB/John Day Dam Road	WBT	0.000	B	10.8	1	Yes
11	I-84 EB/John Day Dam Road	EBT	0.001	A	9.8	1	Yes
12	Krusow St/OR 216/Mill St/ US 97	EBL	0.006	B	10.1	1	Yes
13	Lonerock Rd/US 97	NWBT	0.002	B	11.7	1	Yes
14	4th St/US 97	SEBT	0.000	B	11.7	1	Yes

v/c = volume-to-capacity

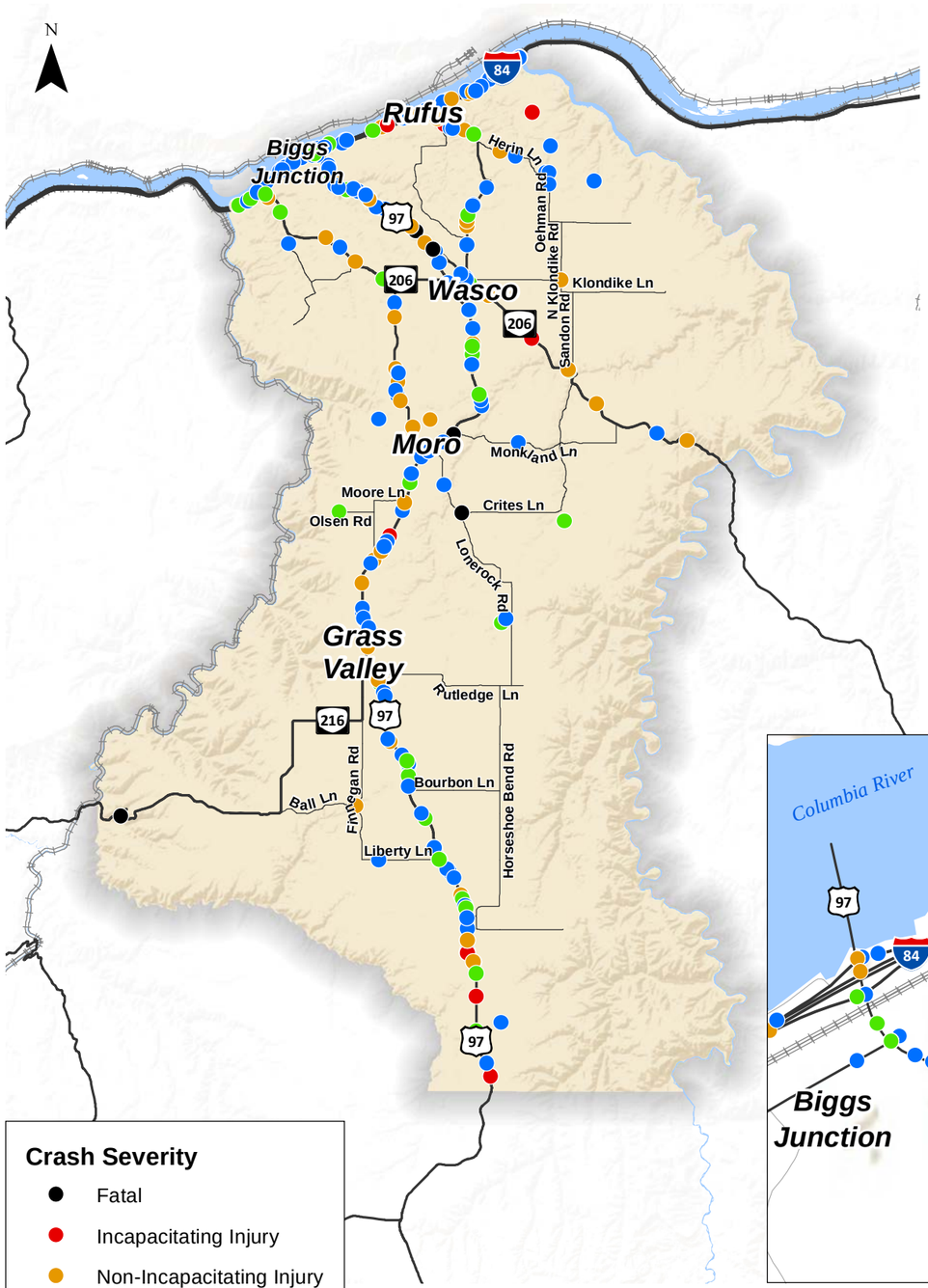


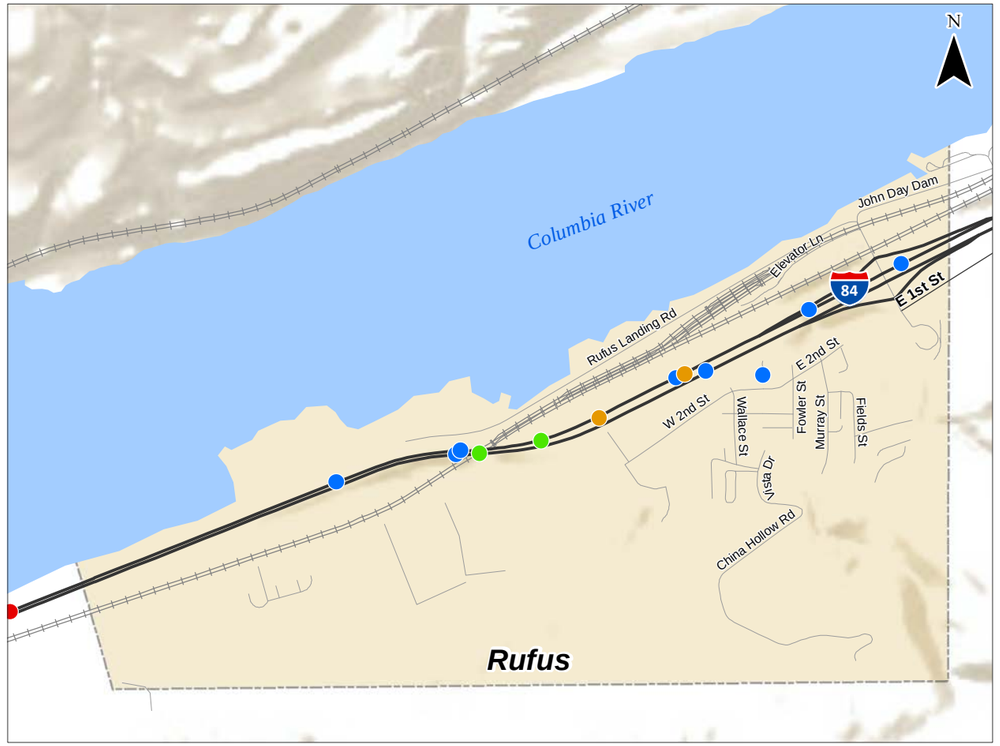
Existing Traffic Operations Analysis Results
Sherman County, Oregon

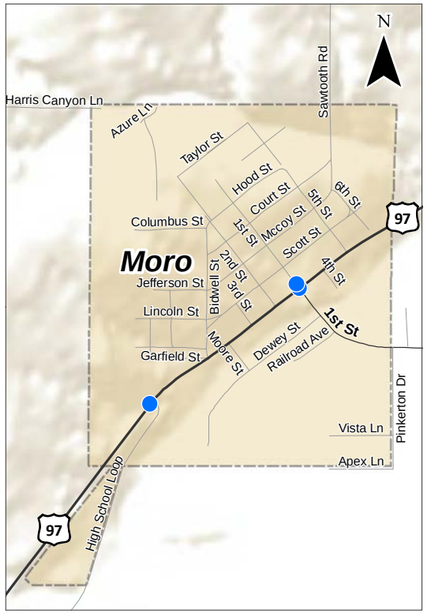
Figure **4-3**

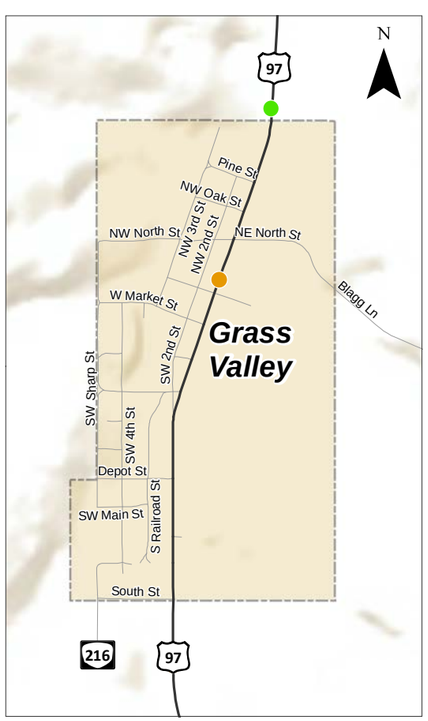
HISTORIC CRASH ANALYSIS

Crash data from the latest five years (January 1, 2009 through December 31, 2013) was obtained from ODOT for all roadways within Sherman County. Figure 4-4 illustrates reported crash locations throughout the County. As shown in Figure 4-4, the majority of reported crashes are located along state highways, particularly US 97 and I-84. Crash data is provided in Technical Memorandum #3 in Volume 2 of the Technical Appendix.









Crash Severity

- Fatal
- Incapacitating Injury
- Non-Incapacitating Injury
- Possible Injury
- Property Damage Only

Reported Crashes (2009 - 2013)
Sherman County, Oregon

Figure **4-4**

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Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County, Oregon Department of Transportation

County Crash Patterns

A total of 334 crashes were reported in Sherman County between 2009 and 2013. Just over 22% of the crashes (75 crashes) occurred on I-84 in the County. Of the 259 crashes that occurred on non-interstate facilities, 173 crashes (52%) occurred on other rural principal arterials, 12 crashes (4%) occurred on rural minor arterials, 40 crashes (12%) occurred on rural major collectors, 12 crashes (4%) occurred on rural minor collectors, and 22 crashes (7%) occurred on rural local streets or roads.

Table 4-5 summarizes the reported crashes by severity. Almost half of the reported crashes involved an injury, with 13 crashes resulting in an incapacitating injury and eight crashes resulting in a fatality. The severe injury crashes were located throughout the County on the interstate, state highways, and County and local roads. Exhibit 4-1 shows the number of crashes reported by month and severity.

Table 4-5. Reported Crashes by Severity in Sherman County (2009 – 2013)

	Crash Severity					
	Fatal	Injury A	Injury B	Injury C	PDO	Total
Number of Reported Crashes	8	13	67	61	185	334
Percentage of Total Crashes	2.4%	3.9%	20.0%	18.3%	55.4%	100%

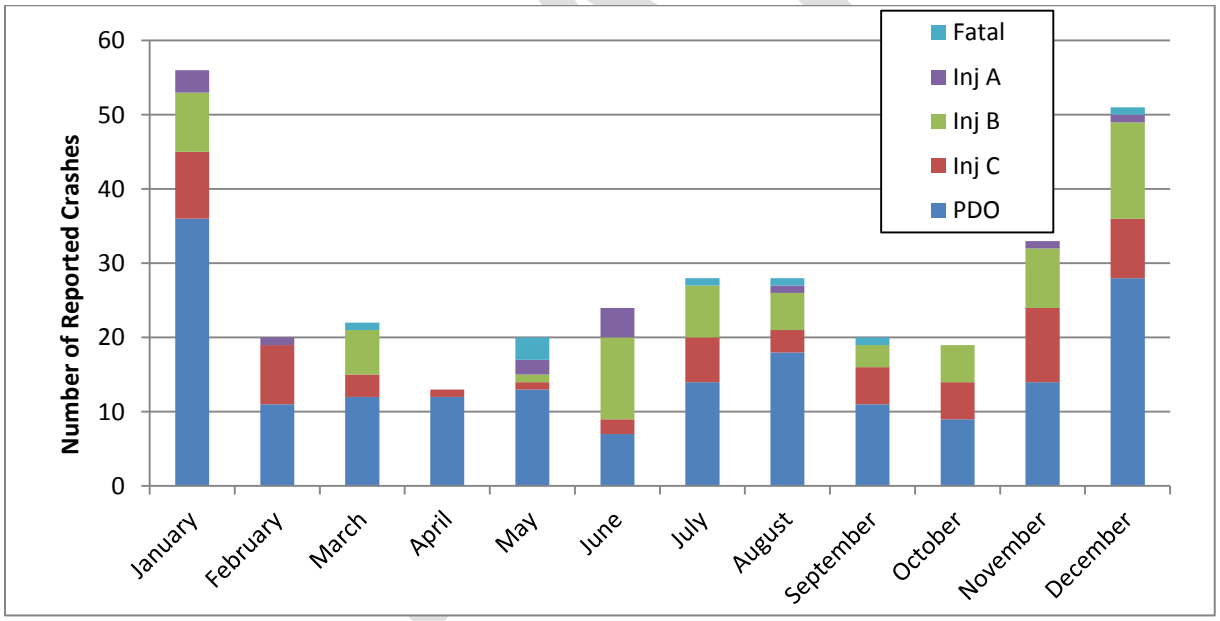


Exhibit 4-1. Reported Crashes by Month (2009-2013)

As shown in Exhibit 4-1, the highest crash frequency occurred during winter months, from November through January. Winter months in Sherman County can include inclement weather conditions producing wet, icy, and/or snowy conditions. Further review of crashes in November, December, and January (140 crashes) indicate that 73% (102 crashes) occurred on roadway surfaces that were wet, icy, or snow-covered.

Other key trends observed in Sherman County included:

- Fixed object crashes: Over the study period, approximately 65% of crashes (217 crashes) were reported as fixed object or non-collision crashes.
- Speed: The most commonly reported crash cause (40% of crashes) was drivers traveling at speeds too fast for conditions.
- Dark light conditions: Approximately 36% (121 crashes) occurred in dark, dawn, or dusk lighting conditions.

Intersection and Segment Crash Analysis

Study intersections and segments were analyzed individually and compared to statewide averages for similar facilities, when possible*. Technical Memorandum 3 in Volume 2 of the Technical Appendices summarizes the analysis.* Based on the results of the crash analysis at study intersections and study segments, the following locations were identified for further review:

- Van Gilder Road / OR 206: This intersection is a 3-leg, two-way stop-controlled intersection with no turn lanes present. It is located just east of the City of Wasco. One crash occurred during the five-year study period, and no injuries were reported with the crash. According to crash reports, it was a turning movement crash that involved a piece of farm equipment as one of the vehicles. The high crash rate at this intersection was due to the low traffic volumes rather than a crash pattern.
- Biggs – Rufus Highway / US 97: This intersection is currently a 4-leg, two-way stop-controlled intersection with left-turn lanes present on three legs. The intersection is adjacent to a Pilot Center gas station and truck rest area. There were 23 crashes at this intersection, resulting in a crash rate of 2.275 crashes per million entering vehicles (MEV), which is substantially higher than the 90th percentile crash rate of 1.08 crashes per MEV. The majority of these crashes, as shown in 0, were turning movement or angle crashes. Nineteen of the 23 crashes occurred during daylight conditions. At least 11 of the 23 crashes involved large trucks. Among these crashes, the most commonly reported crash level cause was “did not yield right-of-way,” which accounted for 19 of the crashes. A traffic signal is expected to open at this intersection in the summer of 2015 and is expected to help reduce the crash frequency.
- Four crashes were reported on the Herin Lane segment during the five-year study period, resulting in a crash rate for the Herin Lane segment that is above state average. Further review of the four crashes on Herin Lane showed that two of the crashes were fixed object crashes and two were reported as non-collision crashes. Two crashes occurred during dark light conditions on icy roadways, and two occurred during the daylight in clear weather. Three of the crashes

were property-damage only crashes, and one resulted in a non-incapacitating injury. Herin Lane exhibits characteristics of a typical County road segment and was identified due to low traffic volume which resulted in a higher crash rate. The segment will be evaluated through the systemic safety process in Section 7.

Statewide Priority Index System (SPIS)

ODOT developed the Safety Priority Index System (SPIS) to identify and prioritize sites where countermeasures could be implemented to potentially reduce the number of crashes. No segments or intersections within Sherman County were identified in the top ten percent of the 2014, 2013, and 2012 SPIS lists (which use crash data from 2011 to 2013, 2010 to 2012, and 2009 to 2011, respectively).

Observed Safety Issues

The issues described above document safety needs based on crash data. Observations of conditions from the Consultant Team and Project Advisory Committee highlighted other safety concerns or issues that may not have a documented crash history but may have roadway designs that are associated with a perceived safety issue. These issues were reviewed as part of the TSP process and are summarized below.

- Crashes frequently occur on US 97 between Grass Valley and Kent, especially during inclement weather.
- Traffic speeds and truck volumes are perceived to be high in locations where highways travel through towns.
- Many of the side streets lack deceleration lanes and/or turn lanes on US 97.
- The lack of adequate passing lanes on US 97 leads to driver impatience and unsafe passing maneuvers.

PEDESTRIAN SYSTEM

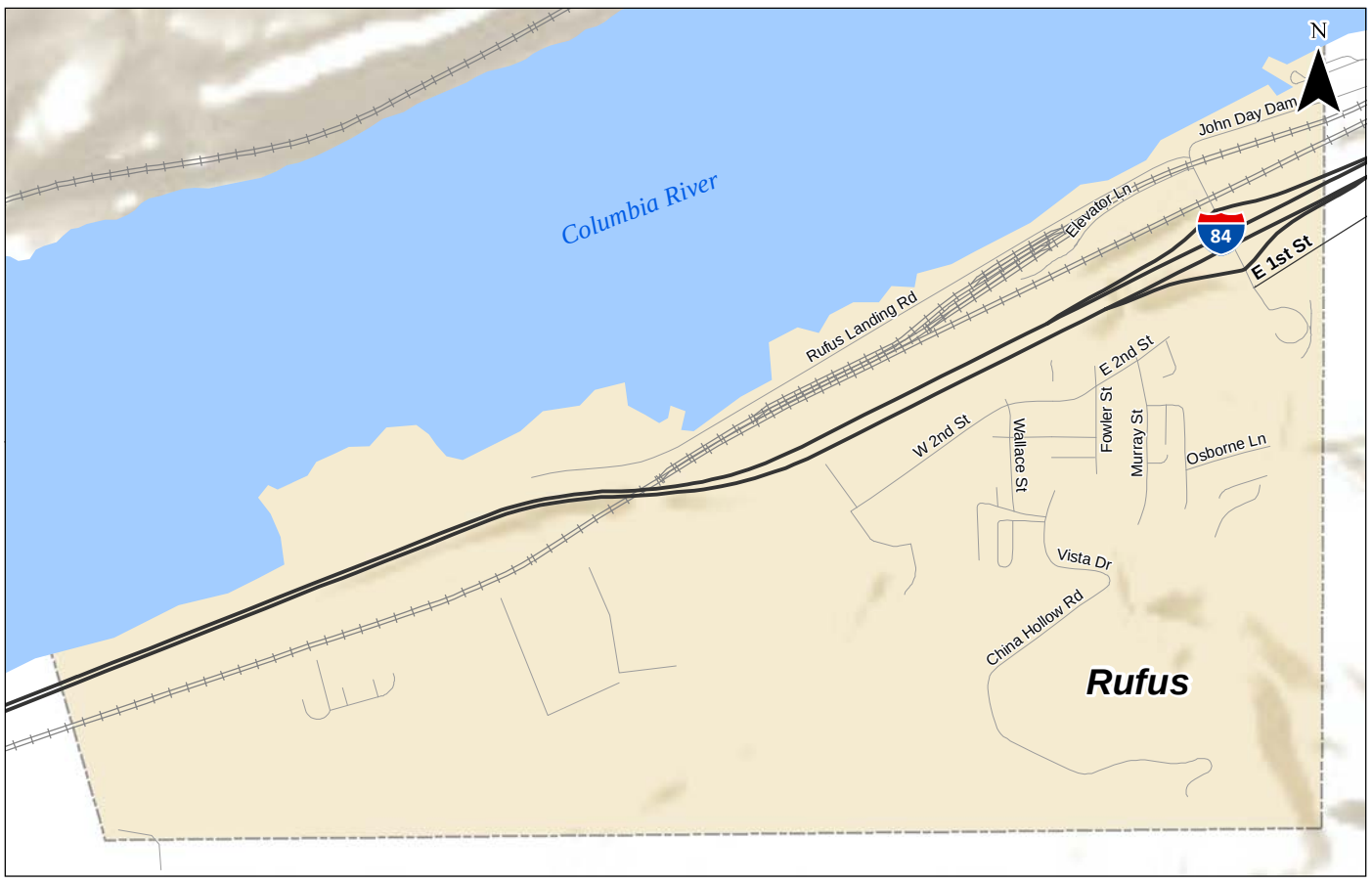
The pedestrian system in the Cities within Sherman County is summarized in Figure 4-5. The inventory was completed based on maps from the 2003 TSP, a list of projects provided by the County that summarizes new sidewalks or treatments completed since the last TSP update, and a review of Google Earth imagery.

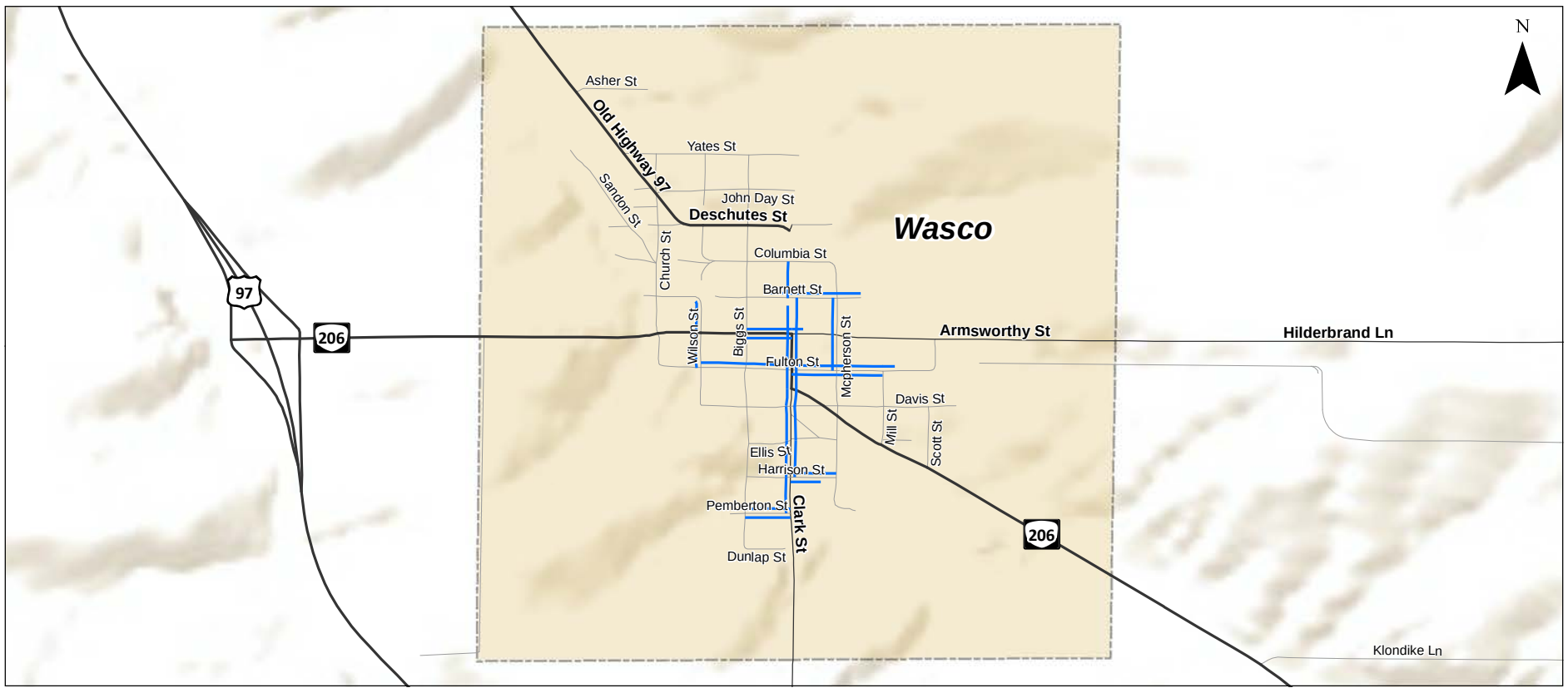
The pedestrian facilities inventory map shows the location of existing sidewalks within the Cities of Wasco, Moro, and Grass Valley. No sidewalks are located within the City of Rufus. With the exception of new sidewalks in Moro and Grass Valley along US 97, the sidewalks in the County are generally in poor condition or of narrow width. In Wasco, sidewalks are primarily located along Clark Street, Fulton Street, and OR 206 west of Clark Street. In Moro, sidewalks extend along the majority of US 97 and

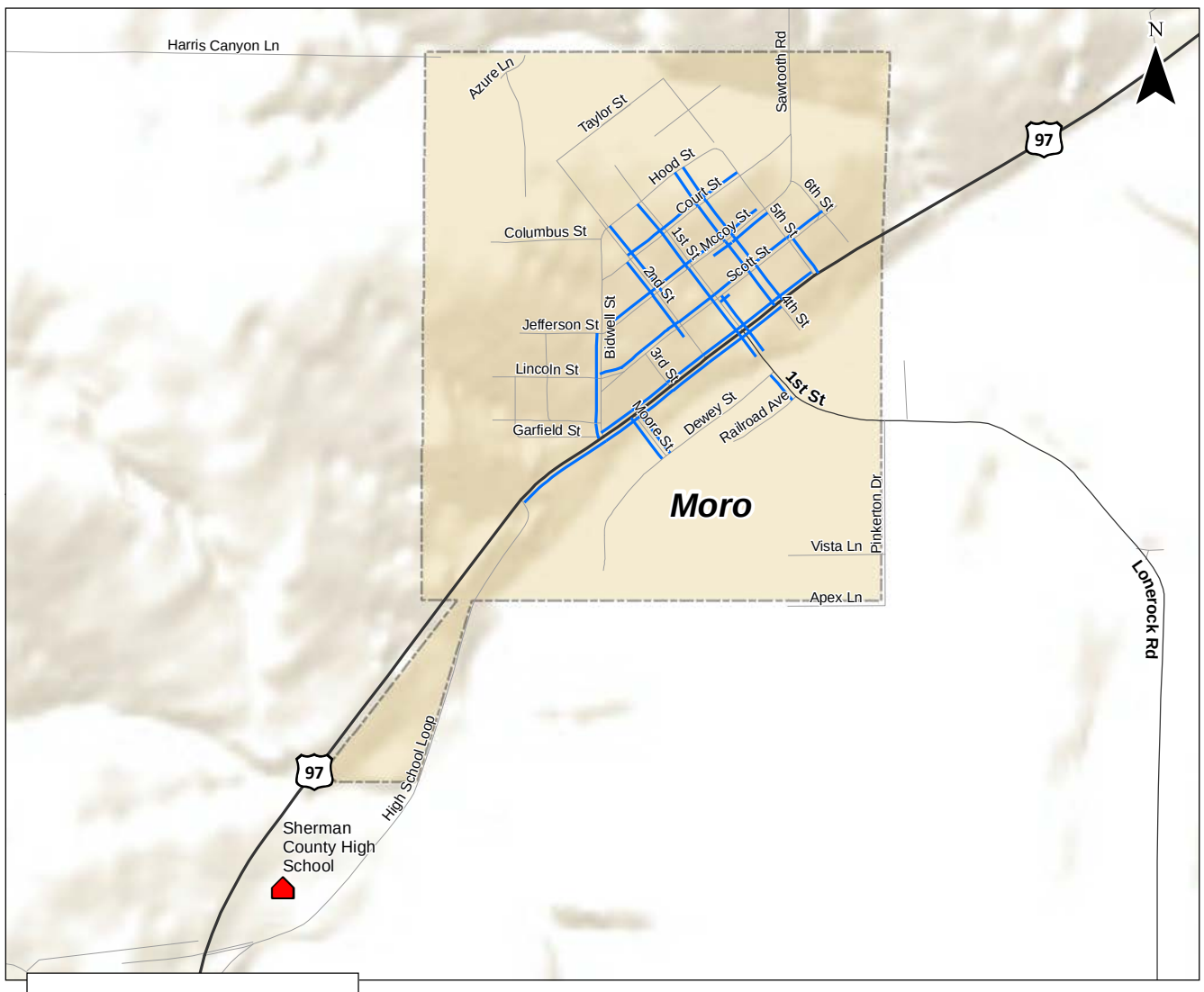
many of the connecting streets. In Grass Valley, sidewalks are located along the northern section of US 97 through the City, but they do not extend far off of the highway.

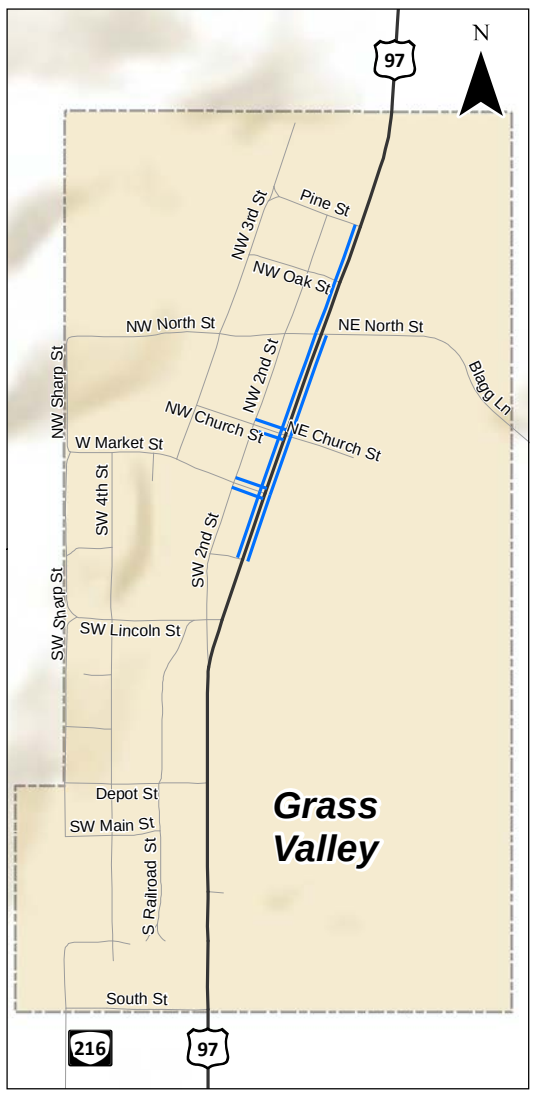
Existing sidewalks in Grass Valley do not connect with Sherman County Elementary School, and existing sidewalks in Moro do not connect to Sherman County High School. In Grass Valley, a short gap of approximately 0.05 mile in length exists between the school and the sidewalks along US 97. However, the school district plans to relocate the elementary school to the high school campus in 2016. Sherman High School is located approximately 0.6 miles south of Moro City Limits.

Many recreational walkers use the track at Sherman County High School in Moro to exercise. Others use the local roads leading out of the cities for recreational walks. Commuters who walk to work are generally located in the towns and use the sidewalks or the streets to commute to work.









Existing Sidewalks

City Boundary

Sidewalk Inventory
Sherman County, Oregon

Figure **4-5**

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Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl
Data Source: Wasco County

BICYCLE SYSTEM

The only existing bicycle facilities in Sherman County are located in Moro and Grass Valley. Within the City limits of Moro and Grass Valley, striped bicycle lanes are located along both sides of US 97. Exhibit 4-2 illustrates the bike lanes along US 97 in Moro.

Exhibit 4-2. Image illustrating the bicyclist and pedestrian facilities along US 97 in Moro (Source: Google Earth)

Recreational bicyclists commonly ride along US 97 and the local County roads. Occasionally larger groups of bicyclists pass through the County. Sherman County promotes bicycle tourism by highlighting cyclist routes in its marketing brochure. The number of residents that commute via bicycle is relatively small due to the rural nature of the County, the distances between towns, and the lack of bicycle lanes on state and local roads. Many cyclists do not feel comfortable riding on US 97 and will take alternate routes along County roads, sometimes out of direction, to avoid the highway.

PUBLIC TRANSPORTATION SYSTEM

Sherman County Community Transit provides a dial-a-ride transit service to residents for a fare of $5 per rider. This service is available on Monday and Thursday each week. Residents must request a pick-up 24-hours in advance and can be picked up anywhere in the County or Cities. The bus typically takes residents to The Dalles for shopping, business, and medical appointments. They also travel to Hood River and Portland for medical trips. Since July 2013, a total of 7,480 rides had been provided. Of these, 6,031 rides were for Seniors, and a total of 133,962 miles were traveled.

Sherman County Community Transit owns nine vehicles. ODOT is the lien holder for these vehicles. Drivers are paid for their time rather than operating on a volunteer basis. Currently, the funding that Sherman County Community Transit receives from ODOT meets their transit needs. Beginning in August 2014 and extending until August 2015, the County is being reimbursed for Veteran medical trips by the Veteran's Administration. This funding is provided by a highly rural transportation grant that was awarded in early 2015.

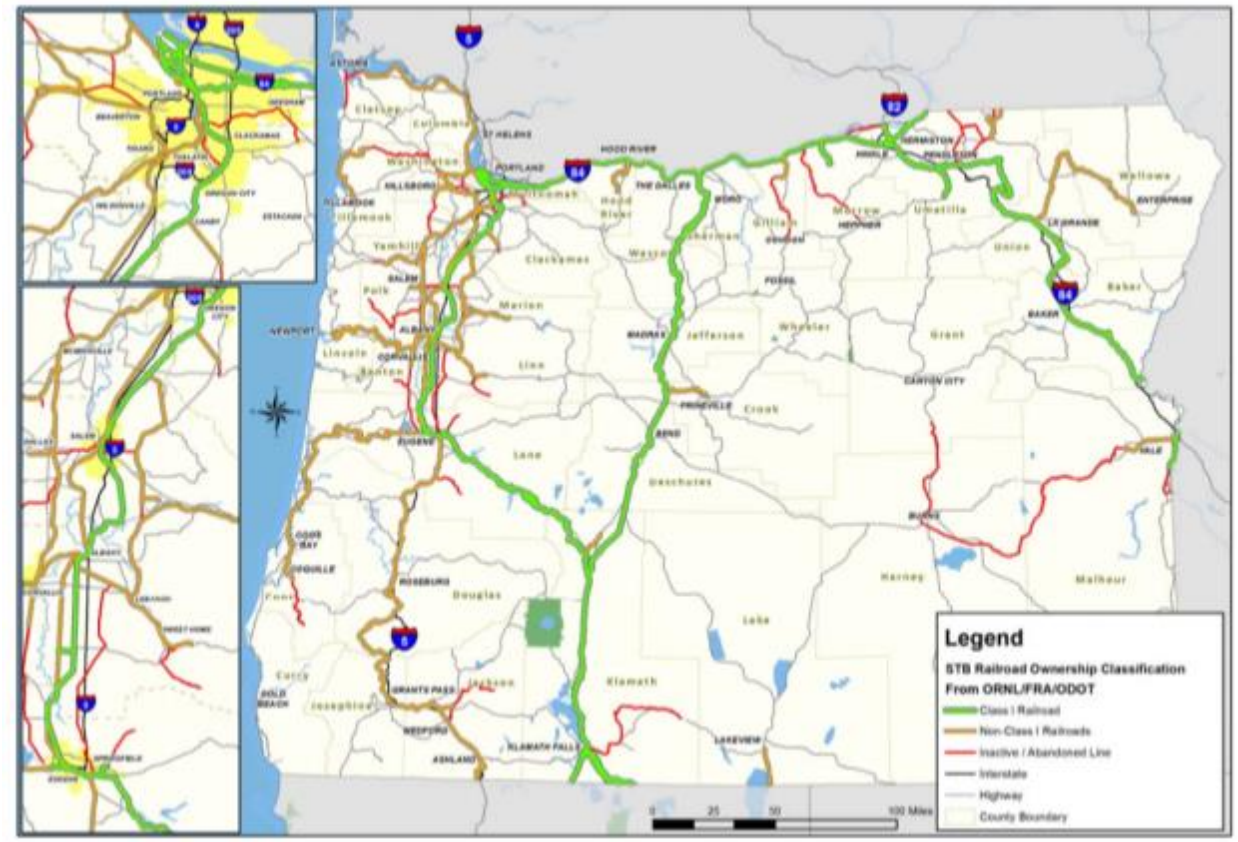
TRUCK FREIGHT ROUTES

I-84 and US 97 are the only state facilities in Sherman County designated as state truck freight routes. National and regional truck freight movements are intended to occur via I-84, which is part of the National Highway System. US 97 runs north-south through Central Oregon and serves as an important regional connection for Oregon as well as between California and Washington.

RAIL SYSTEM

The Union Pacific Main Line (UP) and the Burlington Northern/Santa Fe Bend Branch (BNSF) serve Sherman County at Biggs Junction. The UP line includes a spur serving the Mid-Columbia Grain Growers Terminal at Biggs. However, no grain has been hauled from this spur for approximately 10 years. As such, there are no regular train stops in Sherman County today. There is also currently no passenger rail service in the County.

As shown in Exhibit 4-3, the UP railroad that runs along the Columbia River through Sherman County is designated as a Class I Railroad.



Source: Oak Ridge National Laboratory Rail GIS Data, FRA, ODOT

Exhibit 4-3. State of Oregon Railroads

AIR TRANSPORTATION SYSTEM

The Wasco State Airport is located on the east side of Wasco in Sherman County. The airport was constructed in 1946 and has been continuously operated by the State of Oregon since it acquired it in 1958. The airport is located on the east side of Wasco and is classified as a Local General Aviation Airport by the Oregon Aviation Plan. The airport accommodates general aviation and agricultural users serving the local community and the surrounding region. The Airport was relocated to the east of Wasco in approximately 1987-1988. The original runway terminated inside the City Limits. Wasco State Airport has a land area of approximately 66 acres and is zoned Airport Development (A-D) by Sherman County. The outer periphery of the airport is predominantly zoned Exclusive Farm Use (A-E). The airport is located entirely outside the City's urban growth boundary (UGB). Both the City of Wasco and Sherman County have adopted the FAA Part 77 Imaginary Surfaces Plan for the Airport.

INTERMODAL CONNECTIONS

Intermodal connections for passenger service exist in the form of transit, pedestrian and bicycle, and automobile connections. Intermodal connections for freight exist in the form of rail, truck, air, and water transport connections. This section describes those connections.

Freight Transportation

Industrial activities are important economic catalysts in Sherman County, with energy and agriculture being key industries in the County. Therefore, the intermodal connections for freight are important for the County.

Biggs Junction serves as an important terminal for trucks in the County and within the State. A high number of trucks travel through the state on US 97 and pass through Biggs Junction. However, current intermodal connections between trucks, rail, and river cargo operations are limited at this location. The existing rail service does not stop within Sherman County.

Passenger Transportation

ODOT completed a Park and Ride Plan for Region 4 in 2012. As part of this process, four stakeholders from Sherman County were interviewed about the demand for park and ride in the County as well as existing information lot locations and activities. The results of these surveys indicated that park and ride is a medium priority for Sherman County, as residents are unlikely to change behavior but they acknowledge that gas prices are increasing and there may be a need for more options. The primary demand is for trips to and from The Dalles. There are no existing formal park and ride lots in the County, but following locations are used as informal park and ride lots:

- Fulton Canyon and Highway 30 Junction;
- Biggs Junction;
- Wasco Triangle (across from Wasco City Hall, Junction of Highway 206 and old 97);
- Sherman County Senior Center;
- Moro City Hall; and
- Rufus Community Center.

These existing informal lots would be the priority locations for formal park and ride lots in the future.

BRIDGE CONDITIONS

ODOT maintains an inventory of bridge conditions within the County. This inventory is provided in Technical Memorandum #3 in Volume 2 of the Technical Appendix. This table includes State, County, and City owned facilities.

Sufficiency rating is a measure between 0 and 100 calculated by the Federal Highway Administration (FHWA), based on factors such as condition, materials, load capacity, and geometry (i.e., dimensions). FHWA uses the rating as a tool to prioritize the allocation of funds for bridge repairs. In general, bridges with a sufficiency rating of less than 50 are given priority. The sufficiency rating is used to identify deficiencies, which may include structural issues or functional issues. For example, older bridges may be narrow and not designed to the same width or height clearance of today's standards. Therefore, a sufficiency rating does not necessarily indicate a structural issue.

There are three bridges with sufficiency ratings below 50 within Sherman County:

- The Columbia River, Highway 42, Bridge 00849A (ODOT's jurisdiction): US 97 where it crosses the Columbia River at Biggs Junction.
- Spanish Hollow Creek, Highway 42 at MP 2.18, Bridge 08892 (ODOT's jurisdiction): Mud Hollow Road where it crosses Spanish Hollow Creek.
- Finnegan Creek, Finnegan Road, Bridge 5SC003 (County's jurisdiction): Finnegan Road where it crosses Finnegan Creek.

These three structures are all open today. No structures in Sherman County are currently posted for load limits.

MARINE TRANSPORTATION SYSTEM

Sherman County is located on the Columbia River, a major water transportation route. The only river cargo operations that currently exist in the County are located at Biggs Junction, where Mid-Columbia Producers export much of their grain in the region. Rufus also has access to the river which is currently not developed for industrial purposes.

PIPELINE TRANSPORTATION SYSTEM

Two natural gas pipelines run through Sherman County although they do not currently serve the County. If larger commercial or industrial development came to the County, the County may support the development of pipeline access for the County.

EXISTING CONDITIONS SUMMARY

This section summarizes the key findings from the existing conditions inventory and analysis.

- All study intersections and study segments operate below capacity and within their performance targets.
- 95th percentile queue lengths are not expected to exceed two vehicles at any of the study intersections during the peak hour.
- The intersection of US 97/Biggs-Rufus Highway had the highest number of crashes during the study period, and its resulting crash rate was higher than the state average. Many of the crashes involved trucks, and the majority of crashes were turning movement or angle crashes.
- Approximately 65% of crashes in the County were fixed object or non-collision crashes.
- Approximately 42% of crashes in the County occurred between November and January, and many of these occurred on roadways that were wet, icy, or snow covered.
- The most commonly reported contributing cause was vehicles traveling at speeds that were too fast for conditions.

- A high number of fatal (8) and injury A (13) crashes occurred in the County. Of these, 15 were fixed object or non-collision crashes.
- Incomplete sidewalk networks exist within the cities of Wasco, Moro, and Grass Valley. No sidewalks exist in Rufus.
- The only marked bike lanes in Sherman County are located on US 97 within Moro and Grass Valley.
- Dial-a-ride transit service is available to residents on Monday and Thursday each week.
- The Wasco State Airport, a general aviation airport, serves Sherman County.
- US 97 and I-84 are state truck freight routes and carry high truck volumes throughout the state and region. US 97 bisects the downtown of the Moro and Grass Valley communities.
- Three bridges in Sherman County have sufficiency ratings below 50 and were further evaluated as part of the TSP Update.

Section 5
Future 2035 Transportation Conditions

FUTURE CONDITIONS

This section provides a summary of 2035 future transportation conditions and identifies transportation gaps and deficiencies and subsequent impact on the transportation system based on future land uses, and projected population and employment demographics. Transportation needs were identified for multimodal elements of the transportation system including: auto/truck, pedestrian, bicycle, transit, rail, marine, air, and pipeline/transmission modes.

POPULATION PROJECTIONS

By Oregon Revised Statute 195.034, the Counties are directed to formulate and adopt coordinated population projections among the County and its incorporated Cities. The County's 2007 Comprehensive Plan Update included a Population Projection through the year 2030. State Statute requires Counties to use the projections prepared by the Office of Economic Analysis (OEA) and, further, to allocate the future population growth throughout the County and its incorporated Cities and unincorporated areas. This was done in 2007 based on the past population ratios in the County and the projected future populations on a proportional basis for the four incorporated Cities of the County and updated in 2013. Table 5-1 below summarizes the projected population in each City and the entire County based on the 2007 projections. The 2007 population projection called for a County wide population of 2,102 by the year 2030, which would result in a growth of 169 people or 8.7 percent of the 2010 population. However, the 2013 population update prepared by OEA, shown in Table 5-1, shrinks that number markedly, projecting a County population of just 1,745 by 2035, a net loss of 188 people or 9.7 percent reduction of the 2010 population.

Table 5-1. 2013 Sherman County Population Projections

Year		Population Projections				
	Sherman County (Total)	Unincorporated Area (39.4%)	Grass Valley (8.7%)	Moro (16.6%)	Rufus (15.2%)	Wasco (20.1%)
2015	1735	684	151	288	264	348
2020	1716	677	149	285	261	344
2025	1718	677	149	285	261	345
2030	1731	682	151	287	263	348
2035	1745	687	152	290	265	351

FUTURE TRAFFIC CONDITIONS AND NEEDS

An analysis of the forecast 2035 transportation system capacity of study intersections and segments was conducted to identify improvements needed to meet State and County operational standards for each respective functional class in 2035.

Year 2035 Forecast Traffic Volumes

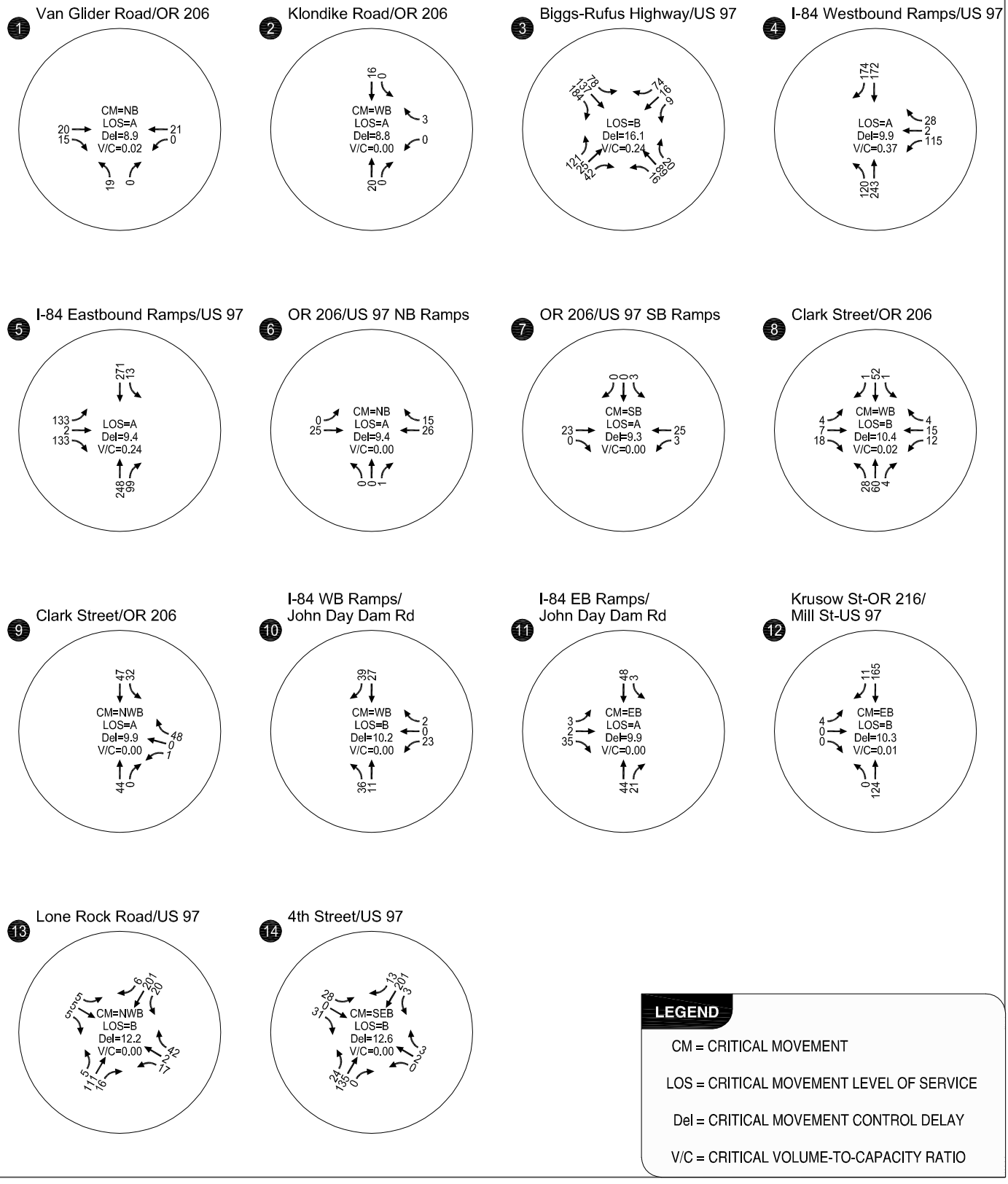
Future (2035) traffic volumes were developed using Oregon Department of Transportation's (ODOT's) historical trends method, which relies on historic traffic volumes to develop an annual growth rate. ODOT maintains Future Volumes Tables that summarize current and future year traffic volumes for state roadways. Based on guidance from ODOT's Analysis Procedure Manual (APM), the projected average annual growth is 1.3 percent for all Sherman County roadways (Reference 3). This growth rate relies on historical trends in traffic volumes. Although population projects may not show a large increase, traffic volumes may continue to increase due to changing travel trends and increased regional use of state highways. The same growth rate was used on state and county roadways.

The projected 1.3 percent annual growth rate was applied to existing 2014 volumes to estimate forecast year 2035 traffic volumes. The technical analysis of the forecast 2035 transportation system is based on ADT for roadway segments and 30th highest hour traffic volume forecasts for intersections.

Year 2035 Forecast Intersection Operations

Forecast 2035 transportation system capacity analysis was conducted based on forecast traffic volumes. The future conditions operational analysis was conducted based on the peak 15-minute period of traffic flow at each study intersection. The intersections of US 97 and I-84 Eastbound and Westbound Ramps as well as the intersection of US 97 and Biggs-Rufus Highway were upgraded from two-way stop-controlled intersections to signalized intersections in the summer of 2015. Therefore, the future conditions analysis reflects signals at these locations.

Figure 5-1 summarizes the 2035 30th highest hour traffic volumes and the resulting intersection operations. All intersections are expected to meet their performance standards in 2035.



2035 Traffic Volumes and Operations Analysis Results
Sherman County, Oregon

Figure **5-1**

Section 6
Future 2035 Transportation Needs & Alternatives

FUTURE 2035 TRANSPORTATION NEEDS AND ALTERNATIVES

This section identifies the future multimodal transportation needs in Sherman County. As noted in the 2035 Future Conditions summary, there are no forecast capacity deficiencies for any of the major highway or roadway facilities serving the County. As such, the identification of future transportation needs and alternatives primarily focused on improving roadway and intersection operations from a safety, maintenance, and modernization perspective. From these needs, a list of projects was developed and refined. The final project list is provided in Section 7.

ROADWAY NEEDS

Although the study roadways and intersections in Sherman County are expected to operate acceptably, several roadway needs were identified to accommodate new growth and support economic development. In addition, some roadway improvements are needed to improve mobility and provide alternate routes for emergency purposes.

Functional Classification

Several County roads serve as alternate routes to US 97, connecting residents to I-84 without traveling through Biggs Junction. These roads were identified for upgrades in functional classification due to changes in travel patterns that have resulted in increased usage of the roads. The lane width, curve radii, shoulder width, and shoulder type along these routes should be designed to accommodate higher traffic volumes and in some cases, industrial traffic. The current design of several of these roads restricts the ability for trucks to use the routes. The roads identified for upgrades in functional classification from Major Collectors to Minor Arterials include:

- **OR 216 from Grass Valley to the Wasco County Line**: This route is a popular route that provides access to the Deschutes River and serves County residents traveling to the west. Upgrading this road supports economic growth from recreational tourism for the County.
- **Van Gilder Road from Moro to OR 206**: This route is a popular alternative to US 97 for local residents traveling west on I-84. Exhibit 6-1 illustrates an example of a horizontal curve on Van Gilder Road where skid marks were observed. Under existing conditions, the curve does not have warning signs or chevrons.

Exhibit 6-1. Example of Van Gilder Road Curve without Curve Warning Signs

- **OR 206/Fulton Canyon Road (from US 97 to the intersection with Biggs-Rufus Highway) and Biggs-Rufus Highway (from OR 206 to the western county limit)**: these routes serve as popular alternatives to provide connections to I-84 (west) for local residents. Fulton Canyon Road access is currently restricted for trucks; trucks cannot use this route due to limited width.

Exhibit 6-2. Example of Fulton Canyon Road

- **Scott Canyon Road from Wasco to Rufus**: this route serves as a popular alternative connection to I-84 (east) for local residents. This road is difficult for trucks to traverse due to limited width. Trucks are currently discouraged from using this route.

Exhibit 6-3. Example of Scott Canyon Road

Roadway Design Standards

The roadway design standards in Rufus, Wasco, and Grass Valley are not appropriate for the cities due to the narrow widths in the cross-sections. The roadway design standards were reviewed and updated to reflect the City's vision and needs in roadway width. **Section 7** presents the recommended roadway cross sections.

Connectivity and Roadway Improvement Needs

Several connectivity needs were identified to improve access to local attractions and to provide alternate routes for emergency access, including:

- **Eastern Alternate Access to the Raceway**: The Oregon Raceway is currently only accessible from Blagg Lane from US 97. Although Blagg Lane continues east from the Raceway, the road is not improved, as shown in Exhibit 6-4.

Exhibit 6-4. Blagg Lane, East of Raceway

- **Northern Alternate Access to the Raceway**: The Oregon Raceway currently only has one access available from Blagg Lane. Constructing a secondary access from the Raceway to Barnum Lane would provide alternate access to Blagg Lane in the event of an emergency.
- **North Street/US 97 in Grass Valley**: The turn radius for the westbound right turn movement is too small to accommodate large vehicles, as shown in Exhibit 6-5. In addition, no turn-lane is provided from US 97 to North Street. This intersection serves the Oregon Raceway and is therefore traveled by many vehicles pulling large trailers. Modifications to the intersection to provide a larger turn radius and a left-turn lane from US 97 to North Street were considered.

Exhibit 6-5. Intersection of US 97 and North Street

Source: Google Earth Streetview

- **US 97/Erskine Road**: The throat of Erskine Road at this intersection is crumbling and needs repair, as shown in Exhibit 6-6.

Exhibit 6-6. Erskine Road Intersection with US 97

Source: Google Earth Streetview

- **Biggs-Rufus Highway (Maddie's Hump)**: Biggs-Rufus Highway serves local residents who live/work in Biggs/Rufus and also provides an important alternate route when the interstate is closed for crashes or other rare events. However, the road is narrow and subject to frequent rock falls from above, as illustrated in Exhibit 6-7. This alternative included evaluating the need to widen shoulders, install guardrail in some locations, and install a rock guard for vehicles.

Exhibit 6-7. Biggs-Rufus Highway

Local City Circulation and Parking Needs

Several city related circulation needs were identified to support economic development, particularly tourism, including::

- **Rufus Traffic Calming Improvements to Murray Street**: Murray Street in Rufus is a residential road that is frequently used as a cut-through route from Scott Canyon Road to 1st Street. Traffic calming measures were considered for this street to reinforce the posted speed limit and deter cut-through traffic.

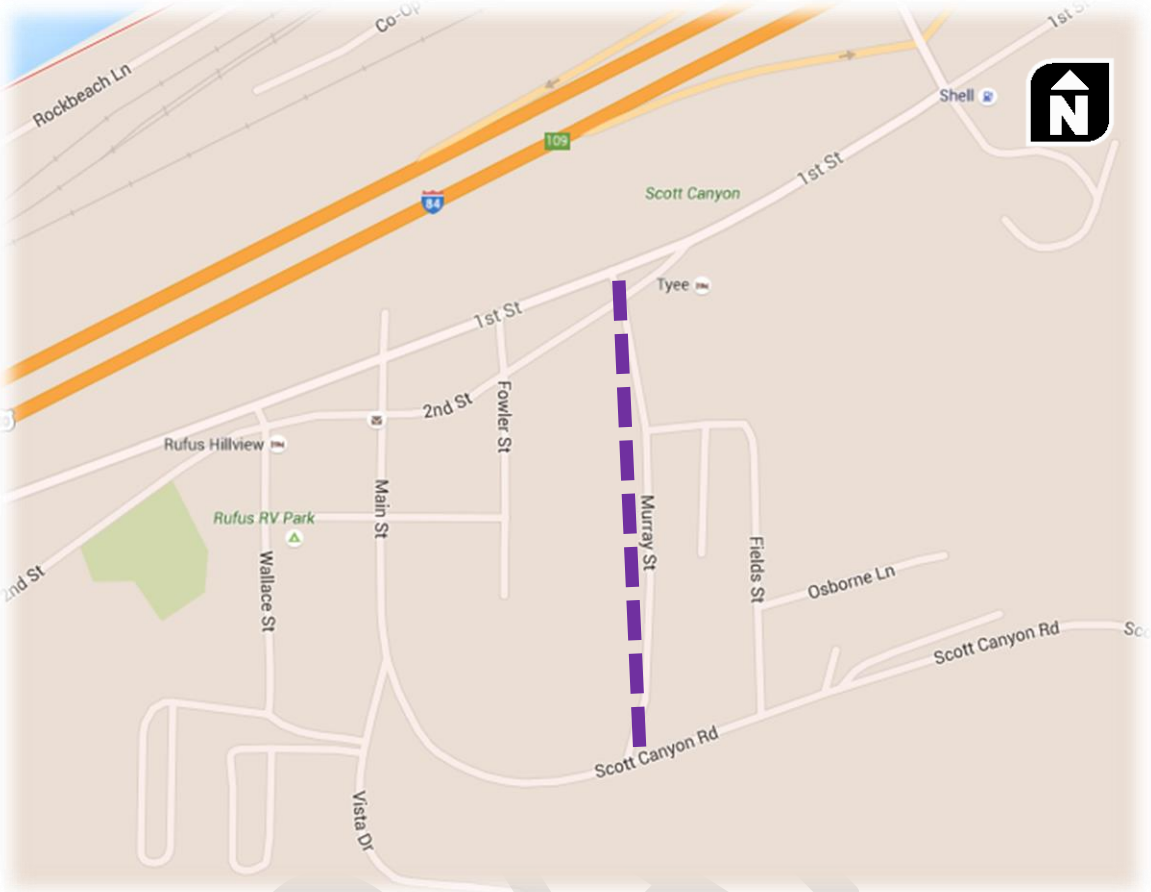


Exhibit 6-8. Illustration of Murray Street Cut-Through Route

- **Wasco Wayfinding Signage**: The downtown area of Wasco lacks adequate wayfinding signage to clearly direct drivers to US 97, Cottonwood Canyon State Park, and Rufus. Improved wayfinding signage within Wasco would reduce driver confusion in Wasco.

Exhibit 6-9. Downtown Wasco

- **Rufus Downtown Parking**: The City of Rufus lacks defined on-street parking and identified several potential locations for parking in the downtown area to encourage economic growth. In addition to a city-wide parking analysis to identify parking needs and options, the specific areas identified for potential future parking include:
  - 1st Street/Biggs-Rufus Highway; and
  - Fowler Street from 1st Street to 2nd Street.

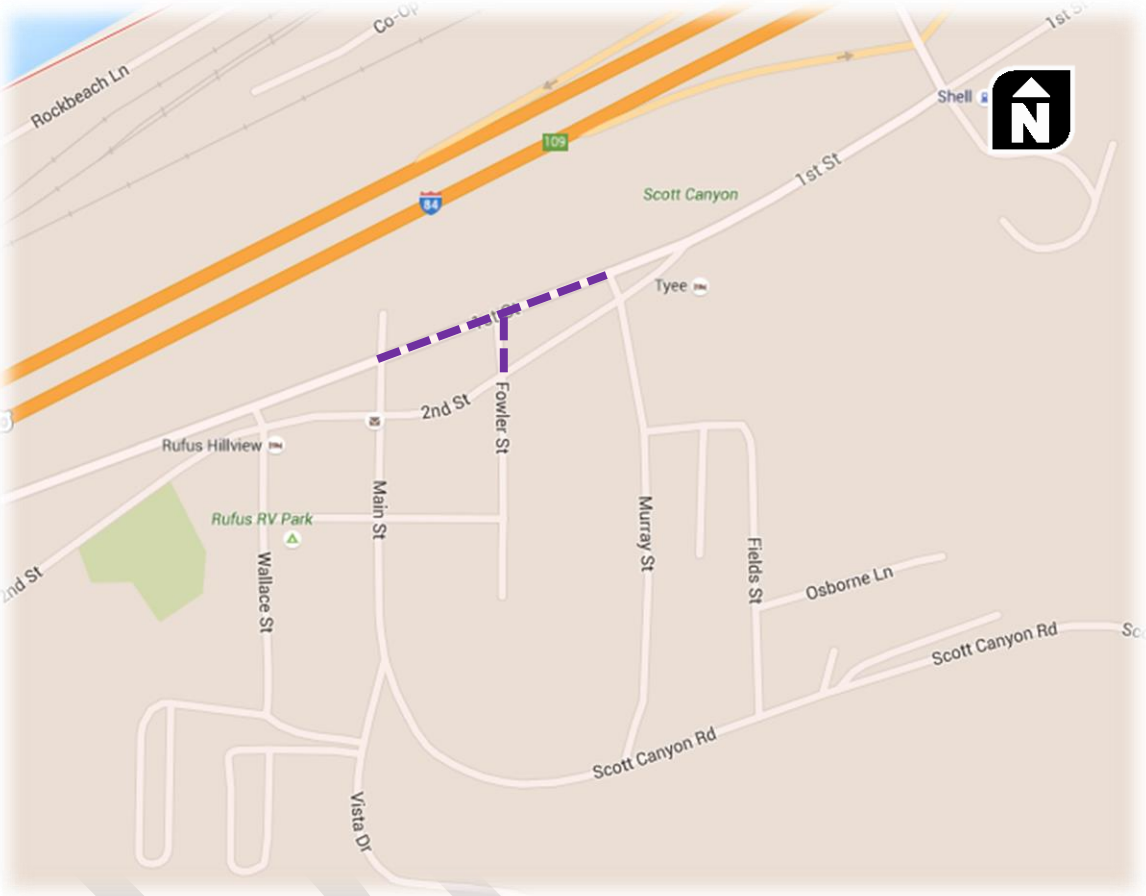


Exhibit 6-10. Illustration of Potential On-Street Parking Locations in Rufus

TRANSPORTATION SAFETY NEEDS

Although there are no identified operational or capacity issues, there are several safety related concerns and issues identified throughout the County. The needs were categorized as hot spot or systemic projects, consistent with the ODOT All Roads Transportation Safety (ARTS) program project classifications.

US 97 Traffic

US 97 is a major statewide highway and a freight route. US 97 bisects the county, including two incorporated cities and two unincorporated communities. The County and Cities identified multiple concerns with US 97 traffic, including:

- Traffic speeds;
- The lack of passing opportunities in some locations;
- The lack of wildlife crossings; and
- Balancing truck volumes and speeds with the character and pedestrian system in local cities.

Weather Related Crashes

A high percentage of crashes that occur during winter months on snow or icy roads, as summarized in **Section 4**. Treatments such as ITS warning devices that could help reduce the crash frequency and severity on all County and State roads.

High School Access

The Sherman County High School is served by High School Loop Road, which is only accessible from US 97. The school district is also relocating the elementary school to the same campus in 2016. High School Loop Road currently has three access points on US 97 in two general locations. The northern location has inadequate sight distance to the north with the current posted speed limit of 45 miles per hour, as shown in Exhibit 6-11. Sight distance to the south at this intersection is sufficient, as shown in Exhibit 6-12. Alternatives considered for the high school access included consolidating access points while maintaining one access point for emergency vehicles only, relocating the speed limit transition areas to result in a lower speed limit through the school intersections where sight distance is limited, installing speed feedback signs at the posted speed limit signs to reinforce posted speeds, and adding a southbound left-turn lane at the northern intersection of US 97/High School Loop Road.

Exhibit 6-11. Sight Distance Looking North at the Northern Intersection of US 97/High School Loop Road

Exhibit 6-12. Sight Distance Looking South at the Northern Intersection of US 97/High School Loop Road

Rufus Safety Needs

In Rufus, the intersection of 2nd Street/Wallace Street is located close to Biggs-Rufus Highway/1st Street. Alternatives considered included connecting 2nd Street to 1st Street west of Wallace Street and vacating 2nd Street from the new connection to Wallace Street. An extension of 3rd Street to 2nd Street/1st Street after this realignment was also considered.

Systemic Safety Program

ODOT allocates Oregon's Highway Safety Improvement Program (HSIP) funds through the ARTS program. The program currently splits funding between hot-spot and systemic safety projects. Hot spot safety projects are individual locations where a unique countermeasure could be applied to reduce the frequency and severity of crashes. Systemic safety projects include multiple locations where many low-cost countermeasures can be applied.

ARTS project funding will be allocated through the Statewide Transportation Improvement Program (STIP). The project locations are selected based on reported history of fatal and severe injury crashes.

Systemic Safety Prioritization Methodology

Although no safety projects in Sherman County are included in the draft 2017-2021 STIP lists, a set of objective criteria were established to generate a prioritized list of projects that could be considered for future updates to the STIP.

A list of projects was generated based on a review of crash trends and locations with history of crashes in the County, including:

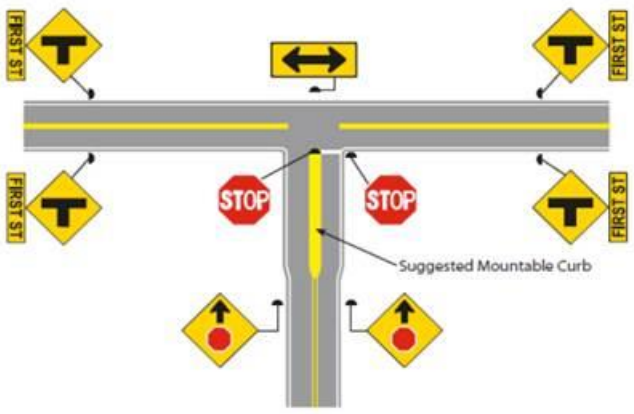
- Projects developed by the consultant team to address safety concerns identified by the Project Advisory Committee;
- Projects identified in ODOT's Roadway Departure, Intersection, and Pedestrian/Bicycle Safety Implementation Plans;
- Projects identified for locations with geometric and traffic control characteristics where low-cost, systemic countermeasures could reduce risk of roadway departure or intersection crash types. Sherman County has a high percentage of run-off-the-road crashes.

Systemic countermeasures that may be applied for the Roadway Departure projects include centerline rumble strips, edgeline rumble strips, shoulder widening, guardrail, and curve warning signs, as summarized in Table 6-1. Intersection treatments may include additional signage, pavement markings, right-turn deceleration lanes, left-turn lanes, and mountable raised medians, as shown by the concepts in Table 6-2. Traffic volumes were not available for any of the locations where turn lanes or deceleration lanes were identified. Therefore, ODOT warrants should be reviewed prior to implementation of the left-turn or right-turn deceleration lanes.

Table 6-1. Systemic Safety Countermeasure Toolbox for Rural Roadways

Systemic Safety Countermeasure	Description	Documented Effectiveness
Milled Rumble Strip – Centerline  Photo: ODOT	Rumble strips are grooves in the roadway placed on the roadway in such a manner that, as the tires of a vehicle contact them, they produce sound (noise) and vibration. The noise and vibration produced by rumble strips is intended to alert inattentive drivers that they have departed from their lane. They can be placed on the shoulder (if adequate paved shoulder is available) or on the centerline.	38 to 50 percent reduction in injury crashes resulting from head-on and opposite direction sideswipe crashes on rural two-lane roads. (Source: NCHRP Report 641)
Milled Rumble Strip – Shoulder or Edgeline 		26 to 46 percent reduction in single-vehicle run-off-road injury crashes on two-lane rural roads (Source: NCHRP Report 641)
Horizontal Curve Signage  Photo: Speed Concepts: Informational Guide, FHWA	Provide Static Combination Horizontal Alignment/Advisory Curve Warning Sign, Install RECOMMENDED Chevron Signs on Rural Horizontal Curves	13 to 16 percent reduction in run-off-road injury crashes rural two-lane roads. Source: *Manual for Selecting Safety Improvements on High Risk Rural Roads* (FHWA-SA-14-075)
Shoulder Widening  Photo: Low Cost Treatments for Horizontal Curve Safety (http://safety.fhwa.dot.gov/roadway_dept /horicurves/fhwasa07002/ch6.cfm)	Widen the paved roadway shoulder to provide additional space for vehicles to recover if they exit the travel lane.	3 to 6 percent reduction in crashes per one foot of shoulder widening. (Source: *CMF Clearinghouse* and *ODOT's List of Approved CRFs*)
Safety Edge  Photo: Selecting Speed Treatments, FHWA (http://safety.fhwa.dot.gov/hsip/hrrr/manual/sec45.cfm)	Install Safety Edge treatment on the pavement edge drop-off to provide a more gradual drop-off and increase the likelihood of vehicle recovery if the vehicle exits the roadway. This may be done in conjunction with shoulder widening or pavement maintenance activities.	5 to 15 percent reduction in rural roadway crashes. (Source: *CMF Clearinghouse* and *ODOT's List of Approved CRFs*)
Guardrail  Photo: FHWA Horizontal Curve Safety (Source: http://safety.fhwa.dot.gov/roadway_dept/horicurves/cmhoricurves/)	Install guardrail to prevent vehicles from entering areas that are not recoverable. When guardrail is located close to the roadway, vehicles are more likely to hit it. However, these crashes are typically less severe than roadway departure crashes in locations without guardrail. Guardrail is often used in situations where there is limited recovery area for vehicles and steep drop offs or fixed objects are present.	38 percent reduction to 23 percent increase in run off the road crashes. Source: *CMF Clearinghouse* (CMF ID: 39). *Note: This item is not included in ODOT's list of approved systemic countermeasures.*

Table 6-2. Systemic Safety Countermeasure Toolbox for Rural Intersections

Systemic Safety Countermeasure	Description	Documented Effectiveness
Basic Set of Sign and Marking Improvements  Photo: Low-Cost Safety Enhancements for Stop-Controlled and Signalized Intersections, FHWA	Install basic set of signs/markings from the ODOT Intersection Safety Implementation Plan, including: double up oversize warning signs, double STOP signs, mountable curb on stop approach (if feasible), street name signs, and stop bars.	40 percent reduction in intersection crashes at rural two-way stop controlled intersections. Source: *Low-Cost Safety Enhancements for Stop-Controlled and Signalized Intersections* (FHWA-SA-09-020)
Right-Turn Deceleration Lane 	Install right-turn deceleration lanes to provide an area for vehicles to slow down prior to completing a turning movement on high-speed roads. Deceleration lanes reduce the likelihood that vehicles will be rear-ended when slowing for a turn.	14 to 26 percent reduction in crashes at unsignalized intersections. (Source: *Highway Safety Manual* and *ODOT's List of Approved CRFs*) *Note: This item is included in ODOT's list of approved CRFs as a hot spot treatment rather than systemic.*
Left-turn Lane 	Install a left-turn lane to provide an area for vehicles to decelerate prior to making a left-turn and an area for vehicles to wait until a sufficient gap in traffic is available to complete the left-turn. Left-turn lanes help reduce rear-end crashes and discourage left-turn vehicles from taking smaller gaps in traffic because they have a refuge area.	33 to 55 percent reduction in crashes at rural unsignalized intersections. (Source: *Highway Safety Manual* and *ODOT's List of Approved CRFs*) *Note: This item is included in ODOT's list of approved CRFs as a hot spot treatment rather than systemic.*
Reduce Intersection Skew by Realignment  *(Example of skewed approach prior to realignment.)*	Realign the intersection to create a 90-degree intersection, removing any skewed approaches.	The effectiveness of this treatment varies depending on the skew angle of the intersection prior to realignment.
Improve Intersection Sight Distance  *(Example of restricted sight distance that could be mitigated by tree removal.)*	Improve intersection sight distance to meet minimum AASHTO guidance based on the posted speed limit of the major roadway.	44 to 89 percent reduction in crashes at rural unsignalized intersections. (Source: *ODOT's List of Approved CRFs*)

Objective criteria outlined in Table 6-3 were applied to prioritize projects.

Table 6-3. Objective Criteria for Identifying and Prioritizing Systemic Safety Projects

	Roadway Departure Projects	Intersection Projects
Criteria for Identifying Locations for Systemic Projects	▪ ≥1 Fatal or Injury A Crash ▪ ≥2 Injury B or C Crashes ▪ ≥3 PDO Crashes ▪ Presence of Roadway Departure Crashes ▪ Presence of a Horizontal Curve	▪ ≥1 Fatal or Injury A Crash ▪ ≥2 Injury B or C Crashes ▪ ≥3 PDO Crashes ▪ Restricted intersection sight distance ▪ Skewed intersection approach ▪ Uncontrolled approach speed >45 mph ▪ Functional classification ▪ Land use

Systemic Safety Projects

Lists of Systemic Safety Roadway Departure projects and Intersection projects are provided in Table 6-4 and Table 6-5.

Table 6-4. Systemic Safety Roadway Departure Projects

Roadway	Start MP or Cross Street	End MP or Cross Street	Potential Countermeasures							
			Inlaid Raised Pavement Markers	Widen Shoulder & Install Safety Edge	Install Centerline and Shoulder Rumble Strips*	Curve Warning Signs	Chevrons at Curves	Guard-rail	Passing Lanes^	Speed Enforcement
US 97	0.86	6.20	X		X	X	X			
US 97	42.43	43	X		X	X	X		X	X
OR 206	3	6.1	X		X	X	X			
US 97	22.5	23.9	X		X				X**	
Scott Canyon Road	Rufus City Limits	Herin Lane	X	X	X	X	X			
US 97	12	13.28	X		X					
US 97	33.33	33.58	X		X	X	X			
Van Gilder Road	4	5.6	X	X	X	X	X	X		
Scott Canyon Road	Medler Ln	Gerking Canyon Rd	X	X	X	X	X			
Herin Lane	Scott Canyon Road	Oehman Road	X	X	X					
Lonerock Road	N/A	N/A	X	X	X			X		
Blagg Lane	N/A	N/A	X	X	X	X	X			

*Rumble strips should only be installed in locations where the shoulder width permits it.

^Passing lanes and speed enforcement should involve further study prior to implementation. Cost estimates do not include passing lanes.

**Passing lanes exist from approximately MP 23 to 23.55. The study should evaluate whether this passing lane can be lengthened.

Table 6-5. Systemic Safety Intersection Projects

Major Road	Minor Road	Potential Countermeasures						
		Rural Intersection Signing and Marking Improvements	Right-turn deceleration Lane	Lengthen existing right-turn deceleration lane	Install left-turn lane	Lengthen existing left-turn lane	Improve sight distance	Reduce intersection skew
US 97	Monkland Lane				X		X	
US 97	Barnum Lane				X			
US 97	Sawtooth Road	X						
US 97	Finnegan Road							X
US 97	Stark Lane						X	
US 97	Moore Lane			X				
OR 206	Fairview Road	X						X
US 97	Rutledge Lane							X
US 97	Mud Hollow Road				X			
US 97	Liberty Lane		X					
US 97	Bourbon Lane				X			
US 97	Old Highway 97				X			
W 1st Street / Biggs-Rufus Highway	Industrial Access				X			
US 97	Dobie Point Road		X		X			
US 97	Clark Street			X				
US 97	Wilcox Lane				X			
Monkland Lane	Hay Canyon Road	X						

PEDESTRIAN NEEDS

Although the cities of Wasco, Grass Valley, and Moro have an existing limited network of connected sidewalks, the cities have gaps and deficiencies in their respective pedestrian systems. Rufus does not have any sidewalks in the City. Prioritizing these pedestrian routes and gaps in the system will inform funding decisions. The following sections summarize the key gaps in each City.

Rufus

Rufus has no sidewalks in the City today. The locations that were identified as key pedestrian system needs include:

- Install sidewalks on 1st Street from Sullivan Lane to Wallace Street;
- Install sidewalks on Main Street from Vista Drive to 1st Street;
- Install sidewalks on 2nd Street from Main Street to the Community Center;
- Provide a pedestrian crossing or undercrossing of the I-84 and the railroad; and
- Provide a pedestrian crossing(s) of 1st Street/Biggs-Rufus Highway.

Wasco

Priority gaps identified in Wasco include:

- Install sidewalks on Old Highway 97 from Clark Street to Asher Street;
- Install sidewalks on OR 206 from Clark Street to Scott Street;
- Install sidewalks on Clark Street from Old Highway 97 to Yates Street;
- Install sidewalks on OR 206 from Biggs Street to Church Street;
- Install sidewalks on Armsworthy Street from Church Street to Scott Street; and
- Upgrade existing sidewalks on Clark Street from Columbia to Ellis and add sidewalks on the east side of the street.

Grass Valley

No new sidewalks were identified in Grass Valley. Although there is a gap in sidewalks between US 97 and the elementary school, the school will be relocated to Moro in 2016. The community has plans for installing pedestrian scale lighting along the sidewalks on US 97 throughout town. Exhibit 6-13 illustrates the scale of the existing lighting on US 97 in Grass Valley.

Exhibit 6-13. Existing Lighting in Grass Valley

Moro

Priority gaps in the pedestrian system in Moro include:

- Install a shared-used path along 4th Street/Van Gilder Road from Hood Street to Azure Lane;
- Install sidewalks on Lonerock Road from US 97 to the Steve Burnett Extension and Research Building; and
- Install sidewalks or a shared-use path on High School Loop Road between the existing sidewalks on Main Street and the schools. As shown in Exhibit 6-14, there is currently a wide shoulder that is used by pedestrians and cyclists on High School Loop Road. This could be expanded or separated to provide a safer facility for pedestrians and cyclists.

Exhibit 6-14. Existing Cross-Section of High School Loop Road

BICYCLE NEEDS

The only marked bicycle facilities in Sherman County are marked bicycle lanes on US 97 in Moro and Grass Valley. Some sections of the state highways have shoulders that can accommodate bicyclists. On local/residential streets, bicyclists share the roadway with slower vehicles. This practice is consistent with recommendations in the Oregon Bicycle and Pedestrian Design Guide, that urban and suburban roadways with posted speeds below approximately 20 miles per hour (mph) operate as shared facilities in which bicyclists share the road with vehicles. The Design Guide also recommends that urban and suburban roadways with average daily traffic volumes below approximately 1,500 vehicles per day have shared facilities rather than separated bicycle lanes regardless of the posted speed limit. County roads in Sherman County currently carry less than 1,500 vehicles per day.

Within the cities, Rufus identified a possible need for a bicycle lane on Main Street, which is a narrow road that connects Scott Canyon Road with Rufus. There is currently not sufficient space for cyclists and trucks to share the road. Outside of Moro, the community is interested in a shared use path along Lonerock Road to connect the Moro city limits to the Fairgrounds. This path would serve pedestrians and cyclists.

Several recreational routes attract bicyclists from around the state. The County would like to promote these bicyclist routes and identify opportunities to route cyclists off of US 97 when possible. Cyclists are uncomfortable riding on US 97 due to the high speeds and truck traffic on the road. By providing signage to encourage cyclist to use alternate routes, the County may direct cyclists to key routes and provide warning signs on these routes to inform drivers to expect cyclists. Van Gilder Road is an example of a heavily used bike route in the County that lacks wide shoulders or bike lanes. Van Gilder Road needs directional signage for cyclists and warning signs for motorists to share the road.

FREIGHT NEEDS

US 97 is a major freight route that runs through Sherman County. It is heavily relied on for transporting agriculture or other industrial goods to I-84, north and south to Washington and California, and to intermodal connections with marine transportation and rail transportation hubs. Although intermodal opportunities exist at Biggs Junction today, the County should evaluate opportunities for improved freight connections between trucks, rail, and river cargo at this location, which is already a junction of I-84 and US 97.

BRIDGE NEEDS

The bridge conditions inventory, summarized in **Section 4**, identified three bridges with low sufficiency ratings. One does not meet current standards, and two are classified as structurally deficient. All three bridges are currently open today.

In addition, the community of Rufus identified several bridges in the City that appear to need repair based on visual inspection. These three bridges (2nd Street bridge, east of Fowler Street; 1st Street

bridge, west of Sullivan Lane; and 1st Street bridge, east of Fowler Street) should be evaluated to determine the structural integrity of the bridges and establish a cost for required improvements. Alternative treatments to replacing or improving the bridges may include road closures and system completeness to reroute traffic off of the bridges.

Section 7
Transportation System Plan

TRANSPORTATION SYSTEM PLAN

This section outlines the draft preferred transportation system plan for Sherman County, which includes TSP elements consistent with OAR 660-12-020 and goals of OAR 660-12-025. The preferred plan includes recommendations for the County's transportation system, including:

- Roadway System Plan
- Access Management Plan
- Pedestrian and Bicycle System Plan
- Public Transportation System Plan
- Air/Marine/Rail/Pipeline/Transmission System Plan

The transportation components presented in this section were developed in accordance with the requirements of Oregon's Transportation Planning Rule (TPR). Each modal plan has been developed concurrent with the findings presented in the existing and future forecast conditions analysis. The plan applies to the entire county, including areas within the incorporated cities of Rufus, Wasco, Moro, and Grass Valley and the unincorporated communities of Biggs and Kent.

ROADWAY SYSTEM PLAN

The Sherman County roadway system plan reflects the anticipated operations, circulation, and safety needs through the year 2035 and provides guidance on how to facilitate vehicular and freight traffic over the next 20 years. The plan includes projects on the City-, County-, and State-owned and maintained roadway system.

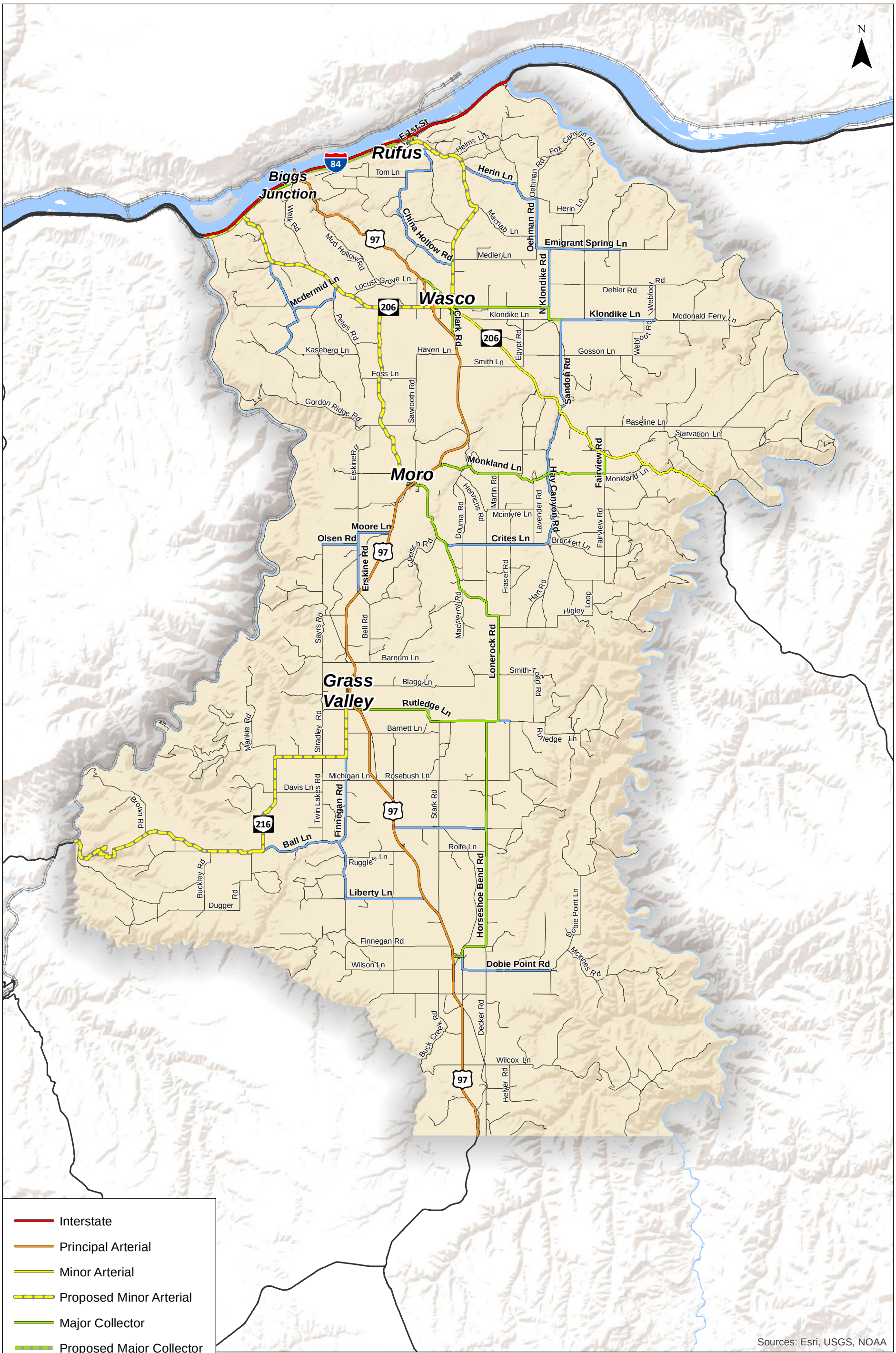
Functional Classifications

Functional classification of a roadway characterizes the intended purpose, amount and type of vehicular traffic it is expected to carry, provisions for non-auto travel, and the roadway's design standards. The classification considers access to adjacent land uses and the transportation modes to be accommodated.

The functional classification system in Sherman County includes: Minor Arterial, Major Collector, Minor Collector, and Local Road. Table 7-1 provides a detailed description of each classification. Figure 7-1 presents the functional classifications for all existing and planned County roadways.

Table 7-1. Sherman County Functional Classification Descriptions

Functional Classification	Description
Interstate	Primary function is mobility and to serve long-distance travel. These roadways are high-speed, divided roadways with limited access. Interstates link urban areas across the United States.
Minor Arterial	Primary function is to carry high levels of regional vehicular traffic at high speeds. These roads connect the collector road system to freeways, provide access to other cities and communities, and serve major traffic movements. Access is limited but can be accommodated with at-grade intersections.
Major Collector	Primary function is to serve traffic from local roads and move them to arterials. These roads provide some degree of access to adjacent properties, while maintaining circulation and mobility for all users. Major Collectors carry lower traffic volumes at slower speeds than arterials. Major Collectors are often longer in length and have lower driveway density, higher speed limits, higher traffic volumes, and may have more travel lanes than Minor Collectors. Major Collectors can be located in urban or rural environments. In rural environments, Collectors generally serve intra-county travel. In rural areas, traffic volumes and spacing may be the most significant designation factors between Major and Minor Collectors. In urban areas, these roads serve both access and traffic circulation in higher dense residential, commercial, and industrial areas. They typically have higher speeds and more signalized intersections.
Minor Collector	Primary function is to serve traffic from local roads and connect traffic to arterials. These roads can be urban or rural. In urban areas, they serve both access and traffic circulation but in lower density areas than Major Collectors. They also penetrate neighborhoods, but often for a shorter distance than Major Collectors. They typically have lower speeds and fewer signalized intersections. In rural areas, they serve to bring traffic from local roads to developed areas or connections to those areas. They provide service to smaller communities not served by a higher class facility and link locally important traffic generators with rural areas.
Local Road	Local roads account for the largest percentage of all roadways in terms of mileage. Their primary function is to provide direct access to adjacent land uses. They are characterized by short roadway distances, slow speeds, and low volumes. Local roads offer a high level of accessibility, serves passenger cars, pedestrians, and bicycles, but not through trucks.



Roadway Functional Classification
Sherman County, Oregon

Figure **7-1**

K:\H_Portland\proj\file\18054 - Sherman County TSP\gis\Draft TSP\7-1 Functional Classifications County.mxd - agriffin - 3:27 PM 7/28/2015

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County

Design Standards

Roadway design standards take into consideration roadway function and operational characteristics, including traffic volume, capacity, , adjacent land use, operating speed, and safety. The design standards are necessary to ensure that as the road system develops, it will be capable of safely and efficiently serving the traveling public, while also accommodating orderly development of adjacent lands.

While not specifically outlined in this plan, improvements on state highways must meet ODOT design and operating standards provided in the ODOT Highway Design Manual.

Rural Design Standards

Rural roadway design standards for all County-owned and maintained facilities are shown in Exhibit 7-1, Exhibit 7-2, and Exhibit 7-3. Deviations from these design standards will be considered on a case-by-case basis and approved by the designated roadway manager (e.g., Roadmaster).

Sidewalks have not been included in the roadway design standards because the majority of County roadways are rural in nature and sidewalks are not typically provided. Bicyclists are expected to share the travel lane with vehicles in rural areas, consistent with guidance provided in the Oregon Bicycle and Pedestrian Design Guide.

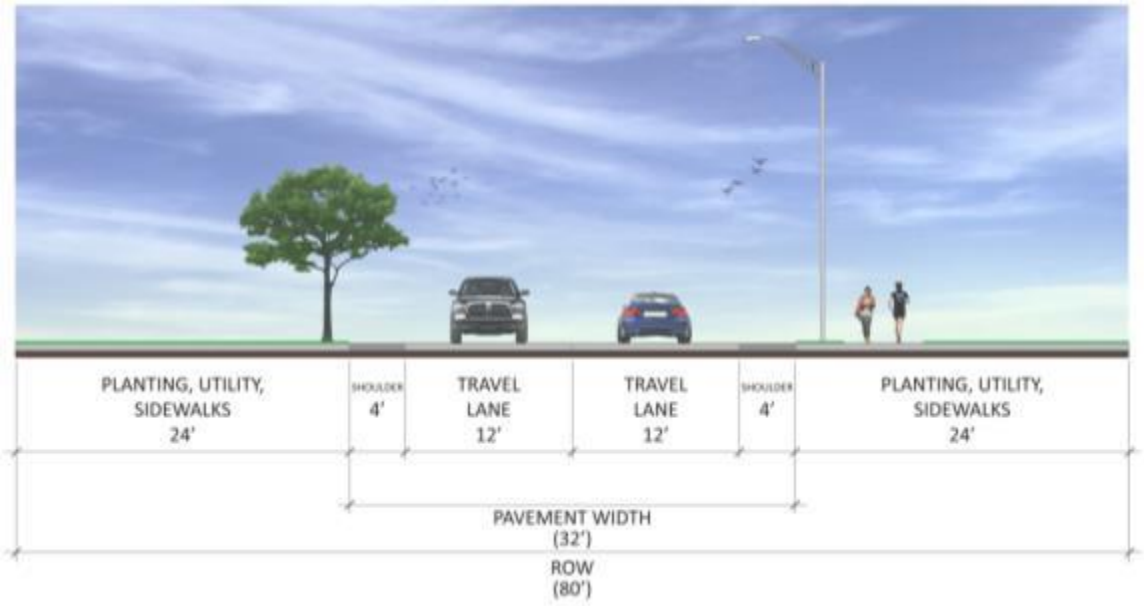


Exhibit 7-1. Rural Arterial Street Cross-Section

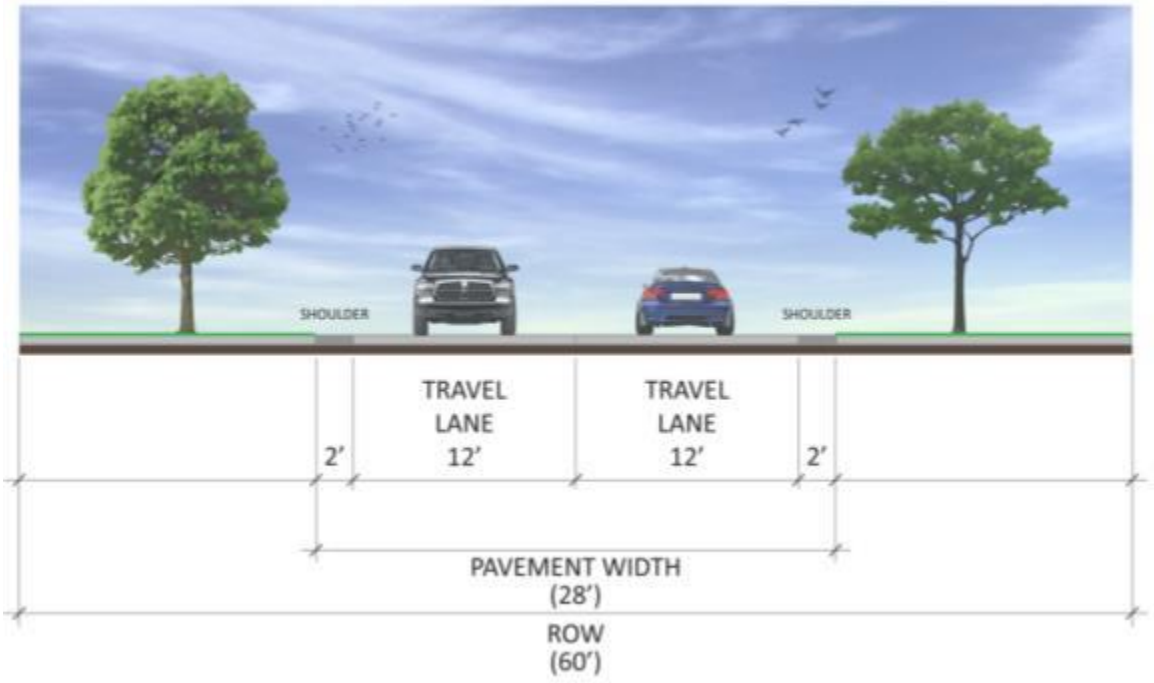


Exhibit 7-2. Rural Major and Minor Collector Street Cross-Section

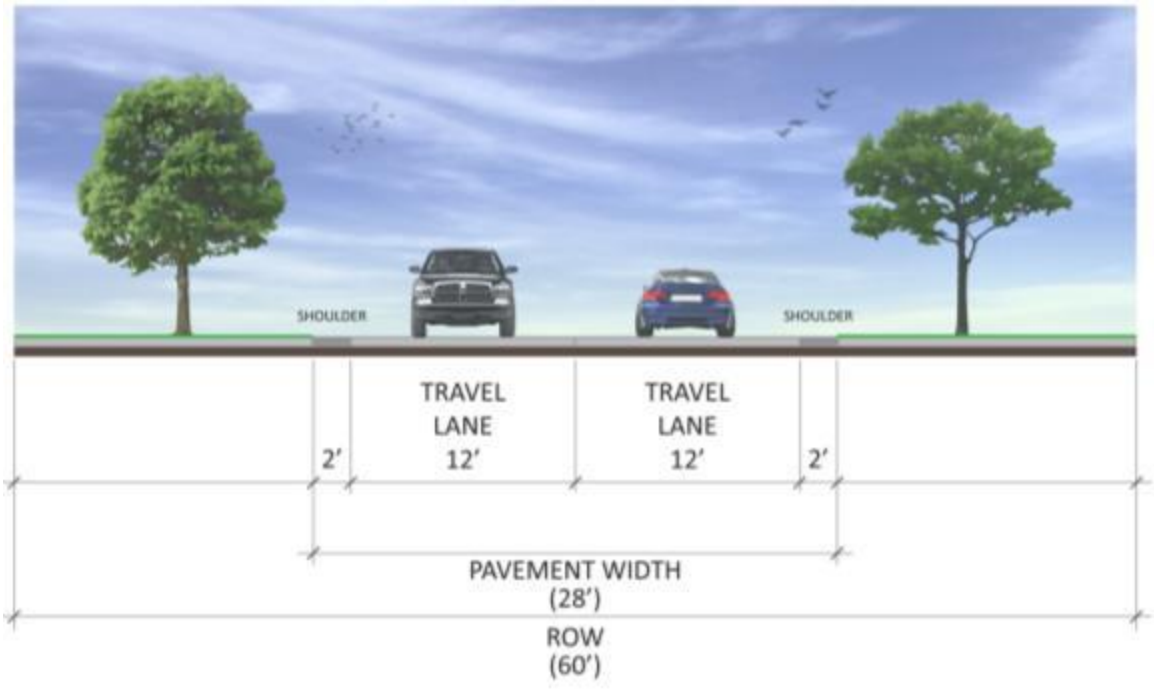


Exhibit 7-3. Rural Local Street Cross-Section

Urban Design Standards

Design standards for City roadways within urban areas (incorporated cities) are provided below.

Rufus Design Standards

City of Rufus' street standards are summarized in Table 7-2. Exhibit 7-4, Exhibit 7-5, Exhibit 7-6, and Exhibit 7-7 illustrate the cross-sections based on the road design standards for the City of Rufus for arterials, collectors, local roads, and half-streets, respectively.

Table 7-2. City of Rufus Road Design Standards

Type of Street	Right-of-Way Width	Paving Width Between Curbs[6]	Curb Return Radius	Maximum Percent of Grade	Minimum Radius of Curvature
Arterial [4]	60'	42'	35'	10%	400'
Collector [4]	60'	28'	35'	10%	300'
Residential [4]	60'	24'	25'	10%	150'
Half Street [4]	30'	20'	25'	10%	150'
Cul-de-sac [4]	50-60' [1]	36' [1]	25'	10%	150'
Alley	20'	20'	15'	10%	150'

1. The paving radius at the turn-around of a cul-de-sac shall be 38' on a right-of-way radius of 50'.
2. Minimum grade of 0.3%. If unavoidable conditions exist, a grade of 2% steeper than that shown will be allowed.
3. One street name sign shall be provided at each intersection for each street.
4. Curbs and gutters shall be provided on both sides of the street on Arterial and Collector Streets with the council discretion of curb designs.
5. Curbs, Gutters, pedestrian walkways and bike lanes may be required on Residential, Half Street, and Cul-de-sac streets.
6. With approval from the City, pavement widths may be reduced to a minimum of 36' for Arterials, 24' for Collectors, 20' for Residential streets, 18' for half-streets, 15' for alleys, and 26' for a cul-de-sac.

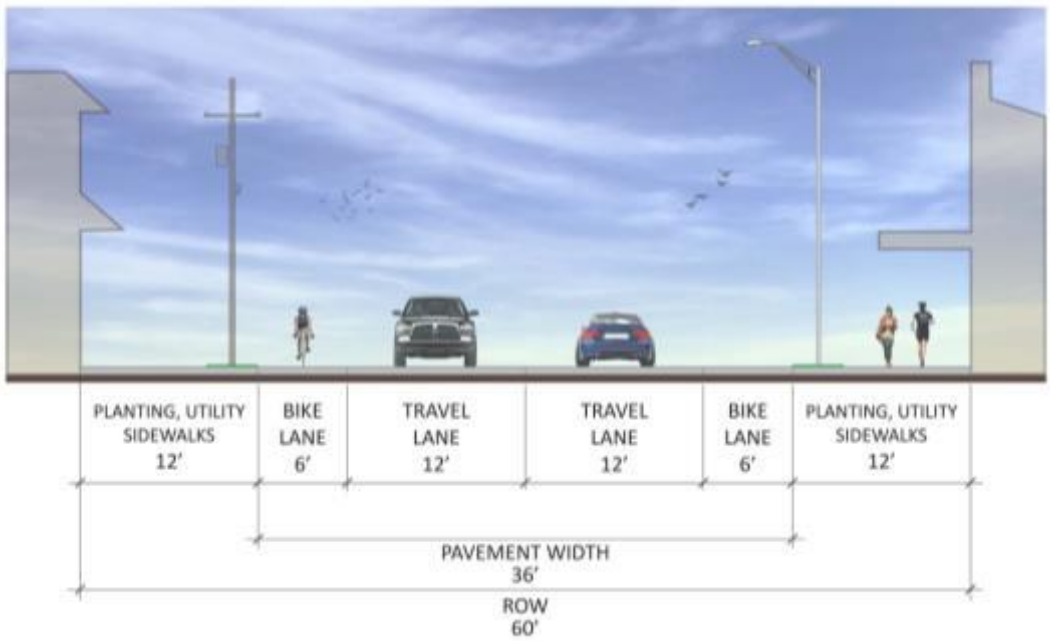


Exhibit 7-4. City of Rufus Arterial Design Standard

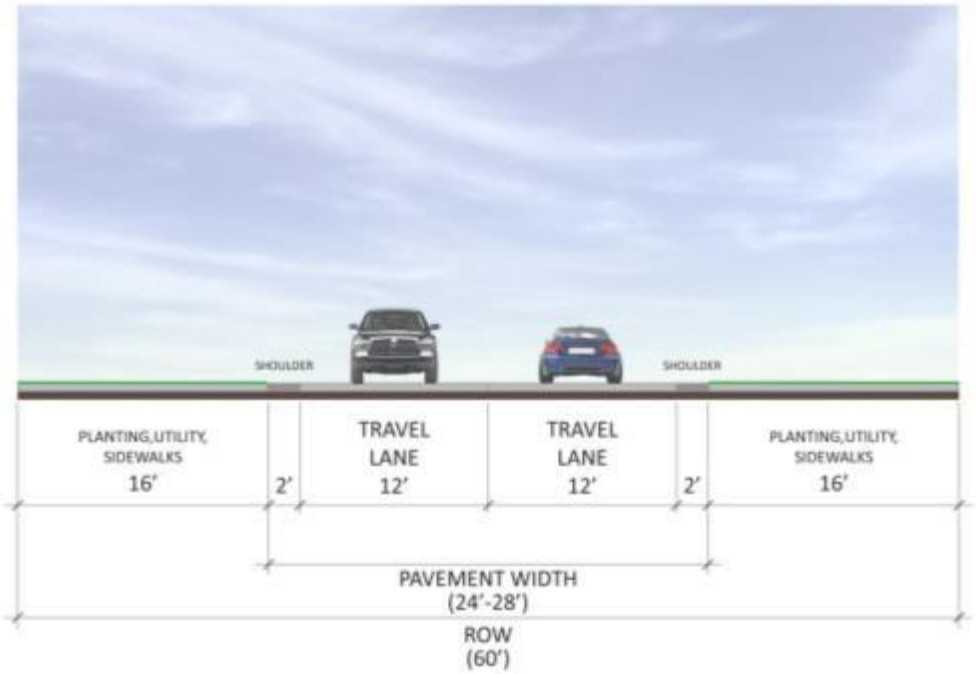


Exhibit 7-5. City of Rufus Collector Design Standard

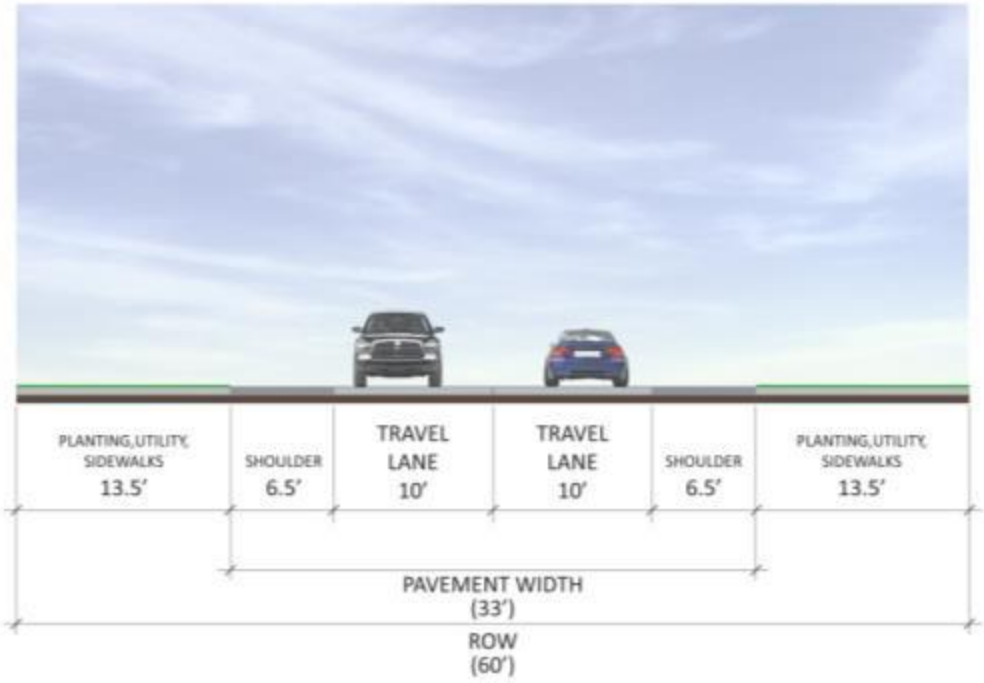


Exhibit 7-6. City of Rufus Local Road Design Standard

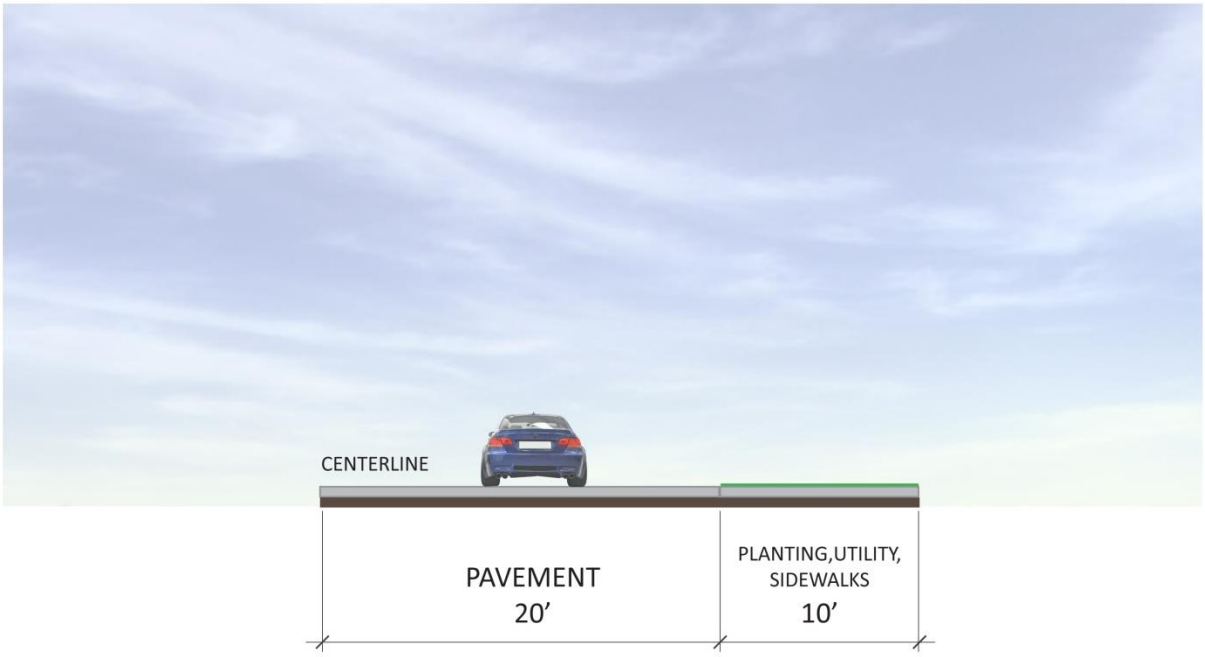


Exhibit 7-7. City of Rufus Half-Street Design Standard

Moro Design Standards

City of Moro's street standards are summarized in Table 7-3. Exhibit 7-8, Exhibit 7-9, Exhibit 7-10, and Exhibit 7-11 illustrate the cross-sections based on the road design standards for the City of Moro for arterials, collectors, local roads, and half-streets, respectively.

Table 7-3. City of Moro Road Design Standards

Type of Street	Right-of-Way Width	Paving Width Between Curbs[5]	Curb Return Radius	Maximum Percent of Grade	Minimum Radius of Curvature
Arterial [4]	60'	42'	35'	10%	400'
Collector [4]	50'	28'	35'	10%	300'
Residential [4]	50'	24'	25'	10%	150'
Half Street [4]	30'	20'	25'	10%	150'
Cul-de-sac [4]	50-60' [1]	36' [1]	25'	10%	150'
Alley	20'	20'	15'	10%	150'

1. The paving radius at the turn-around of a cul-de-sac shall be 38' on a right-of-way radius of 50'.
2. Minimum grade of 0.3%. If unavoidable conditions exist, a grade of 2% steeper than that shown will be allowed.
3. One street name sign shall be provided at each intersection for each street.
4. Curbs and gutters shall be provided on both sides of the street on Arterial and Collector Streets. Curbs, Gutters, pedestrian walkways and bike lanes may be required on Residential, Half Street, and Cul-de-sacs.
5. With approval from the City, pavement widths may be reduced to a minimum of 36' for Arterials, 24' for Collectors, 20' for Residential streets, 18' for half-streets, 26' for a cul-de-sac, and 15' for alleys.

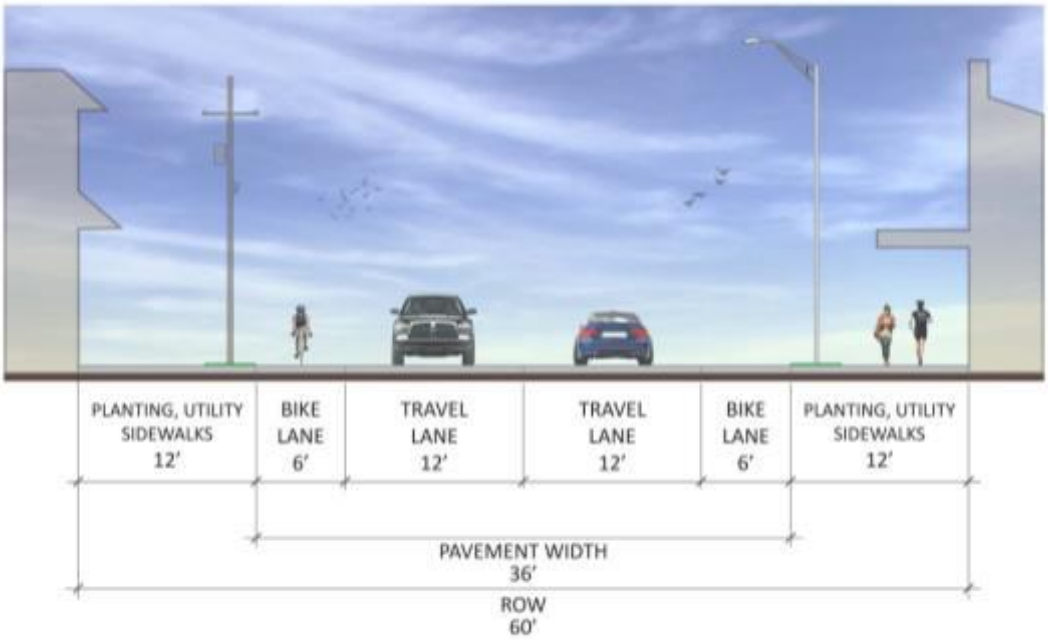


Exhibit 7-8. City of Moro Arterial Design Standard

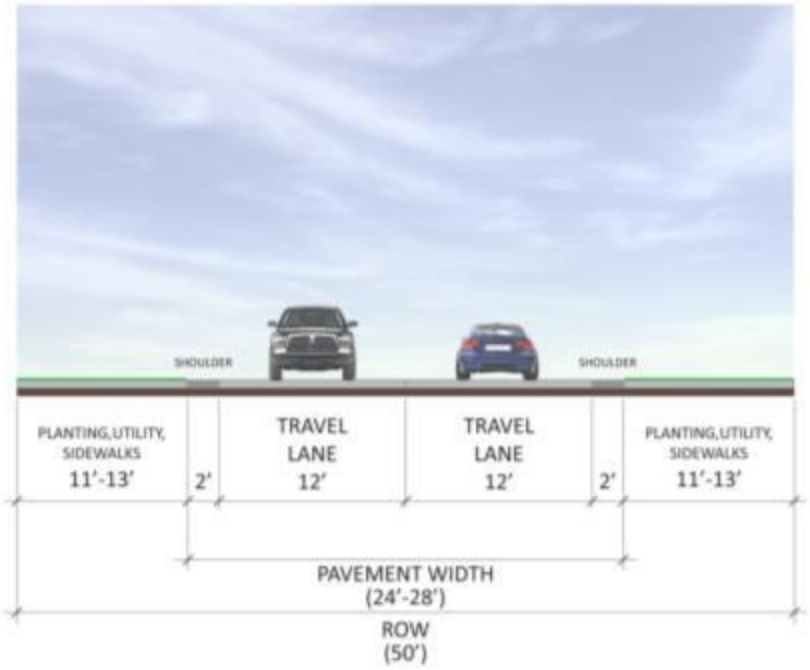


Exhibit 7-9. City of Moro Collector Design Standard

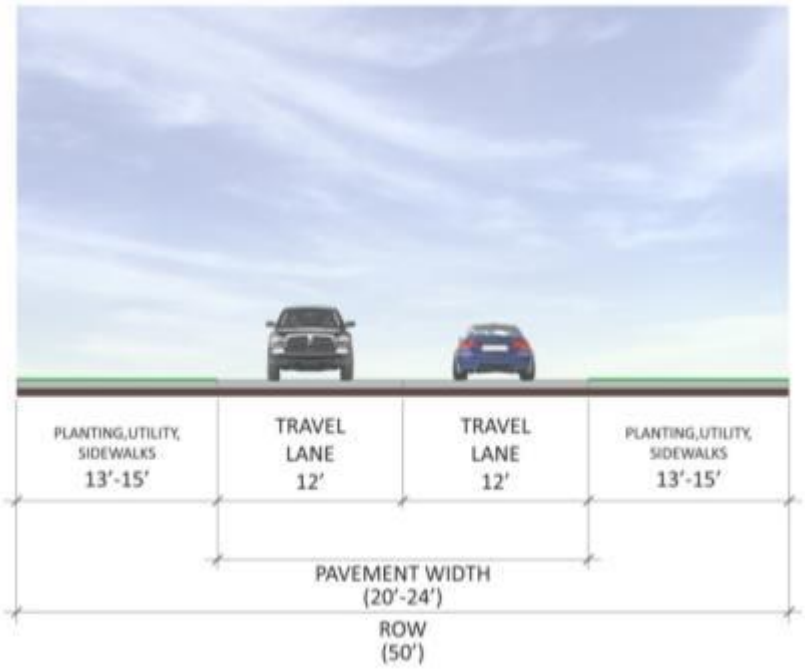


Exhibit 7-10. City of Moro Local Road Design Standard

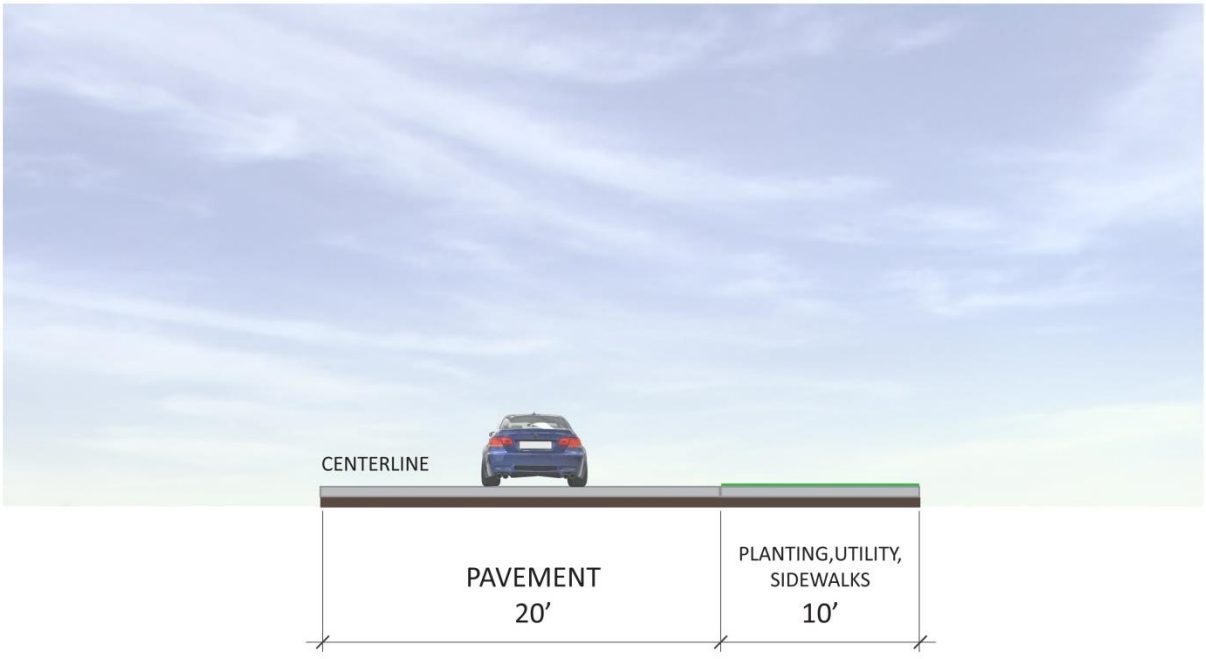


Exhibit 7-11. City of Moro Half-Street Design Standard

Wasco Design Standards

City of Wasco's street standards are summarized in Table 7-4. Exhibit 7-12, Exhibit 7-13, Exhibit 7-14, and Exhibit 7-15 illustrate the cross-sections based on the road design standards for the City of Wasco for arterials, collectors, local roads, and half-streets, respectively.

Table 7-4. City of Wasco Road Design Standards

Type of Street	Right-of-Way Width	Paving Width Between Curbs[5]	Curb Return Radius	Maximum Percent of Grade	Minimum Radius of Curvature
Arterial [4]	60'	42'	35'	10%	400'
Collector [4]	60'	28'	35'	10%	300'
Residential [4]	60'	33'	25'	10%	150'
Half Street [4]	30'	20'	25'	10%	150'
Cul-de-sac [4]	50-60' [1]	36' [1]	25'	10%	150'
Alley	20'	20'	15'	10%	150'

1. The paving radius at the turn-around of a cul-de-sac shall be 38' on a right-of-way radius of 50'.
2. Minimum grade of 0.3%. If unavoidable conditions exist, a grade of 2% steeper than that shown will be allowed.
3. One street name sign shall be provided at each intersection for each street.
4. Curbs and gutters shall be provided on both sides of the street on Arterial and Collector Streets. Curbs, Gutters, pedestrian walkways and bike lanes may be required on Residential, Half Street, and Cul-de-sacs.
5. With approval from the City, pavement widths may be reduced to a minimum of 36' for Arterials, 24' for Collectors, 20' for Residential streets, 18' for half-streets, 15' for alleys, and 26' for a cul-de-sac.

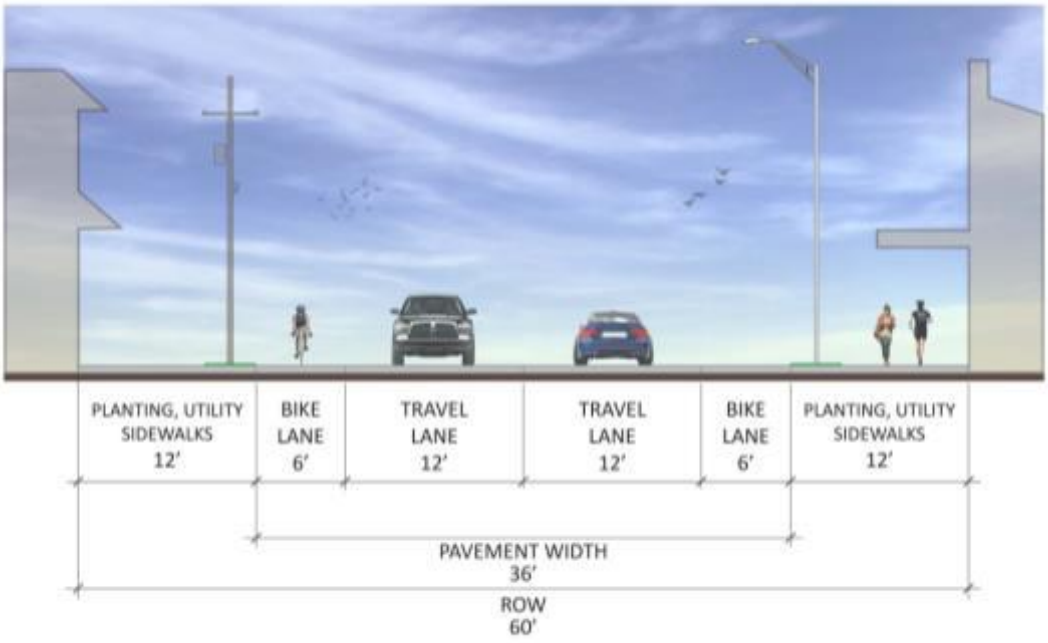


Exhibit 7-12. City of Wasco Arterial Design Standard

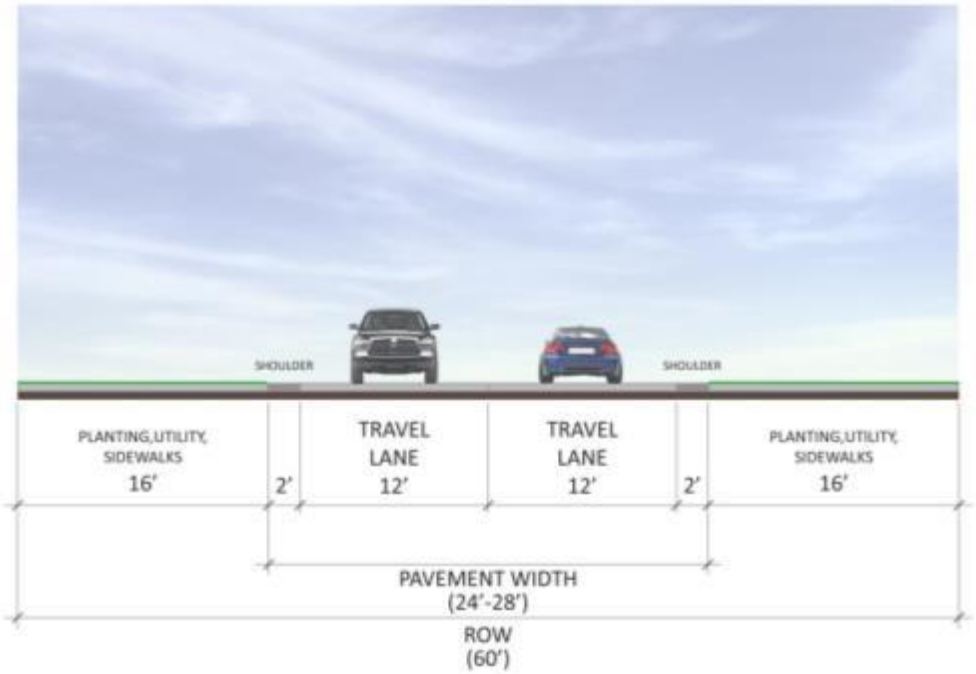


Exhibit 7-13. City of Wasco Collector Design Standard

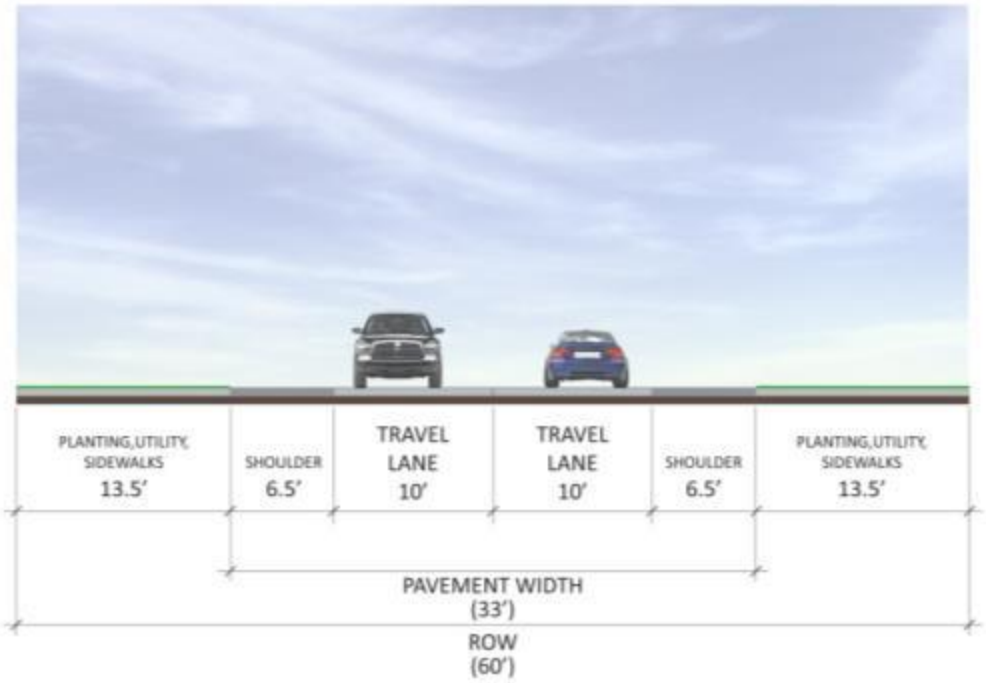


Exhibit 7-14. City of Wasco Local Street Design Standard

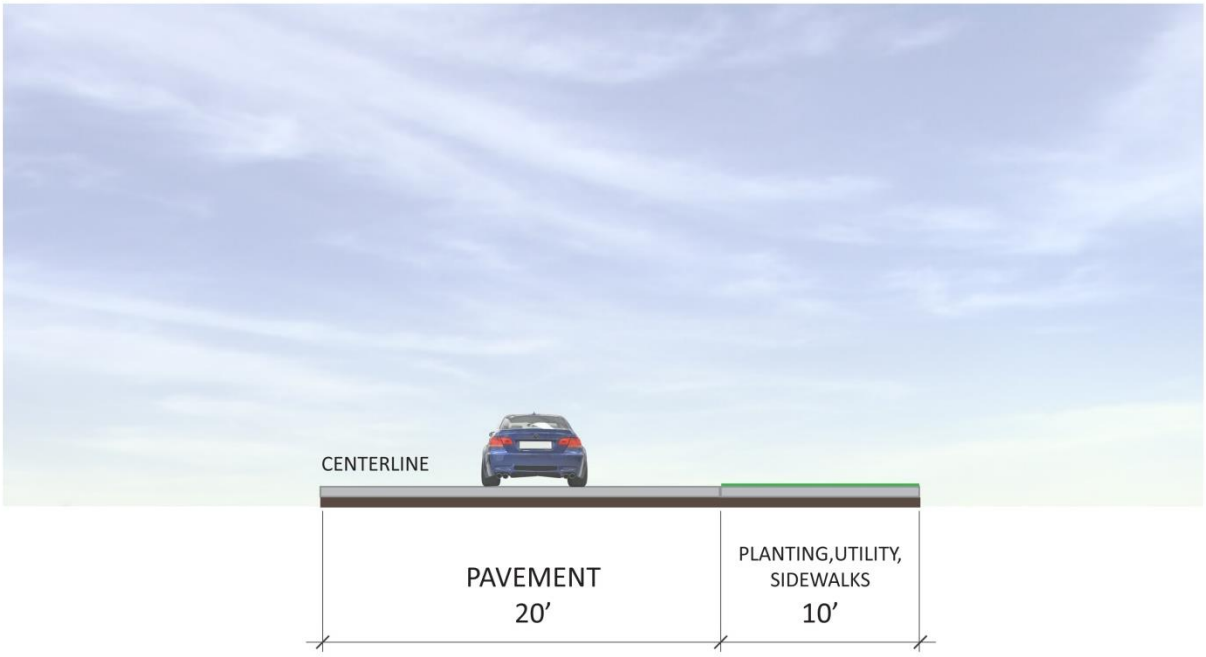


Exhibit 7-15. City of Wasco Half-Street Design Standard

Grass Valley Design Standards

City of Grass Valley's street standards are summarized in Table 7-5. Exhibit 7-16, Exhibit 7-17, Exhibit 7-18, and Exhibit 7-19 illustrate the cross-sections based on the road design standards for the City of Grass Valley for arterials, collectors, local roads, and half-streets, respectively.

Table 7-5. City of Grass Valley Road Design Standards

Type of Street	Right-of-Way Width	Paving Width Between Curbs[5]	Curb Return Radius	Maximum Percent of Grade	Minimum Radius of Curvature
Arterial [4]	60'	42'	35'	10%	400'
Collector [4]	60'	28'	35'	10%	300'
Residential [4]	60'	24'	25'	10%	150'
Half Street [4]	30'	20'	25'	10%	150'
Cul-de-sac [4]	50-60' [1]	36' [1]	25'	10%	150'
Alley	20'	20'	15'	10%	150'

1. The paving radius at the turn-around of a cul-de-sac shall be 38' on a right-of-way radius of 50'.
2. Minimum grade of 0.3%. If unavoidable conditions exist, a grade of 2% steeper than that shown will be allowed.
3. One street name sign shall be provided at each intersection for each street.
4. Curbs and gutters shall be provided on both sides of the street on Arterial and Collector Streets. Curbs, Gutters, pedestrian walkways and bike lanes may be required on Residential, Half Street, and Cul-de-sacs.

5. With approval from the City, pavement widths may be reduced to a minimum of 36’ for Arterials, 24’ for Collectors, 20’ for Residential streets, 18’ for half-streets, 15’ for alleys, and 26’ for a cul-de-sac.

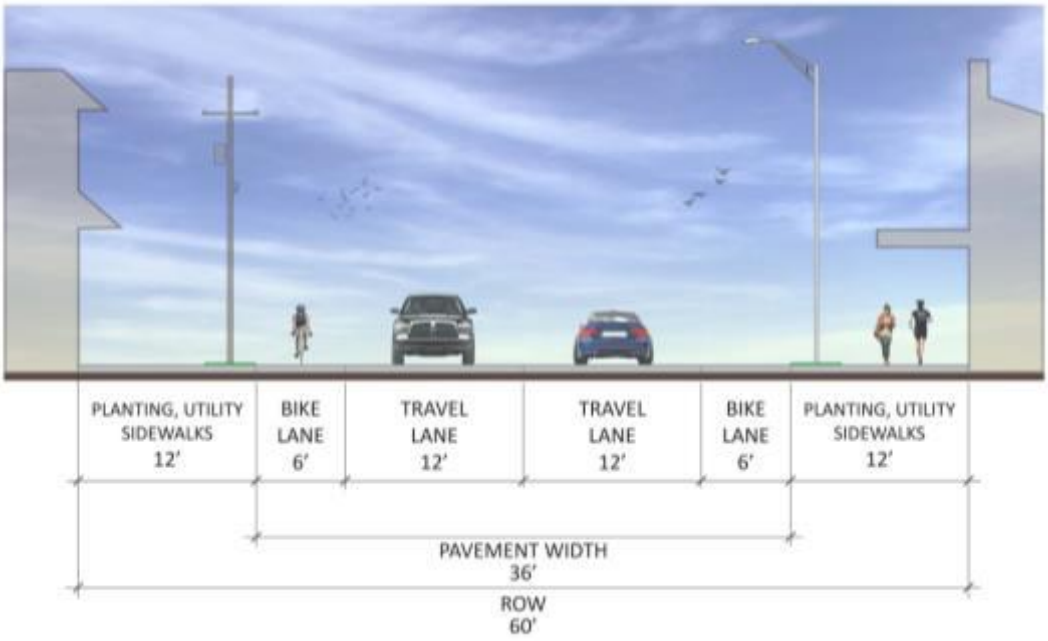


Exhibit 7-16. City of Grass Valley Arterial Design Standard

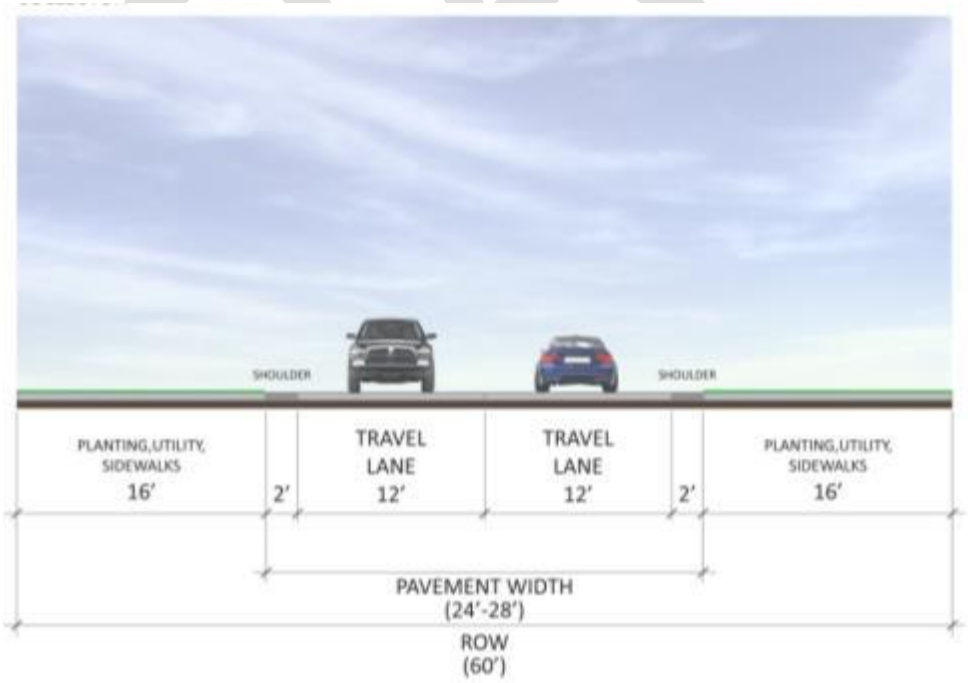


Exhibit 7-17. City of Grass Valley Collector Design Standard

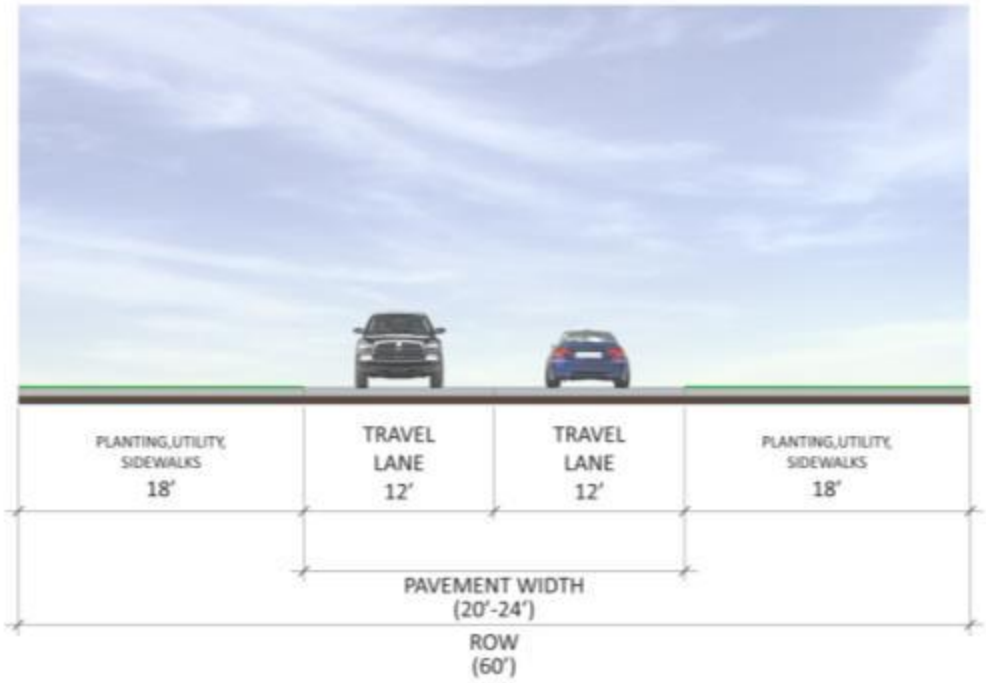


Exhibit 7-18. City of Grass Valley Local Road Design Standard

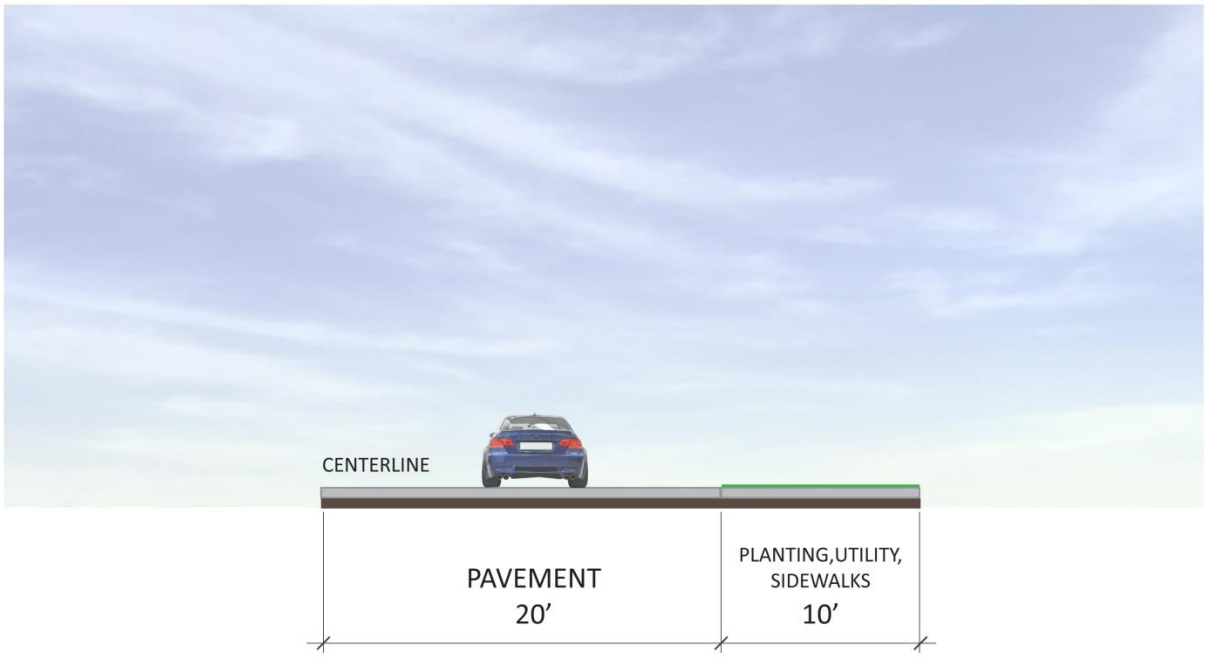


Exhibit 7-19. City of Grass Valley Half-Street Design Standard

Access Management Policy

Managing access to the County's road system is necessary to preserve capacity and maintain safety of the County's arterial and collector system. Capacity is preserved by minimizing the number of points where traffic flow may be disrupted by traffic entering and exiting the roadway. Access management also enhances safety along roadways by minimizing the number of potential conflict points.

Access spacing standards for all driveways and private roads accessing County collector and arterial roadways are provided in Table 7-6.

Access to state facilities is governed by ODOT's access management standards provided in the most current version of the Oregon Highway Plan and in Oregon Administrative Rule 734-051. ODOT's standards also apply to access spacing on County facilities located within the management area of a freeway or expressway interchange, as defined by OAR 734-051.

The Oregon Transportation Planning Rule (TPR) defines access management as a set of measures regulating access to streets, roads, and highways, from public roads and private driveways. The TPR requires that new connections to arterials and state highways be consistent with designated access management categories. This TSP includes an access management policy that maintains and enhances the integrity (i.e., capacity, safety, and level of service) of Sherman County's roadways.

Table 7-6. Access Management Spacing Standards for Rural Sherman County Roadways

Functional Classification	Public Road Spacing	Private Drive Spacing
Collector	¼ mile	1,200 ft
Local Street	200-400 ft	Vary

These standards apply to new development or redevelopment; existing accesses are allowed to remain as long as the land use does not change. As a result, access management is a long-term process in which the desired access spacing to a street slowly evolves over time as redevelopment occurs.

Traffic Operations Standards

Sherman County has an obligation to maintain a safe, convenient, and economical transportation system. A maximum volume-to-capacity (v/c) ratio of 0.85 during a typical weekday peak hour should be maintained for all City- and County-owned or maintained intersections. At intersections with an ODOT facility, ODOT standards shall apply. For unsignalized intersections, the v/c ratio should be based on the intersection's critical movement. For signalized intersections, the ratio is based on the overall intersection operation.

SYSTEMIC SAFETY PLAN

The Systemic Safety Plan identifies relatively low-cost safety projects that can be implemented systemically at locations with similar characteristics throughout the County. The methodology used to develop this Plan is summarized in **Section 6**.

Lists of prioritized Roadway Departure projects and Intersection projects, based on the set of objective criteria are provided in Table 7-7 and Table 7-8. Figure 7-2 illustrates the locations of these projects throughout the County.

Table 7-7. Systemic Safety Roadway Departure Projects

ID	Roadway	Start MP or Cross Street	End MP or Cross Street	Priority	Cost Estimate	Potential Countermeasures							
						Inlaid Raised Pavement Markers	Widen Shoulder & Install Safety Edge	Install Centerline and Shoulder Rumble Strips*	Curve Warning Signs	Chevrons at Curves	Guard-rail	Passing Lanes^	Speed Enforcement
95	US 97	0.86	6.20	High	$18,500	X		X	X	X			
4	US 97	42.43	43	High	$4,800	X		X	X	X		X	X
87	OR 206	3	6.1	Medium	$12,900	X		X	X	X			
88	US 97	22.5	23.9	Medium	$8,600	X		X				X**	
89	Scott Canyon Road	Rufus City Limits	Herin Lane	Medium	$9,500	X	X	X	X	X			
90	US 97	12	13.28	Medium	$6,600	X		X					
91	US 97	33.33	33.58	Medium	$4,000	X		X	X	X			
49 & 86	Van Gilder Road	4	5.6	Medium	$14,700	X	X	X	X	X	X		
92	Scott Canyon Road	Medler Ln	Gerking Canyon Rd	Low	$6,600	X	X	X	X	X			
2	Herin Lane	Scott Canyon Road	Oehman Road	Low	$9,200	X	X	X					
48	Lonerock Road	N/A	N/A	High	$5,300	X	X	X			X		
59	Blagg Lane	N/A	N/A	Low	$3,500	X	X	X	X	X			

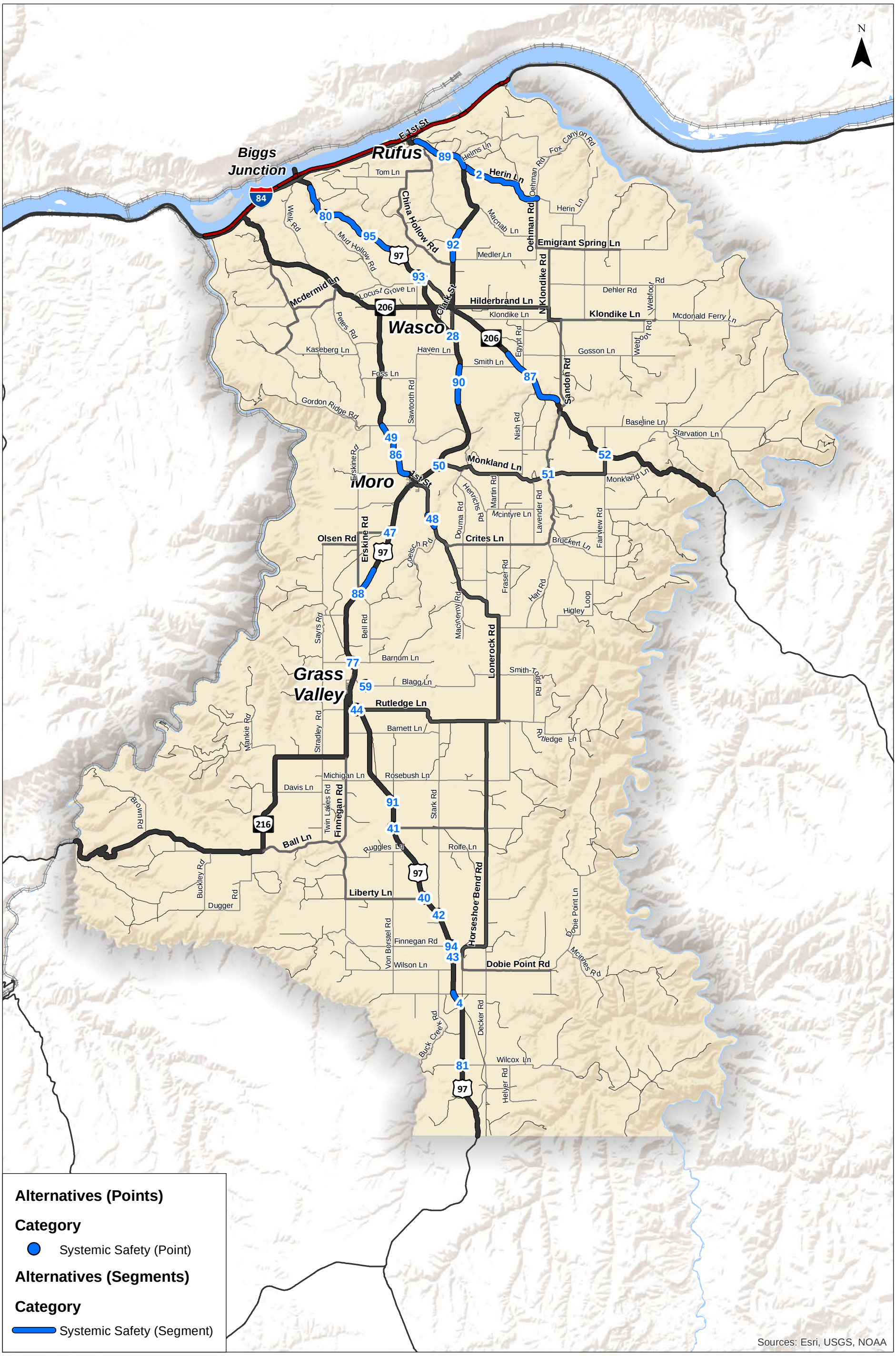
*Rumble strips should only be installed in locations where the shoulder width permits it.

^Passing lanes and speed enforcement should involve further study prior to implementation. Cost estimates do not include passing lanes.

**Passing lanes exist from approximately MP 23 to 23.55. The study should evaluate whether this passing lane can be lengthened.

Table 7-8. Systemic Safety Intersection Projects

ID	Major Road	Minor Road	Priority	Cost Estimate	Potential Countermeasures						
					Rural Intersection Signing and Marking Improvements	Right-turn deceleration Lane	Lengthen existing right-turn deceleration lane	Install left-turn lane	Lengthen existing left-turn lane	Improve sight distance	Reduce intersection skew
50	US 97	Monkland Lane	High	$309,900				X		X	
77	US 97	Barnum Lane	High	$309,900				X			
93	US 97	Sawtooth Road	High	$6,500	X						
94	US 97	Finnegan Road	Medium	$18,500							X
42	US 97	Stark Lane	Medium	$5,000						X	
47	US 97	Moore Lane	Low	$25,600			X				
52	OR 206	Fairview Road	Medium	$27,300	X						X
44	US 97	Rutledge Lane	Medium	$25,600							X
80	US 97	Mud Hollow Road	Medium	$309,900				X			
40	US 97	Liberty Lane	Medium	$210,000		X					
41	US 97	Bourbon Lane	Medium	$309,900				X			
27	US 97	Old Highway 97	Medium	$309,900				X			
20	W 1st Street / Biggs-Rufus Highway	Industrial Access	High	$309,900				X			
43	US 97	Dobie Point Road	High	$514,900		X		X			
28	US 97	Clark Street	Low	$25,600			X				
81	US 97	Wilcox Lane	Medium	$309,900				X			
51	Monkland Lane	Hay Canyon Road	Medium	$3,200	X						



Systemic Safety Projects
Sherman County, Oregon

Figure **7-2**

K:\H_Portland\proj\file\18054 - Sherman County TSP\gis\Draft TSP\7-2 - Systemic Safety Projects.mxd - agriffin - 3:29 PM 7/28/2015

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County

IMPLEMENTATION PLAN

This section outlines specific transportation system projects, policies, programs, pilot projects and studies of the plan as well as overall prioritization: near- and long-term. The prioritization presented reflects the relative time period in which it may be foreseeable for the County and Cities to implement the identified plan elements; it is not intended to limit the selection of a plan element or the order in which elements will be implemented. The County will need to periodically update its TSP and will review the need and timing of plan elements at those times.

Long-term plan elements may or may not be feasible within the twenty-year planning horizon, for reasons of both need and resources. However, they represent a vision for an efficient transportation system in the future, and have been identified to support the preservation of the opportunities as future conditions may warrant them.

The construction of roads, water, sewer, and electrical facilities in conjunction with local development activity should be coordinated if the County is to develop in an orderly and efficient way. Consequently, the identified plan elements should be considered in light of developing infrastructure sequencing plans, and may need to be modified accordingly.

The transportation plan elements include those identified to address various types of transportation issues, which generally include:

- *Operations:* These elements provide the roadway capacity needed to accommodate future traffic flows and reduce delay.
- *Safety:* These elements consider opportunities to improve existing facilities to reduce probability and severity of crashes. These elements include those identified as part of the Systemic Safety Plan for the County.
- *Pedestrian and Bicycle Enhancements:* These elements improve existing facilities or create new facilities that provide greater connectivity and increase access to pedestrian and bicycle routes.
- *Heavy Maintenance:* These projects address the needs identified by the County that relate to roadway, roadside, or drainage and cannot be conducted as part of regular maintenance activities.
- *Full Reconstruction:* These projects include reconstruction of the roadway including removal of existing roadway and placement of aggregate base and asphalt pavement.
- *Feasibility Studies:* These elements have identified the need for some level of long-term improvements to different roadway segments or intersections. Given the size and complexity, a more detailed evaluation of potential improvements has been identified that is beyond the scope of the TSP.
- *Pilot Projects*: Pilot projects are innovative projects that can be done on an interim basis and can be reversed if needed.
- *Programs/Policies*: The programs and policies reflect changes to County or City operations or code that has an impact on the transportation system.

While site-specific projects, such as adding turn lanes at an existing intersection, have been included to improve conditions at particular locations, the Plan elements collectively reflect a broader goal which is to develop an efficient transportation network that will reduce reliance on the state highways and limit potential for motor vehicle crashes while encouraging economic activity.

Roadway Transportation Plan Elements

The near- and long-term transportation plan elements within unincorporated areas of Sherman County are listed in Table 7-9, and the transportation plan elements for the incorporated cities of Rufus, Wasco, Moro, and Grass Valley are shown in0. The table includes a project number for reference to the plan element location illustrated in Figure 7-3 for rural areas and Figure 7-4 for urban areas, respectively. Additionally, the tables include preliminary cost estimates with 40-percent contingency for the plan elements, excluding right-of-way. Potential non-binding funding sources were also identified for each plan element and are subject to negotiation at the time of plan element execution. *Cost estimate calculations and assumptions are provided in* ***Appendix A****. Project prospectus sheets, documenting concepts for each plan element, are provided in* ***Appendix B****.*

The implementation plan incorporates the finance plan, which identifies that a limited amount of money will be available to fund plan elements. As a result, only plan elements that are identified for implementation and are expected to have funding are shown in the near-term time frame. The long-term timeline reflects the fact that some plan elements are not needed immediately and that it will take time to accumulate the funds to implement these elements.

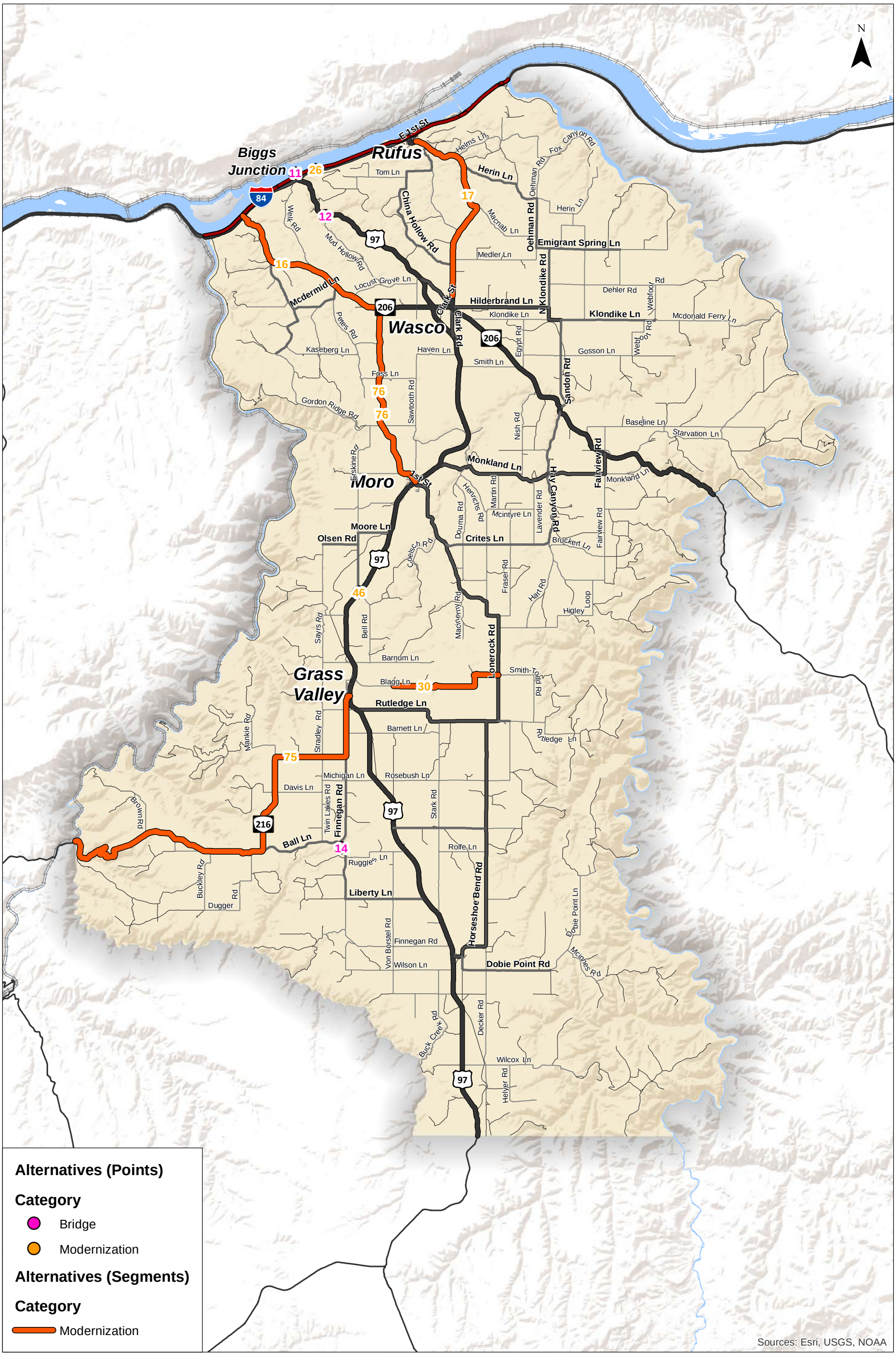
Table 7-9. Plan Elements in Sherman County (including unincorporated areas of Biggs and Kent)

ID	Name	Description	Category	Type	Cost Estimate[1]	Potential Funding Source			
						ODOT/ State	County	Cities	Private
Short-Term Plan Elements									
72	Traffic Speeds on US 97	Improve education and enforcement related to traffic speeds in the County through programs and additional signage or campaigns. Evaluate the feasibility of using ITS treatments to reduce speed in Cities throughout the County.	Safety	Program/ Study	$20,000	X	X	X	
73	Truck Volumes and Speeds on US 97 in Cities	Install speed reduction treatments on US 97 to reinforce posted speeds in cities. Speed reduction treatments may consider automated speed enforcement, speed feedback signs, roadway modifications to visually indicate to drivers that they are entering urban area.	Safety	Project	$56,800	X	X	X	
74	Passing Opportunities on US 97	Conduct study to determine locations where passing lanes are needed. Supplement with previous work ODOT has completed.	Safety	Study	$10,000	X	X		
5	Weather-related crashes	Conduct study to determine feasibility and cost of implementing treatments for weather related crashes, including: ITS treatments, different pavement materials, warning signs, etc.	Safety	Study	$10,000	X			
97	I-84 Westbound Variable Message Sign	Replace variable message sign on I-84 westbound at Rufus, Construction scheduled for 2018	Modernization	Project	$400,000	X			
Long-Term Plan Elements									
11	US 97 Bridge over Columbia River at Biggs Junction	Improve or replace bridge to meet current design standards. (Note: Future improvement or maintenance of this bridge fall under the Washington Department of Transportation's responsibility.)	Bridge	Project	N/A	X			
12	Mud Hollow Road Bridge over Spanish Hollow Creek	Clean out the stream and place new revetment because of the history of scour and rock accumulation. The bridge will remain structurally deficient but is fit for use.	Bridge	Project	$100,000		X		
14	Finnegan Road Bridge over Finnegan Creek	Study the feasibility of improving or replace bridge to meet current design standards.	Bridge	Project	$20,000		X		
18	Intermodal freight connections at Biggs Junction	Evaluate opportunities for improved freight connections between trucks, rail, and river cargo.	Intermodal	Study	$20,000	X	X		X
26	Maddie's Hump	Upgrade to major collector. Study feasibility of widening shoulders.	Modernization	Project & Study	$10,000	X	X		
46	US 97 / Erskine Road	Widen the throat of Erskine Road.	Modernization	Project	$56,900	X	X		
96	Intersection Lighting in Kent	Install illumination at the intersections of US 97/2nd Street and US 97/4th Street in Kent.	Modernization	Project	$50,000	X	X		
30	Eastern Alternate Access to Raceway	Pave Blagg Lane from Oregon Raceway to Lonerock Road. Consider upgrading the functional classification.	Roadway	Project	$2,559,600		X		X
31	Northern Alternate Access to Raceway	Construct a secondary access from the Oregon Raceway to Barnum Lane.	Safety	Project	$484,100		X		X
55	Wildlife Crossings	Conduct a study to determine where wildlife crossings are needed on the major state highways. Estimate the cost of installing the crossings.	Safety	Study	$10,000	X			

Table 7-10. Plan Elements in Urban Areas

ID	City	Name	Description	Category	Type	Cost Estimate[1]	Potential Funding Source			
							ODOT/ State	County	Cities	Private
Short-Term Plan Elements										
23	Rufus	1st Street/Biggs-Rufus Highway Bridge (west of Sullivan Ln)	Evaluate structural integrity of the existing bridge and establish cost estimates for required improvements to support structural integrity and serve existing traffic use.	Bridge	Study	$20,000	X	X		
24	Rufus	1st Street/Biggs-Rufus Highway Bridge (east of Fowler St)	Evaluate structure integrity of the existing bridge and establish cost estimates for required improvements.	Bridge	Study	$20,000	X	X		
19	Rufus	Murray Street	Install traffic calming measures on Murray Street to reinforce posted speed and deter cut-through traffic.	Modernization	Project	$10,000			X	
21	Rufus	2nd Street/Wallace Street	Connect 2nd Street to 1st Street 300' west of Wallace Street. Vacate 2nd Street from new connection to Wallace Street. Consider extending 3rd Street to 2nd Street/1st Street.	Safety	Project	$95,800			X	
68	Rufus	Intersection of 2nd Street/Biggs Rufus Highway	Vacate 2nd Street from Murray Street to 1st Street.	Safety	Project	$22,300	X		X	
56	Wasco	Wasco Wayfinding Signage	Provide better signage to direct vehicles to highways, Rufus, and Cottonwood Canyon State Park.	Modernization	Project	$6,800			X	
66	Moro	High School Access	Restripe southern access points to restrict minor street left-turns to northern part of fork and make southern entrance one-way incoming northbound only. Add southbound left-turn lane at northern intersection on US 97. Relocated speed limit signs to reduce speed limit further in advance of intersection. Consider speed feedback signs to reduce speeds in advance of intersections.	Safety	Project	$204,700	X	X	X	
Long-Term Plan Elements										
22	Rufus	Biggs Rufus Highway (1st Street) lacks defined on-street parking.	Define access management along the highway and define on-street parking spaces.	Modernization	Project	$28,400	X		X	
25	Rufus	2nd Street Bridge (east of Fowler St)	Close bridge to traffic when 2nd Street is closed to traffic as part of Project #68.	Bridge	Project	$0			X	
69	Rufus	Fowler Street Parking	Vacate Fowler Street from 1st Street to 2nd Street and convert to a parking lot with access to 2nd Street only.	Modernization	Project	$27,300			X	
71	Rufus	Rufus Parking Analysis	Conduct a parking options study and analysis for the business and residential block.	Modernization	Study	$10,000			X	
45	Grass Valley	North Street/US 97	Reconstruct North Street approach to US 97 to provide larger turn radius, and add a left-turn lane from US 97 to North Street.	Modernization	Project	$91,000	X		X	

[1] Cost estimate is planning level only. Does not include right-of-way costs.



Rural Transportation Alternatives
Sherman County, Oregon

Figure **7-3**

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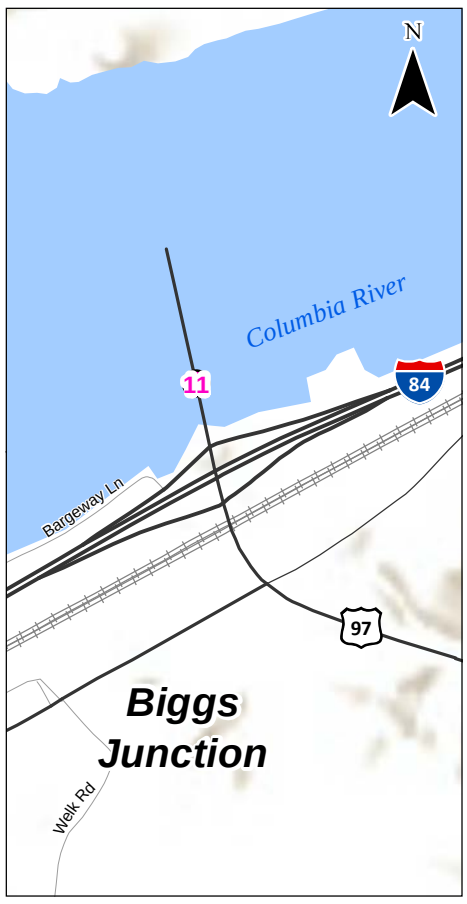
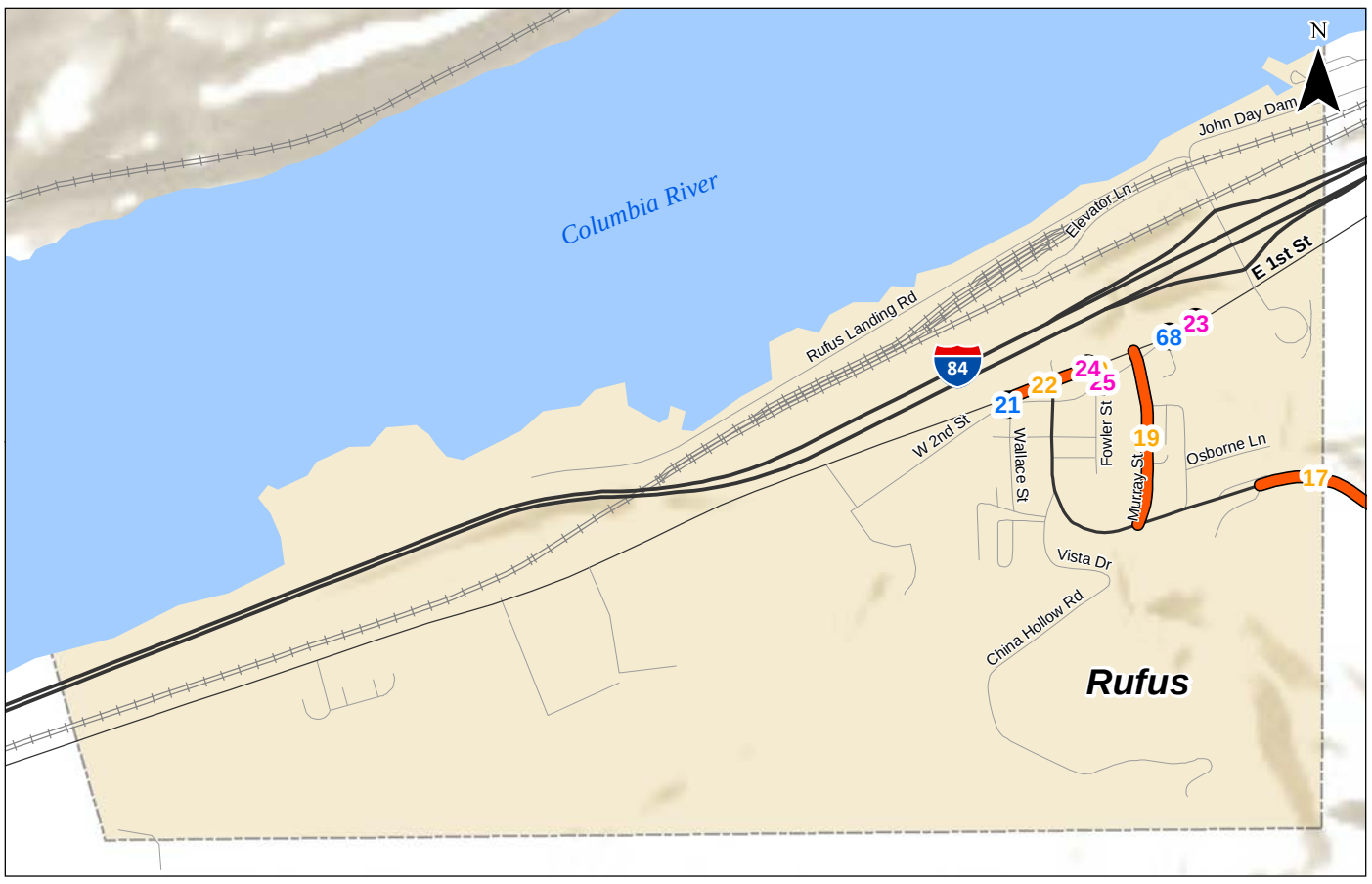
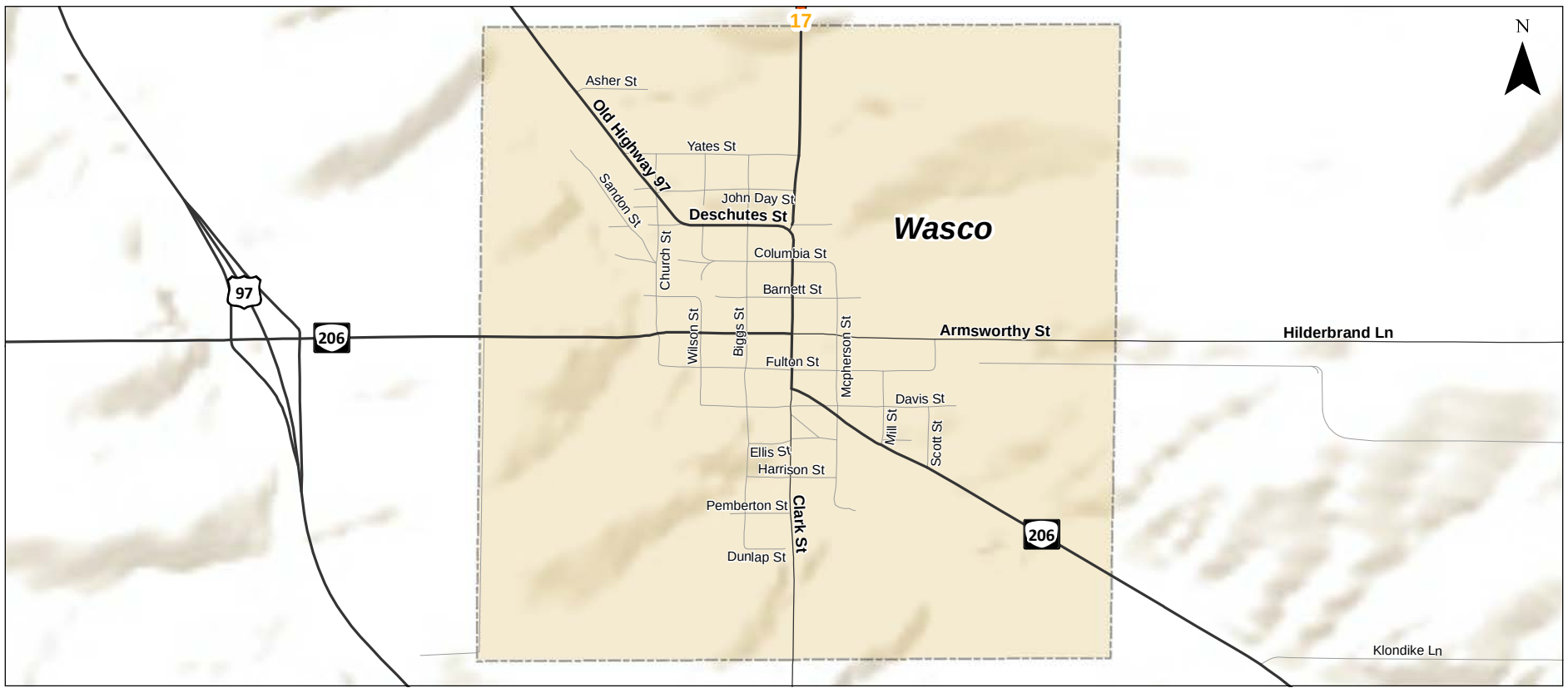
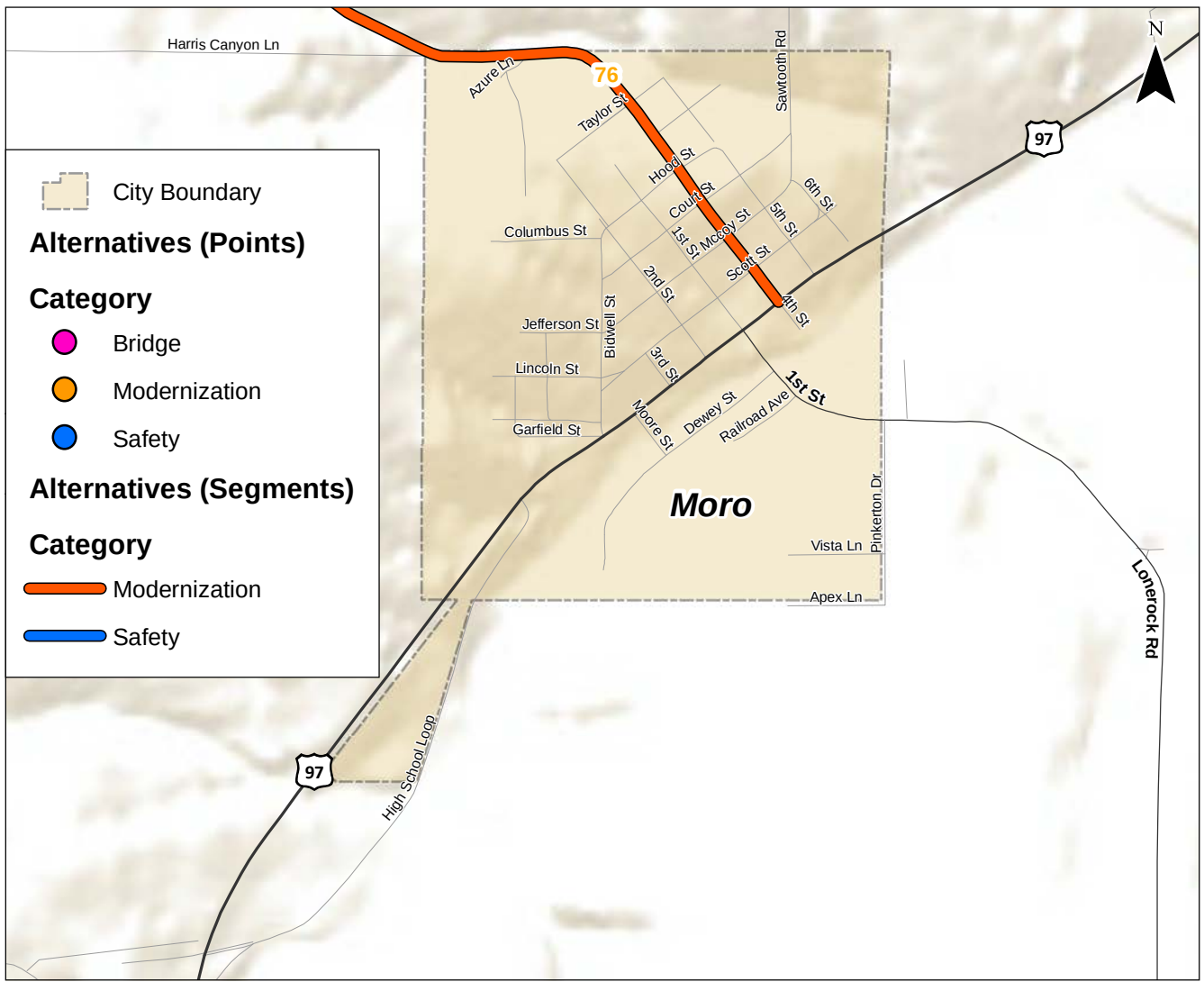
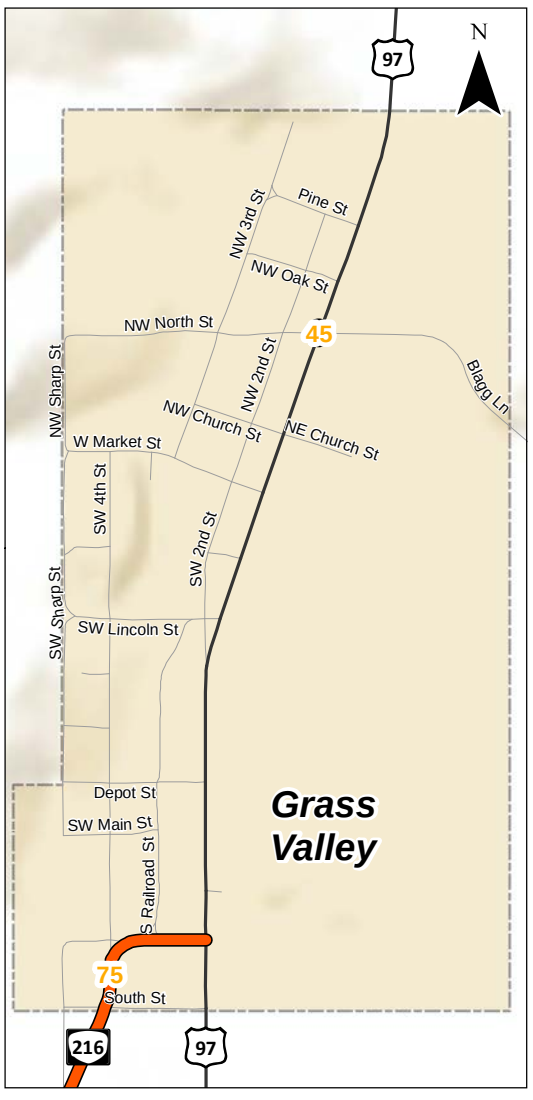
Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Wasco County











Urban Transportation Alternatives
Sherman County, Oregon

Figure **7-4**

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Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl
Data Source: Wasco County

The total cost of projects, policies, programs, and feasibility studies shown in Table 7-9 and 0 that are expected to be implemented in the near-term is approximately $500,000. The total cost of the long-term plan elements is approximately $3.3 million.

PEDESTRIAN AND BICYCLE SYSTEM PLAN

Expanding the sidewalk network to create connected networks within the four Cities and to provide new paths in and around the incorporated areas to encourage residents and visitors to ride bicycles for transportation is a priority for the County and Cities. Providing a connected network of pedestrian and bicycle facilities is important for:

- Serving shorter trips from neighborhoods to area activity centers, such as schools, churches, and neighborhood commercial uses;
- Providing access to regional park and ride lots to enhance intermodal connections; and
- Meeting residents' and visitors' recreational needs, further promoting economic activity in the County.

Table 7-11 and Figure 7-5 summarizes the planned pedestrian and bicycle projects for the next twenty years. In rural Sherman County, bicycle and pedestrian design standards provide paved shoulders on arterials and minimum two-foot paved or unpaved shoulders on all other, lower volume roads to facilitate pedestrian and bicycle travel. Within the cities, the standards for arterials include shoulders to accommodate bicyclists in a separate space from vehicles. Bicyclists are expected to share the road with vehicles on the other local roads in the cities due to the low speeds and low volumes.

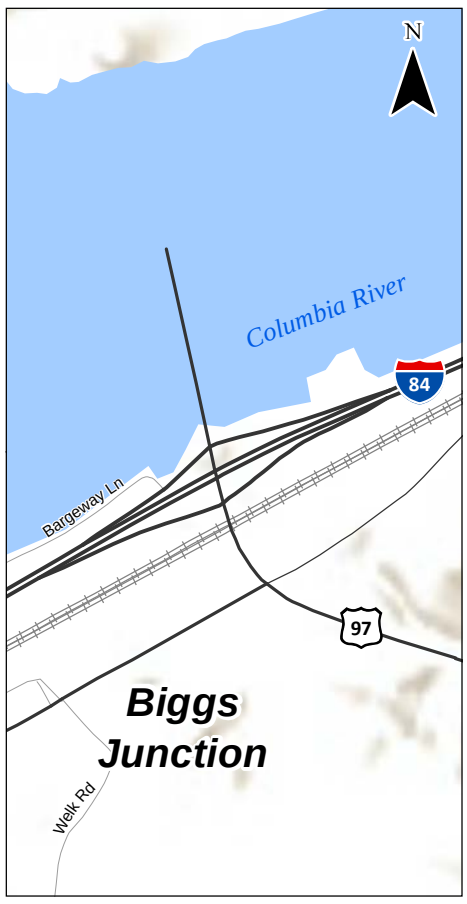
Urban arterials, collectors, and local streets should include sidewalks as they are developed within the city limits. A complete connected sidewalk network will encourage walking as a mode of transportation within each City. Key gaps in the existing sidewalk infrastructure as well as locations with sidewalks in need of repair and other enhancements are identified in Table 7-11 and Figure 7-5.

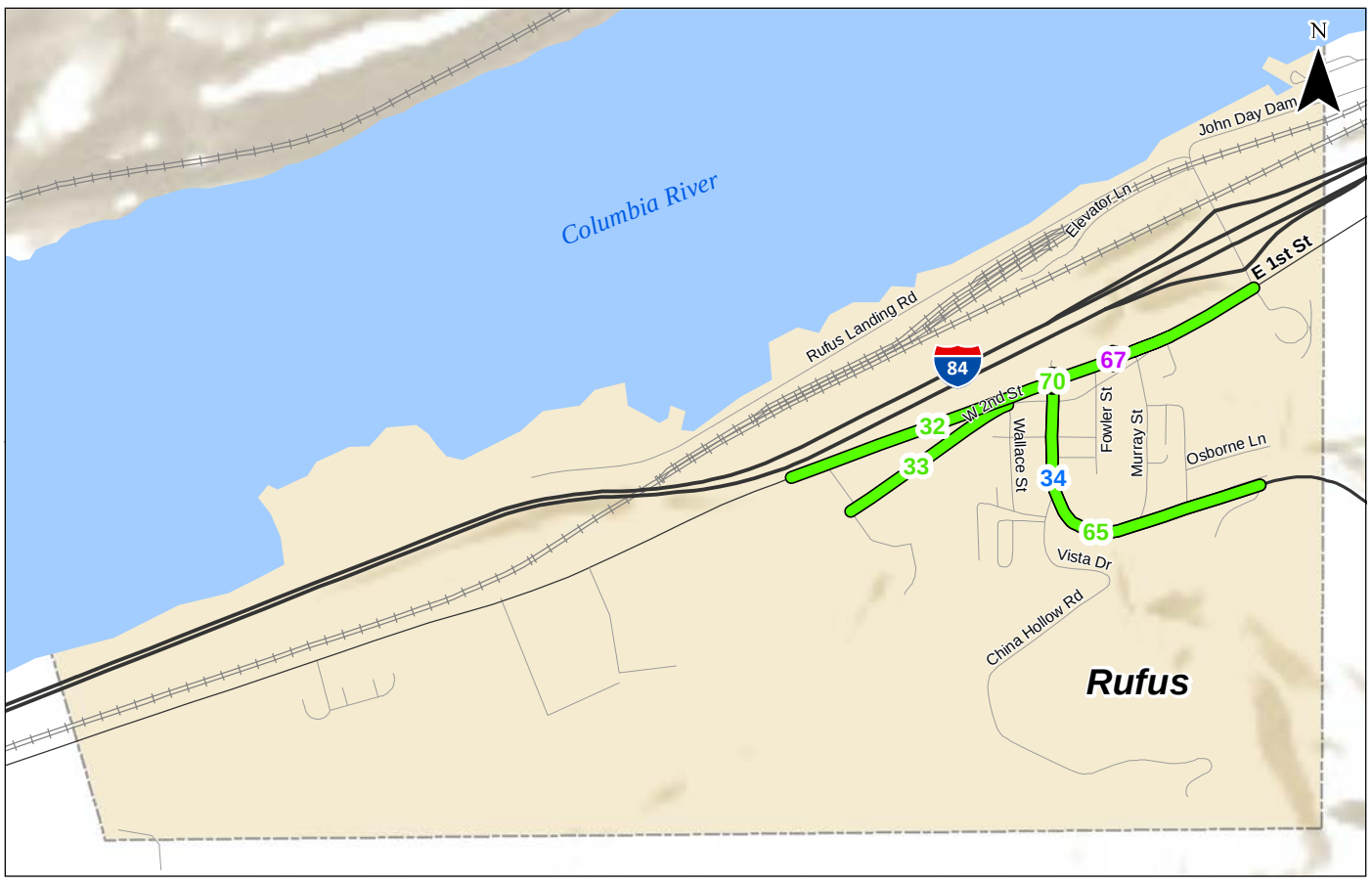
The total cost for all near-term pedestrian and bicycle system improvements is approximately $304,000. The total cost for all long-term pedestrian and bicycle system improvements is approximately $4.7 million, with the largest portions allocated to enhancing the pedestrian systems in Wasco and Rufus.

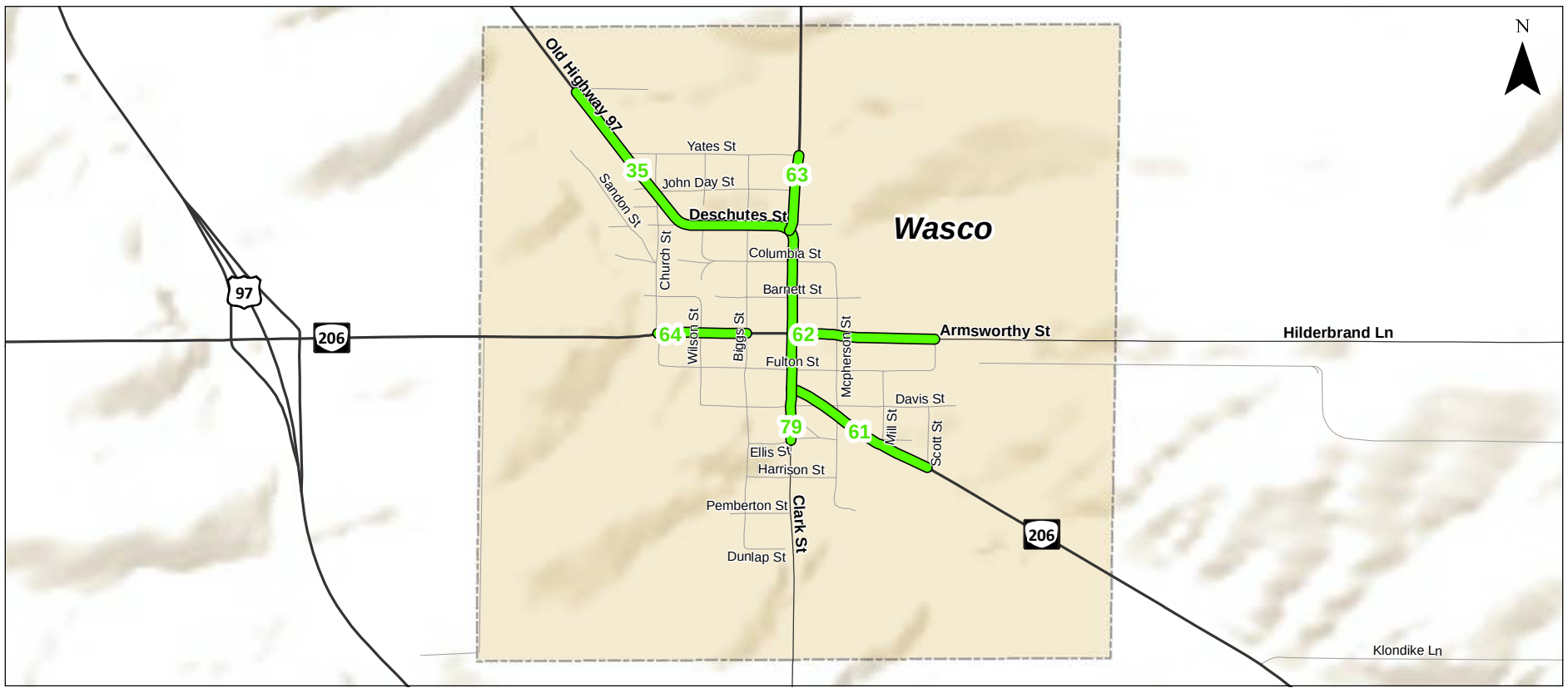
Table 7-11. Planned Pedestrian and Bicycle Improvements in Sherman County

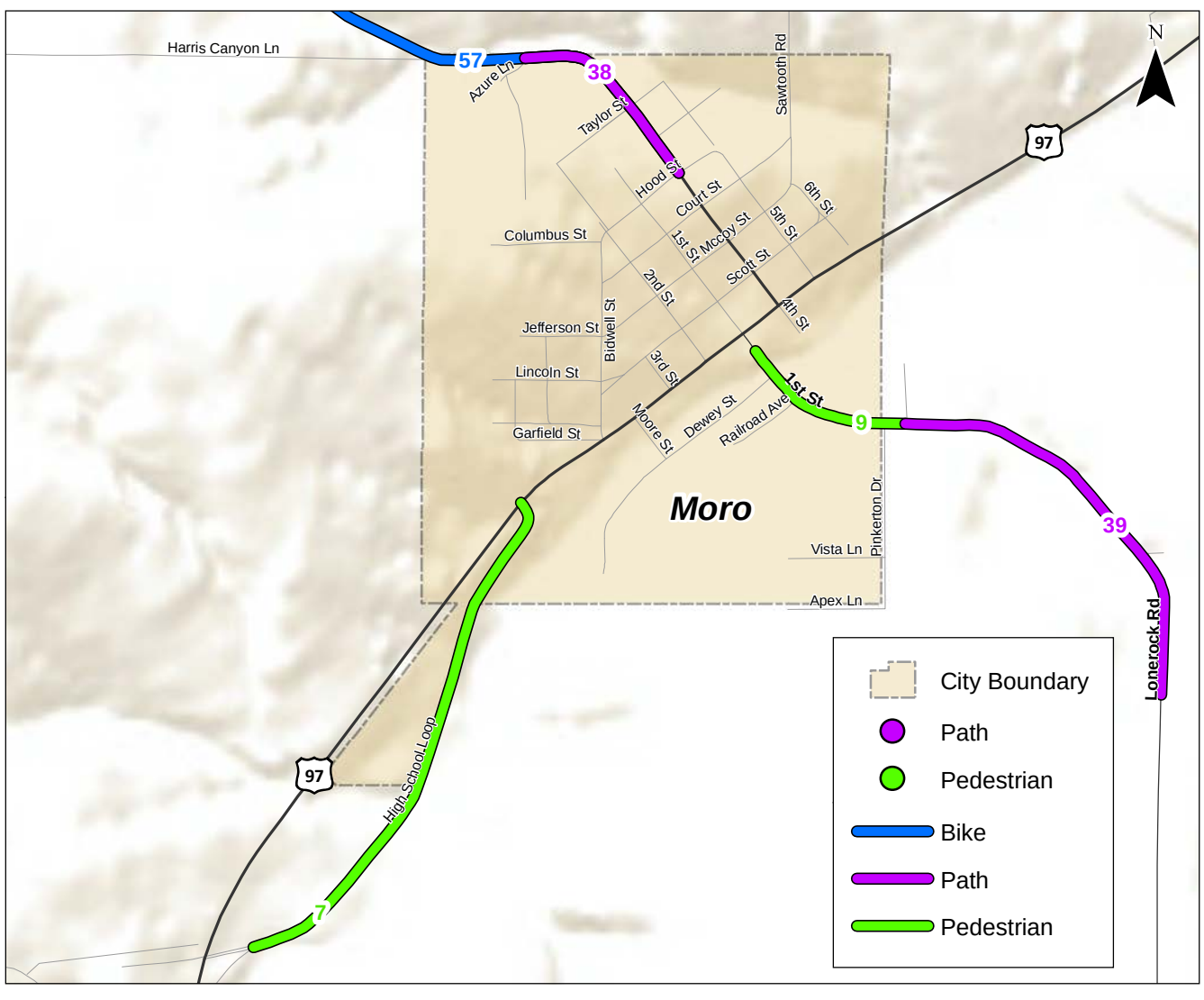
ID	Location	Name	Description	Category	Cost Estimate[1]	Potential Funding Source			
						State	County	Cities	Private
Short-Term Projects									
32	Rufus	1st Street Sidewalks (Rufus)	Install sidewalks and pedestrian scale lighting along both sides of 1st Street from Sullivan Ln to Wallace Street	Pedestrian	$300,600	X		X	
70	Rufus	Pedestrian Crossings of Biggs-Rufus Highway	Stripe crossing of 1st Street at Main Street.	Pedestrian	$2,800	X		X	
Total Cost for Short-Term Rufus Projects					**$304,000**				
Long-Term Projects									
10	County	Bicyclist Routes	Promote the bike routes that are currently popular routes and identify opportunities to route cyclists off of US 97 when possible. Provide signage to encourage cyclists to use alternate routes from the highway and provide warnings signs on these routes to inform drivers of the bicycle routes.	Bike	$17,000	X	X		
57	County	Van Gilder Road	Provide directional signage for cyclists; warning signs for motorists to share the road.	Bike	$5,100		X		X
39	County	Ped/Bike Connections along Lonerock Road, east of City Limits of Moro	Install a shared-use path along Lonerock Road from East City Limits to Fairgrounds.	Path	$270,300		X		
Total Cost for Long-Term County Projects					**$293,000**				
34	Rufus	Bikes on Main Street (Rufus)	Widen to accommodate a bicycle lane.	Bike	$164,100	X		X	
65	Rufus	Main Street Sidewalks	Install sidewalks on Main Street from Vista Drive to 1st Street.	Pedestrian	$500,600				
67	Rufus	Rufus Ped/Bike Access Under Freeway and Railroad	Conduct environmental impact study to determine whether Gerking Gulch is a feasible undercrossing of I-84 and railroad for ped/bike users between 1st Street and the Columbia River.	Path	$20,000	X		X	
33	Rufus	2nd Street Sidewalks (Rufus)	Install sidewalks along the south side of 2nd Street from Main Street to Community Center	Pedestrian	$368,100			X	
Total Cost for Long-Term Rufus Projects					**$1,053,000**				
35	Wasco	Old Highway 97 Sidewalks	Install sidewalks on both sides of Old Highway 97 from Clark Street to 6th Street and along the east side of the road from 6th Street to Asher Street.	Pedestrian	$1,032,000	X	X		
61	Wasco	OR 206 Sidewalks (Clark Street to Scott Street)	Install sidewalks on OR 206 from Clark Street east to Scott Street.	Pedestrian	$723,400	X		X	
62	Wasco	Armsworthy Street Sidewalks	Install sidewalks on Armsworthy Street from Church Street to Scott Street.	Pedestrian	$397,500	X		X	
63	Wasco	Clark Street Sidewalks	Install sidewalks on Clark Street from Old Highway 97 to Yates Street.	Pedestrian	$231,400	X		X	
64	Wasco	OR 206 Sidewalks (Biggs Street to Church Street)	Install sidewalks on OR 206 from Biggs Street to Church Street.	Pedestrian	$152,800	X		X	
79	Wasco	Existing Clark Street Sidewalks	Upgrade existing sidewalks along Clark Street from Columbia to Ellis, and add sidewalks on the east side.	Pedestrian	$208,200	X		X	
Total Cost for Long-Term Wasco Projects					**$2,538,000**				
9	Moro	Lonerock Road Sidewalks	Construct sidewalks on the north side of the road.	Pedestrian	$172,300		X	X	
38	Moro	Ped/Bike Connections along 4th Street to Azure Lane in Moro	Install a shared-used path along 4th Street/Van Gilder Road from Hood Street to Azure Lane.	Path	$134,600		X	X	X
7	Moro	Sidewalks to High School	Install sidewalks or a shared-use path between the High School and the existing sidewalks on Main Street.	Pedestrian	$184,300	X	X	X	
Total Cost for Long-Term Moro Projects					**$492,000**				
84	Grass Valley	US 97 Pedestrian Scale Lighting	Install pedestrian scale lighting along the sidewalks on US 97 in Grass Valley.	Pedestrian	$266,100	X		X	
Total Cost for Long-Term Grass Valley Projects					**$267,000**				

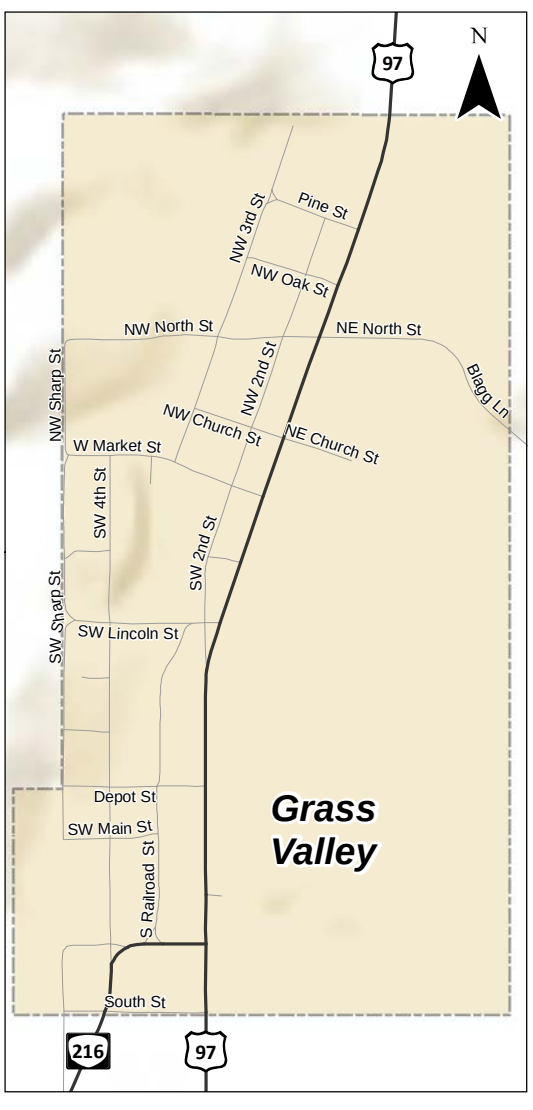
[1] Cost estimate is planning level only. Does not include right-of-way costs.











Pedestrian and Bicycle Plan
Sherman County, Oregon

Figure **7-5**

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Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl
Data Source: Wasco County

PUBLIC TRANSPORTATION PLAN

Sherman County is a Special Transportation Fund (STF) agency. As such, it is required by the state to have a coordinated transportation plan to guide the investment of STF money. The Coordinated Transportation Plan is intended to improve transportation services for people with disabilities, elderly, and low income.

The Mid-Columbia Economic Development District, under contract with the Association of Oregon Counties, prepared the Sherman County Coordinated Transportation Plan Update for 2009 through 2012. An addendum was prepared by Mid-Columbia Economic Development District under the scope of work of the Gorge TransLink Mobility Manager. The addendum covers year 2012 and 2013 and prioritized strategies that the transit service providers can use to develop projects. The high priority strategies in the Coordinated Transportation Plan were grouped into six categories: sustain existing transportation services; operations; service routes; information about services available; planning and coordination; and fares.

The Plan was due for an update in 2013 to evaluate the progress on the highest priorities, gauge interest on these priorities, and identify any unmet community needs. Although Sherman County has the necessary funding it needs as of 2015, the County's Coordinated Transportation Plan should be updated to maintain compliance with federal and state requirements and to maintain STF funding. Improvements and future funding of public transportation in Sherman County should be implemented in accordance with the Coordinated Transportation Plan.

AIR SERVICE

The Wasco State Airport serves Sherman County. The airport is located on the east side of Wasco and is classified as a Local General Aviation Airport by the Oregon Aviation Plan. The airport is operated by the State of Oregon and accommodates general aviation and agricultural users serving the local community and surrounding region. The Wasco State Airport Layout Plan was developed in 2002 for the Oregon Department of Aviation, which owns the facility. There are no planned projects associated with the Wasco State Airport.

MARINE SYSTEM PLAN

Sherman County is located on the Columbia River, a major water transportation route. River cargo operations are located at Biggs Junction, where Mid-Columbia Producers export much of their grain in the region.

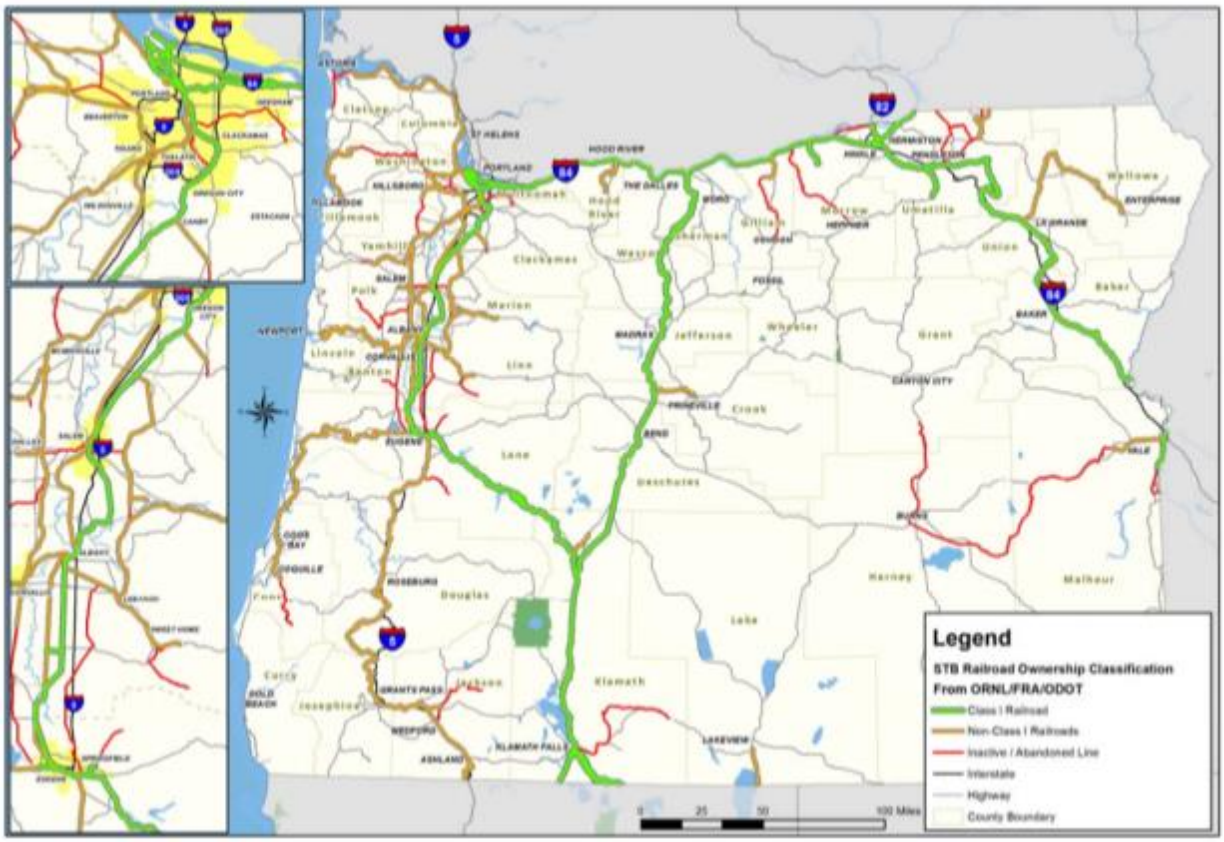
Rufus has access to the river which could be developed for recreational or industrial purposes in the future.

Project number 18 in Table 7-9 identifies a planned study to evaluate opportunities for intermodal connections between the rail system, roadway system, and marine transportation system. Improving intermodal connections between the marine transportation system, roadway system, and rail system supports the County's goal of encouraging economic growth with industrial land uses.

RAIL SERVICE

The Union Pacific Main Line (UP) and the Burlington Northern/Santa Fe Bend Branch (BNSF) travel through Sherman County. As shown in Exhibit 7-1, both railroads are designated as Class I Railroads. Although Biggs Junction is connected to the UP line with a spur that serves the Mid-Columbia Grain Growers Terminal, the spur is inactive. There are no active train stops in Sherman County.

Future industrial developments in the County should be planned near railroad lines when possible. Railroads can move some commodities and products more efficiently than highways. Having access to rail service provides more transportation options and may increase the value of the land. Project number 18 in Table 7-9 identifies a planned study to evaluate opportunities for intermodal connections between the rail system, roadway system, and marine transportation system. By promoting access to railroads for industrial lands and providing intermodal opportunities, Sherman County will support industrial development and economic growth.



Source: Oak Ridge National Laboratory Rail GIS Data, FRA, ODOT

Exhibit 7-20. State of Oregon Railroads

PIPELINE AND TRANSMISSION SYSTEM PLAN

Two natural gas pipelines run through Sherman County although they do not currently serve the County. Sherman County recognizes the potential for connections to these pipelines as future demand for natural gas increases. The County is committed to working with outside interests to safely and efficiently plan for and properly locate these connections.

Future extension of a high-speed broadband service is planned from Idaho along the Columbia River. Sherman County may be able to provide broadband services to its citizens through this line. A broadband internet connection could allow for implementation of Intelligent Transportation Solutions along I-84 that could have a positive effect on transportation safety and mobility. Other benefits of this added service could spur economic development.

Section 8 Transportation Finance Element

TRANSPORTATION FINANCE PLAN

Funding for transportation projects is increasingly in short supply as existing infrastructure ages and transportation demands increase. This section provides a means for evaluating the likelihood that projects can be funded within the timelines identified in the TSP and defines priorities based on available funding opportunities.

The TPR requires that the Sherman County TSP address transportation funding, including the following elements:

- A list of planned transportation facilities and major improvements;
- A general estimate of the timing for planned transportation facilities and major improvements;
- Determination of rough cost estimates for the transportation facilities and major investments identified in the TSP; and,
- A discussion of existing and potential financing sources for each transportation facility and major improvement (which can be described in terms of guidelines or local policies).

Current Sherman County Transportation Funding Revenues

Sherman County has had an annual revenue of approximately $2.2 million per year over the past ten years. This funding covers all transportation related projects, including maintenance and capital improvements projects. As shown in Exhibit 8-1, the County's transportation revenue comes from a variety of sources including property taxes, other local revenue, state revenue, and federal revenue. ODOT has historically been able to fund the County's transportation operations and maintenance activities for state facilities.

Exhibit 8-2 shows that the County has had a small portion of transportation revenue remaining at the end of each fiscal year with the exception of two years when the expenditures exceeded the revenue. Over the past ten years, approximately $1.9 million in excess transportation revenue has been accumulated. The majority of transportation expenditures over the past 10 years have covered operations, maintenance, and system preservation, as shown in Exhibit 8-3. Approximately $200,000 were used for new facilities and system enhancement projects during the past ten years.

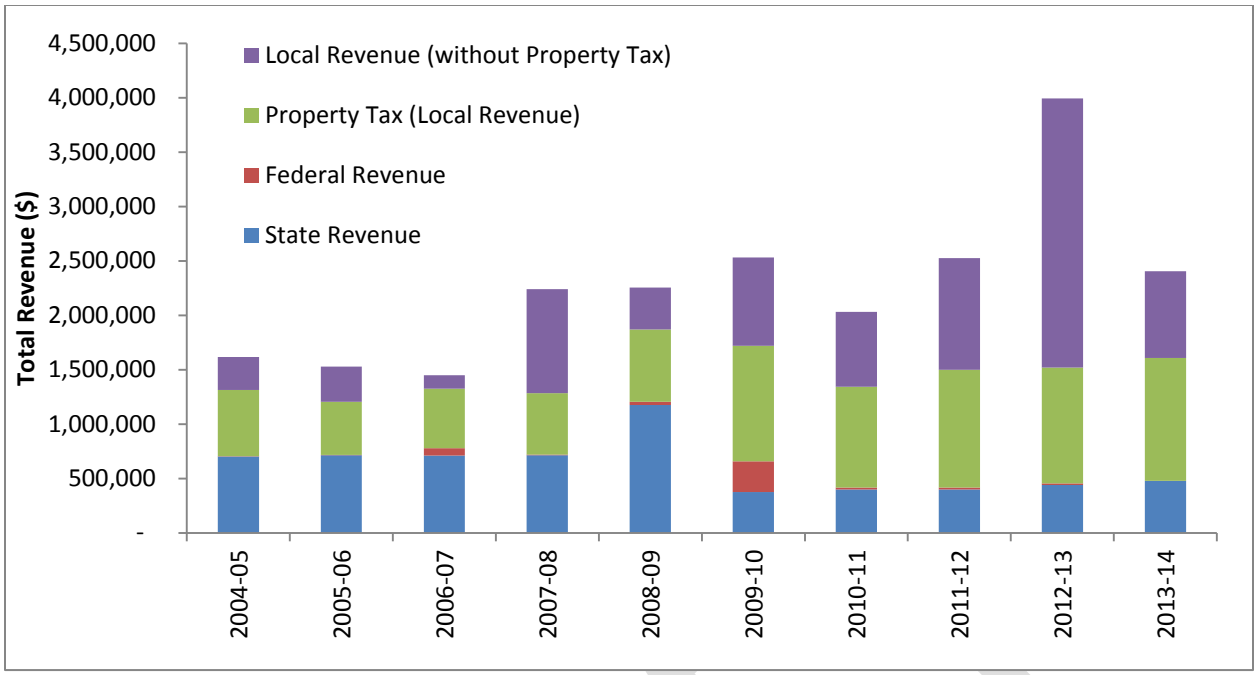


Exhibit 8-1. Sherman County Transportation Revenue Sources (2005 – 2014)

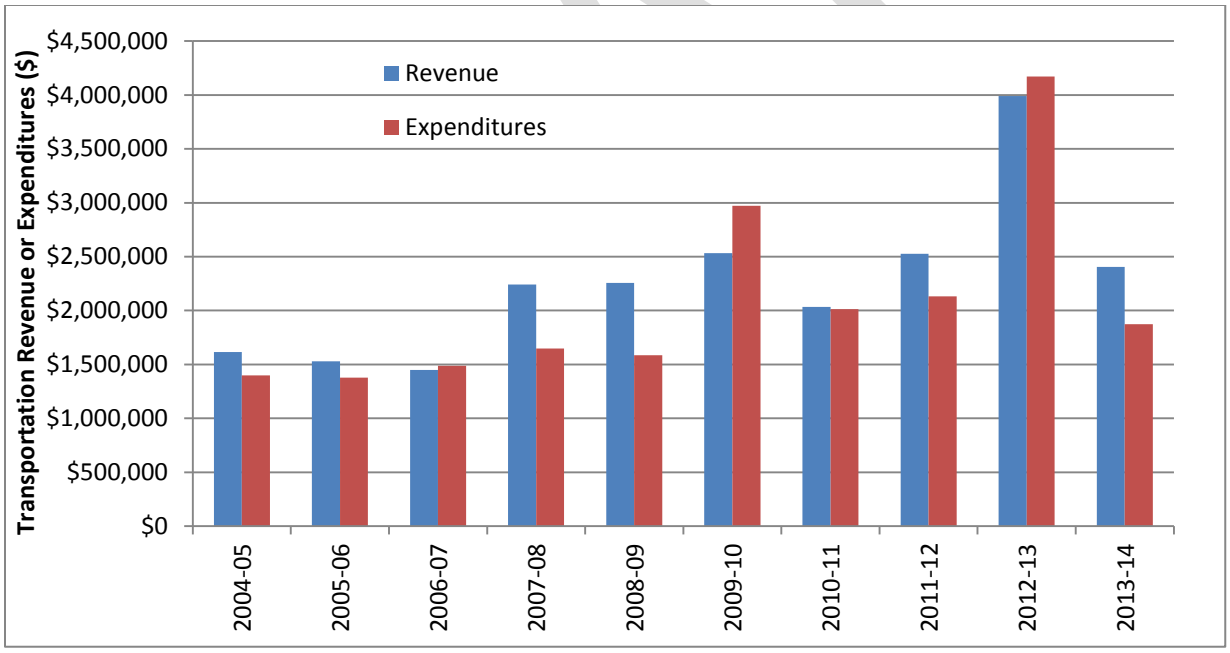


Exhibit 8-2. Sherman County Transportation Revenue Compared to Transportation Expenditures (2005 – 2014)

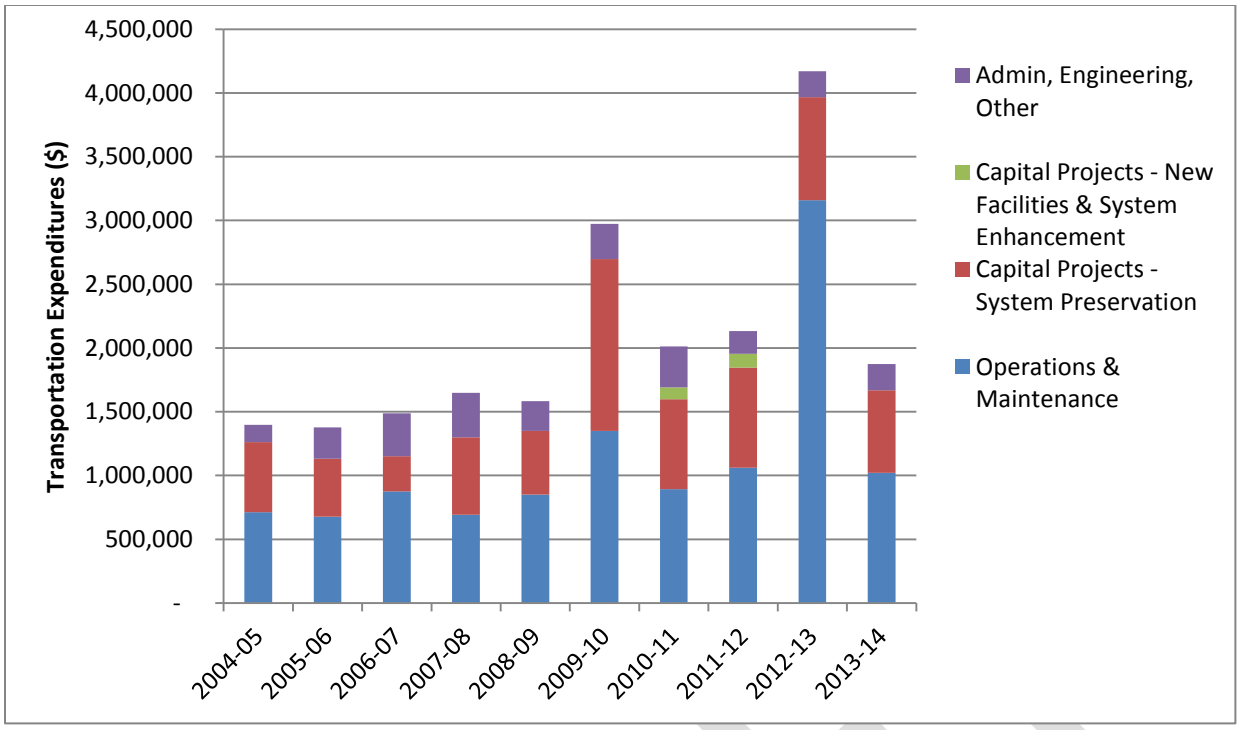


Exhibit 8-3. Sherman County Transportation Expenditures (2005 – 2014)

Transportation Funding Options

Sherman County faces two inter-related financing issues: how to finance operations and maintenance and how to finance capital projects. Presently, the majority of public works funding is devoted to operations and maintenance; there is no substantial funding for capital projects. As shown in Table 8-1, the total funding needed to accomplish all of the near-term alternatives summarized in this plan, including all projects and studies, systemic safety projects, and active transportation projects, would be approximately $2,615,000.

Table 8-1. Total Project Costs

Project Type	Near-Term	Medium/Long-Term
Systemic Safety	$1,780,000	$1,330,000
Roadway	$530,000	$3,250,000
Pedestrian and Bicycle	$305,000	$4,640,000
Total	$2,615,000	$9,220,000

Potential strategies for addressing these needs in Sherman County may generally be grouped into three categories: secure more external funding, identify public/private sponsorship opportunities, and raise local revenue through user fees and taxes. Observations on the use of these strategies are discussed below. They are not all mutually exclusive.

Identify Additional Grant Opportunities

ODOT offers multiple grant opportunities to support transportation projects. The County and Cities should identified grants from those summarized in Table 8-2 that are applicable to their projects. Some of these programs require a local match. The County and Cities should begin identifying these programs early in order to plan for the funding necessary to satisfy a local match. Using local dollars as a match for a grant opportunity is a strategy to stretch the local funding even farther.

Table 8-2. Grant Opportunities

Source ID	Source Title	Award Cycle	Intended Use	Applicable Project Types	Administration Agency	Deadline	Local Match	Website
1	Rivers, Trails, and Conservation Assistance Program	Annual	Technical assistance for recreation and conservation projects.	Shared-use paths	National Park Service	August	None	http://www.nps.gov/ncrc/programs/rtca/contactus/cu_apply.html
2	Highway Safety Improvement Program	Annual	Address safety issues on highways and High Risk Rural Roads	All	ODOT	Varies	10%	www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/highway _safety_program.shtml
3	Oregon Parks and Recreation Local Government Grants	Annual	Primary use is recreation; transportation allowed. Construction limited to outside road right-of-way, only in public parks or designated recreation areas	Shared-use paths	OPRD	Varies	20%	http://www.oregon.gov/OPRD/GRANTS/local.shtml
4	Recreational Trails Program	Annual	Recreational trail-related projects, such as hiking, running, bicycling, off-road motorcycling, and all-terrain vehicle riding.	Shared-use paths	OPRD	Varies	20%	http://www.oregon.gov/OPRD/GRANTS/trails.shtml
5	Land and Water Conservation Fund	Annual	Acquire land for public outdoor recreation or develop basic outdoor recreation facilities	Shared-use paths, bikeways, sidewalks	OPRD	Varies	50%	http://www.oregon.gov/OPRD/GRANTS/lwcf.shtml
6	Statewide Transportation Improvement Program	Biennial	Multi-year, statewide, intermodal program of transportation projects	Sidewalk, bikeways, crossing improvements	ODOT	Varies	Varies	http://www.oregon.gov/ODOT/HWY/STIP/
7	ATV Grant Program	Annual	Operation and maintenance, law enforcement, emergency medical services, land acquisition, leases, planning, development, and safety education in Oregon's OHV (off-highway vehicle) recreation areas	Shared-use paths	OPRD	February / April	20%	http://www.oregon.gov/oprd/ATV/pages/grants.aspx
8	Immediate Opportunity Funds	Biennial	Support primary economic development through the construction and improvement of street and roads.	All	ODOT	On-going	50%	http://www.oregon.gov/ODOT/TD/EA/reports/IOF_PolicyGuidelines2015%20doc.pdf
9	Enhance (STIP)	Biennial	Activities that enhance, expand, or improve the transportation system. Projects that improve or enhance the state's multimodal transportation system.	All	ODOT	August	10%	http://www.oregon.gov/ODOT/TD/STIP/Pages/WhatsChanged.aspx
10	ConnectOregon	Biennial	Non-highway transportation projects that promote economic development in Oregon.	Non-highway modes	ODOT	November	20%	http://www.oregon.gov/ODOT/TD/TP/pages/connector.aspx
11	All Roads Transportation Safety (ARTS)	Biennial	Address safety needs on all public roads in Oregon; reduce fatal and serious injury crashes.	All hot spot and systemic safety projects	ODOT	Varies	8%	http://www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/Pages/ARTS.aspx

Public/Private Sponsorship Opportunities

Public/Private sponsorships involve a private entity such as a local business owner working with the public agency to fund a project. In return for their investment in the community, these business owners often have recognition for their role, providing a marketing venue for the business. In Sherman County, one potential opportunity for this type of partnership is the bicycle wayfinding signage project. Private organizations that sponsor a sign may have the opportunity to provide their logo on a sign to help direct cyclists to their community and business.

Local Taxes and User Fees

Many types of user fees and taxes may be collected to finance road construction and operations. On that premise, it is assumed that the County will need to develop local revenue sources to supplement or replace federal resources if it hopes to maintain current levels of service and assuming that changes in state of federal financing, coupled with efficiency measures are not enough to close the funding gap. Table 8-3 lists options that the County and Cities may wish to consider for funding local roads. The sources include a mix of fees and taxes, some of which if implemented would have implications for other aspects of the County and City budgets. Some of these fees could also be used to provide a local match to obtain greater federal or state funding, further stretching local dollars.

Development Code Updates

In order to fund sidewalk projects, a change to the development code may be beneficial to local jurisdictions. The development code identifies the requirements that a developer must meet before obtaining permission to build. Local jurisdictions may choose to require developers to complete sidewalks in locations where they are identified in the TSP and enforce the completion through the development code. The jurisdiction may also choose to collect a payment in lieu of sidewalk construction from the developers and then use the money to construct complete sections of sidewalk when enough is collected to create efficiencies.

Table 8-3. Local Taxes and User Fee Options

Source	Description	Comments
General Fund	Property taxes from the county's permanent tax rate.	Diverting general fund revenue to the Road Fund would have significant consequences for other county services.
Supplemental 5-year Serial Levy	Voter approved property tax levied in addition to the county's permanent tax rate.	A road fund serial levy would have to be approved by voters every five years. A one-time approval would buy time for the county to develop other options. This method could fund operations and capital programs, some of which might reduce future maintenance requirements.
Road Utility Fee	Monthly user fee with revenue dedicated to road operations. May be enacted legislatively but could be challenged and brought to a vote.	This type of fee is becoming more common in cities but would require substantial investment in rate studies, administrative staffing, software and computer systems to enable the county to collect the revenue. This source is generally better suited to funding operations than for capital improvements, but it may free up existing resources for capital projects.
Vehicle Registration Fee	An extra fee on all registered motor vehicles in the county. May be authorized legislatively but could be challenged and brought to a vote.	State must be willing to act as a collection agent for the county, otherwise would be easy to implement. This source could fund operations or capital programs.
Motor Vehicle Title Fee	Require that all motor vehicles registered in the county also have their title recorded as personal property with the County.	This would generate two sources of revenue: from the fee itself and from personal property taxes levied on motor vehicles. This could be problematic for renters and would increase taxable property that the Assessor must account for.
County Gas Tax	May be enacted legislatively but could be challenged and brought to a vote.	A local-option fuel tax would be easy to collect because the infrastructure is already in place. Would generate revenue for the county from motorists passing through the county. This method could fund operations and capital programs.

Section 9
Implementation Ordinances

IMPLEMENTATION ORDINANCES

Section 10
References

REFERENCES

1. Oregon Highway Plan (OHP)
2. 2010 Highway Capacity Manual (HCM)
3. Analysis Procedures Manual (APM)