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DRAFT TECHNICAL MEMORANDUM #3

Sherman County Transportation System Plan Update

Existing & Future Conditions Analysis

Date: March 11, 2015 Project #: 18054
 To: Michael Duncan, ODOT
 Georgia Macnab, Sherman County
 From: Casey Bergh, PE, Ashleigh Griffin, and Marc Butorac, PE, PTOE
 cc: Project Advisory Committee

This memorandum inventories and evaluates existing and 2035 forecast conditions of the Sherman County transportation system to identify existing system needs and anticipate future needs that can be incorporated into the Transportation System Plan (TSP) update. This memorandum will identify existing and future transportation needs based on current performance measures. Needs identified in this memorandum will be addressed in the Transportation System Plan (TSP) Update through policies, projects, programs, pilot projects and refinement studies to improve the system.

The majority of the inventory and analysis results are presented in figures and tables, with supplemental text provided to explain the illustrated information. The information is organized into the following sections:

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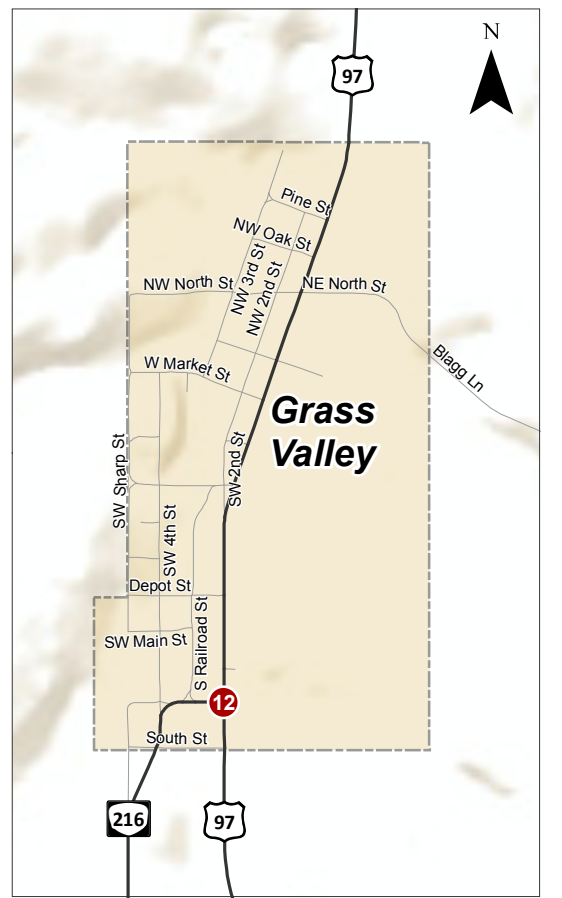
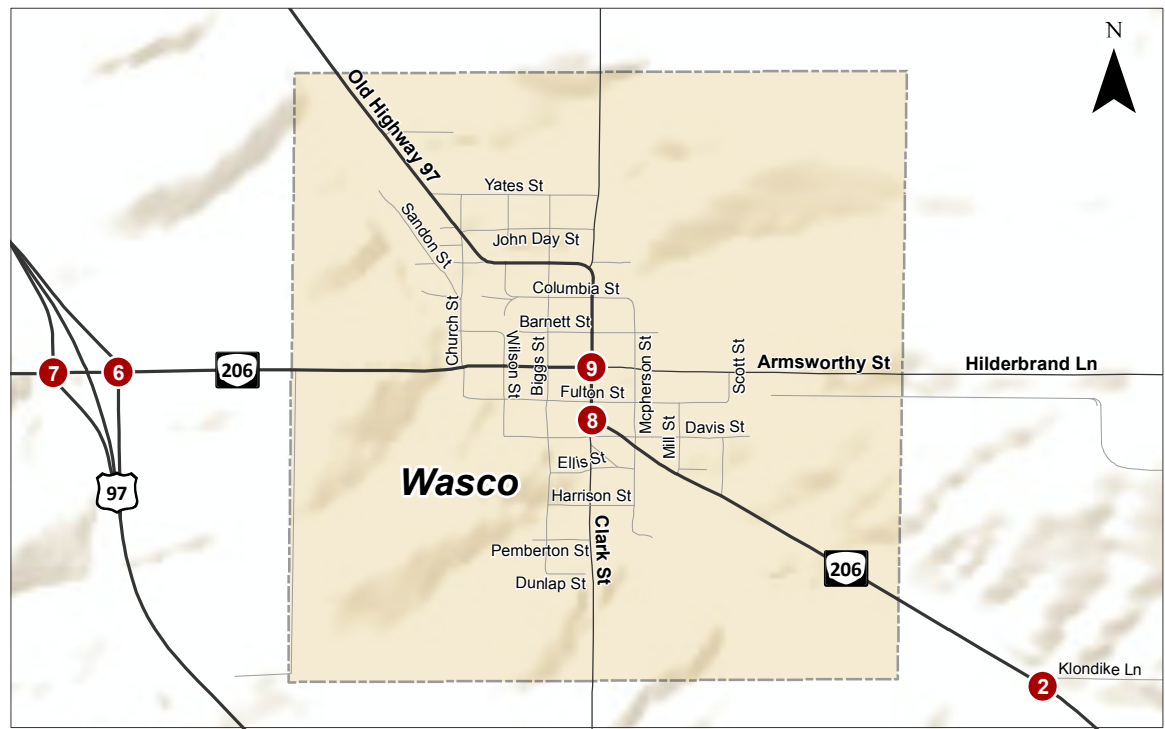
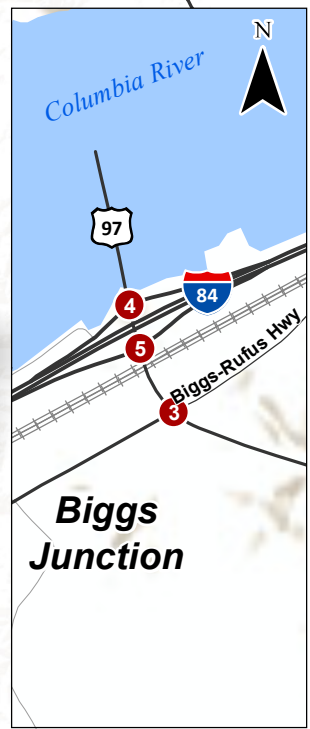
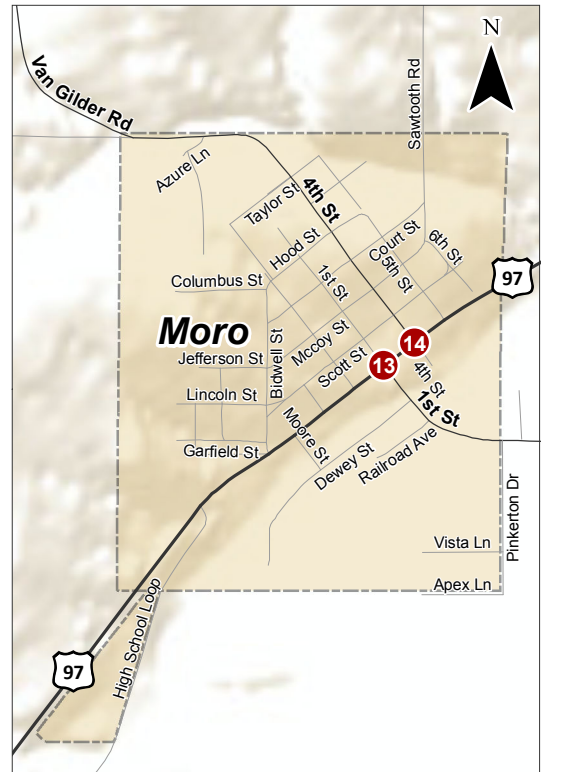
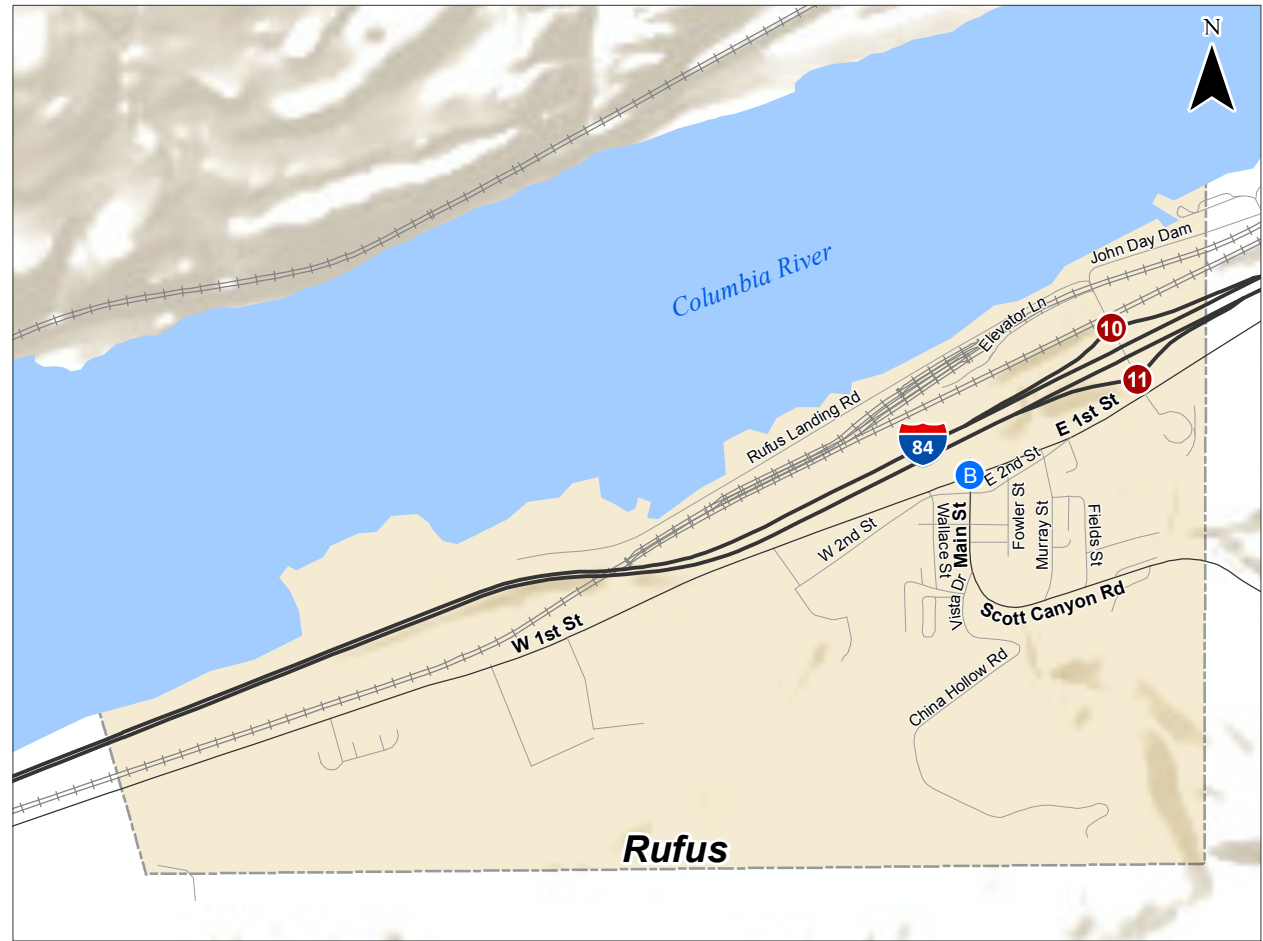
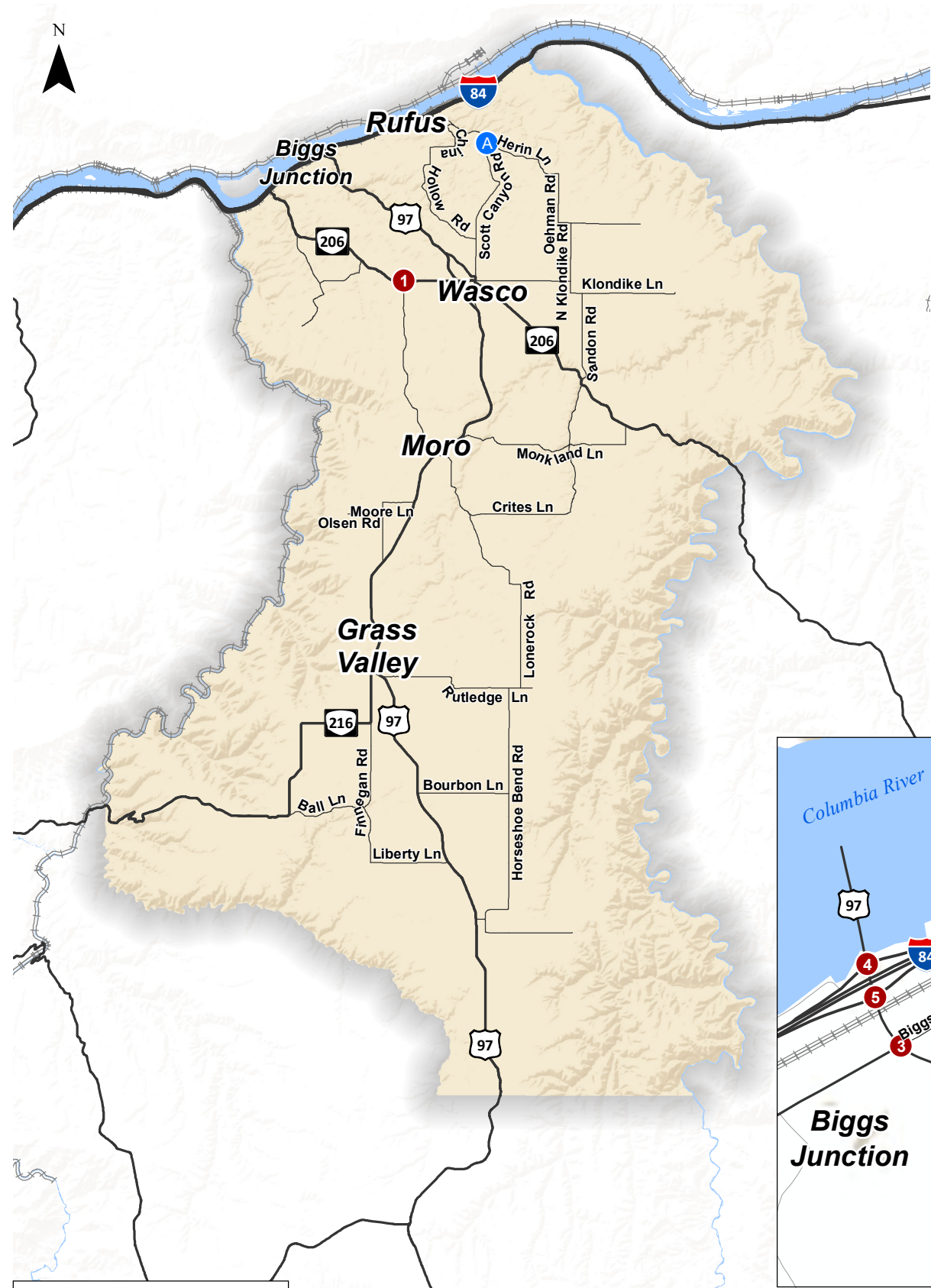
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STUDY AREA

The Transportation System Plan (TSP) focuses on the entire county, including the cities of Wasco, Rufus, Grass Valley, Moro, and the unincorporated community of Biggs Junction, as shown in Figure 3-1. Fourteen intersections and two roadway segments will be evaluated operationally during the study. These study intersections and segments are shown in Figure 3-1 and summarized in Table 3-1.

Table 3-1. Study Intersections and Segments

ID	Intersection/Segment Name	Location
1	Van Gilder Rd / OR 206	Wasco
2	Klondike / OR 206	Wasco
3	Biggs-Rufus Hwy / US 97	Biggs Junction
4	I-84 WB / US 97	Biggs Junction
5	I-84 EB / US 97	Biggs Junction
6	OR 206 / US 97 NB	Wasco
7	OR 206 / US 97 SB	Wasco
8	Clark St / OR 206/Old Wasco-Heppner Hwy	Wasco
9	Clark St / OR 206	Wasco
10	I-84 WB / John Day Dam Rd	Rufus
11	I-84 EB / John Day Dam Rd	Rufus
12	Krusow St / OR 216	Grass Valley
13	Lone Rock Rd / US 97	Moro
14	4 th St / US 97	Moro
A	Herin Lane at Scott Canyon Road	County
B	Main Street at 1 st Street/Biggs Rufus Highway	Rufus



Study Area
Sherman County, Oregon

Figure
3 -1

K:\H_Perland\proj\18054 - Sherman County TSP\gis\memo 33-1 Study Intersections.mxd - agriffin - 10:47 AM 3/5/2015

LAND USE AND POPULATION

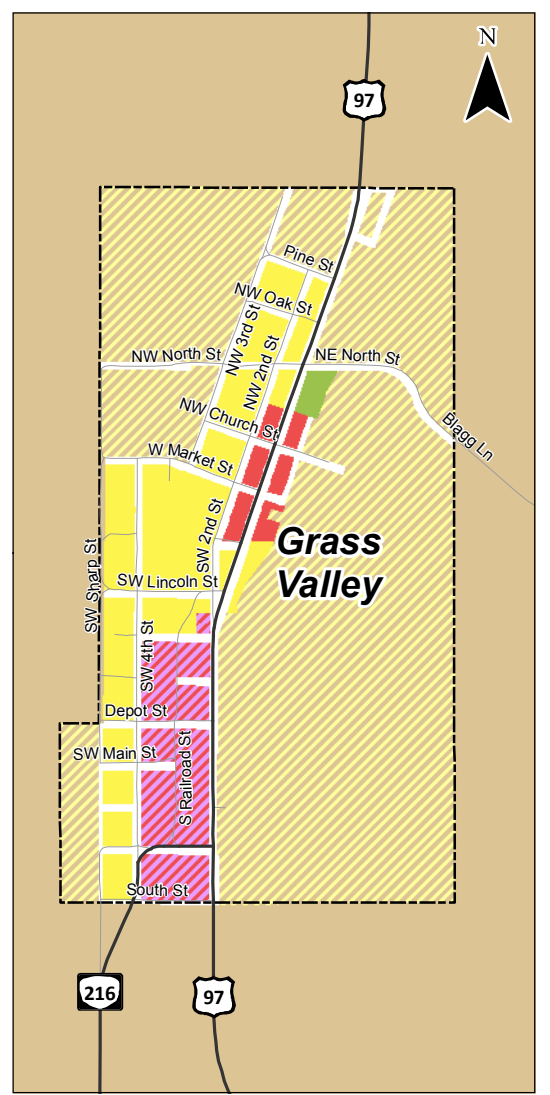
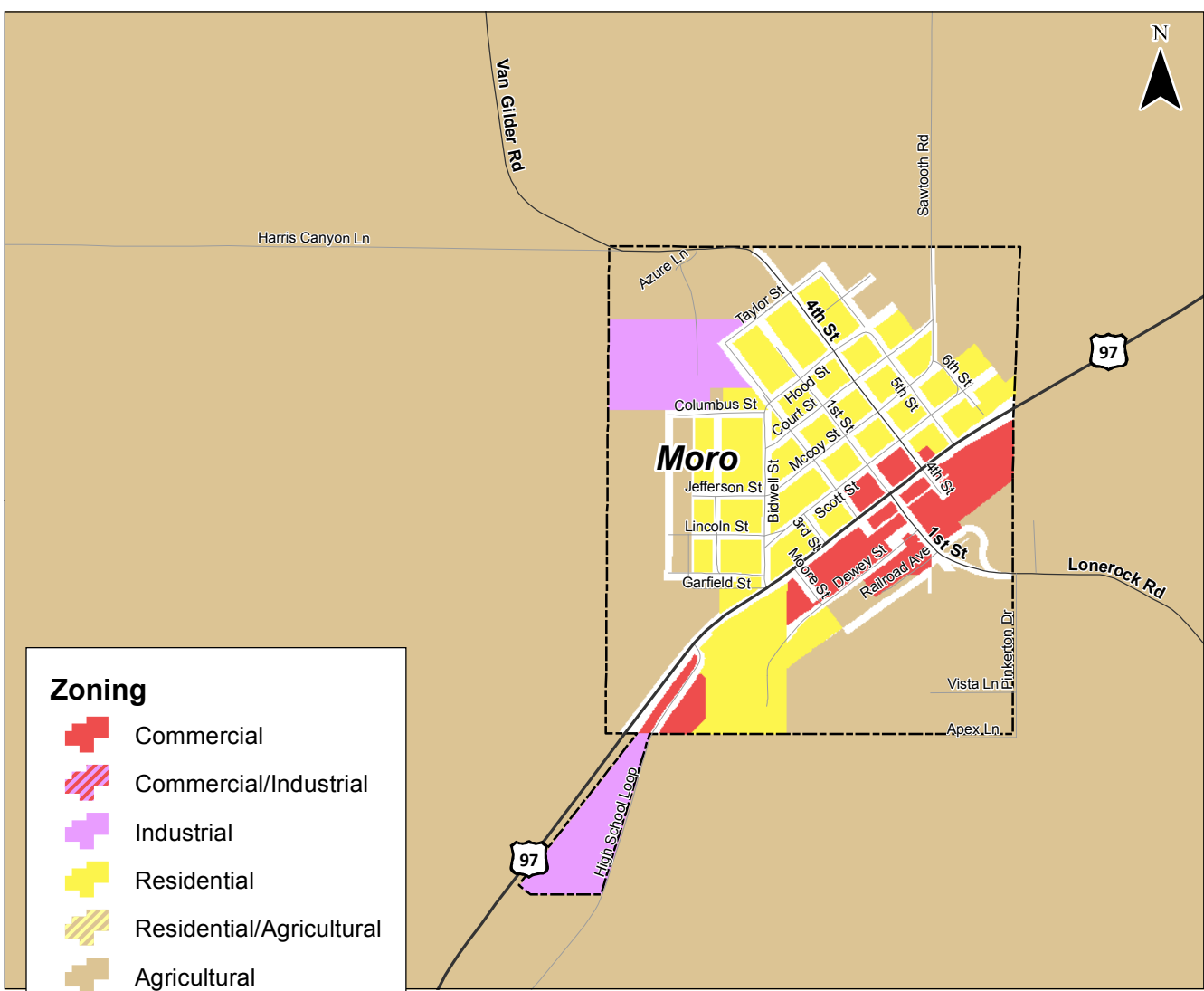
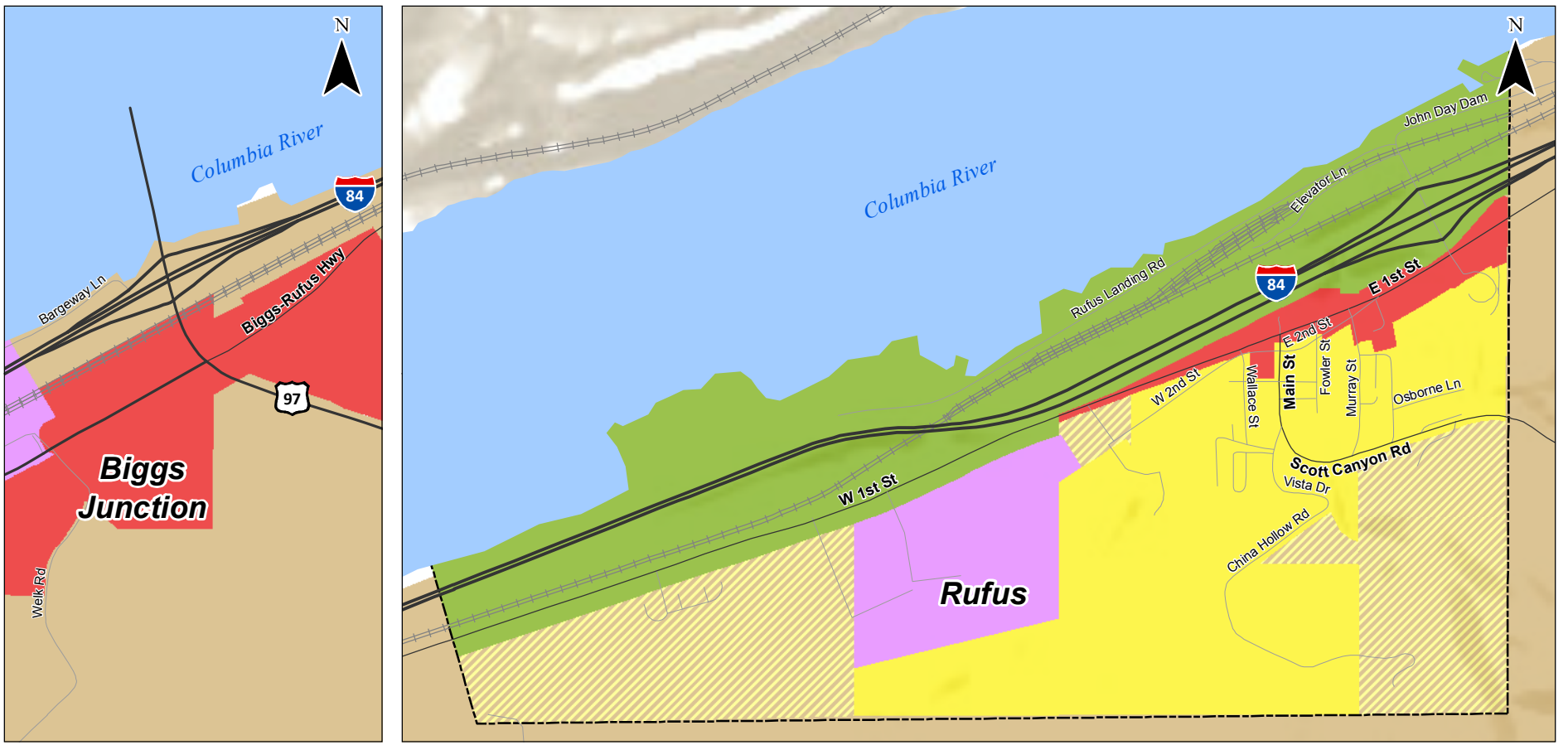
The land use and population inventory identifies existing, planned, and potential land uses. The land use and population inventory will inform existing and future conditions analyses, particularly as the project team works with the community to develop future alternative scenarios that capture the County's vision. Figure 3-2 illustrates the current zoning for the County and Cities.

Key activity centers and destinations within the County include:

- Sherman Elementary School, located in Grass Valley
- Sherman Junior Senior High School, located in Moro (The County has plans to consolidate both schools, the elementary and junior/senior high school, at this site.)
- Wasco, Moro, and Grass Valley City Parks
- Sherman County RV Park outside of Moro, adjacent to the County fairgrounds and DeMoss Park north of Moro
- Cottonwood Canyon State Park
- Deschutes State Park
- Oregon Raceway Park
- Wind Turbine Farms
- Mid-Columbia Producers
- Azure Standard
- Agricultural farms
- Biggs Junction commercial center

In addition to these key activity centers in the County, US 97 within Sherman County is designated as an Oregon State scenic byway and may attract visitors from other regions of the state. The cities also have downtown commercial centers that generate regional trips for shopping, dining, and other purposes.

The following sections describe the buildable lands inventory for the communities of Wasco, Moro, Grass Valley, and Rufus. These exhibits show existing land uses and areas where future growth is possible within the respective Urban Growth Boundary (UGB) areas. The following three sections describe the buildable lands within each of the four cities.



Zoning

- Commercial
- Commercial/Industrial
- Industrial
- Residential
- Residential/Agricultural
- Agricultural
- Public Space
- City Boundary

**Current Zoning Designations
Sherman County, Oregon**

**Figure
3-2**

H:\profiles\18054 - Sherman County TSP\GIS\memo 313-2 Sherman County Zoning Map.mxd - jom.merrill - 1:26 PM 3/9/2015

City of Rufus

The City of Rufus, the northernmost city in Sherman County, lies immediately adjacent to the Columbia River and I-84. The City's Comprehensive Plan was updated in 2007, and notes the City serves as local service center for the surrounding farming community. Over the last 25 years, the City of Rufus has represented approximately 15 percent of the County's population, on average. The 2010 population of 270 documented in the 2010 census is forecast to grow to 320 by 2030, as documented in the Sherman County Comprehensive Plan (2007).

In 2001, the City undertook a Buildable Lands Inventory. The purpose of a Buildable Lands Inventory is primarily to determine if there is enough available land remaining within the City and Urban Growth Boundary to meet the projected population needs for the next twenty years. The secondary purpose is to ascertain where most of the development is occurring and determine the probability for needed urban services as the City continues to grow. The Buildable Lands Inventory, once completed, is generally outdated at the issuance of the next building permit and absolute accuracy is not required unless an Urban Growth Boundary Expansion is being contemplated.

A review of the Buildable Lands Inventory Spreadsheets of 2001 indicates a sufficient amount of land for future residential development. There are a considerable number of platted residential lots and there is a recently platted subdivision on the west side of the City, with full services awaiting development. There is adequate land available barring some unforeseen economic activity to boost the residential housing needs of the community.

The 2010 Census Data indicated the population of the City is 270. The Census found that there are 162 occupied homes in the City to yield an average household size of 1.91 persons per home. This is particularly useful when determining future land needs in the City with any potential expansion of the Urban Growth Boundary.

City of Wasco

The City of Wasco Comprehensive Plan was updated in 2007. The Buildable Lands Map was completed in February of 2007 via a windshield survey by the City's staff. The analysis notes over 70 vacant residential lots available, along with over 400 acres of vacant residential land. There is a new subdivision in the north east corner of the City. It is the first residential subdivision in all of Sherman County in over 40 years.

Over the last 25 years, the City of Wasco has represented 20 percent of the County's population, on average. The 2010 population of 389 is forecast to grow to 423 by 2030, as documented in the Sherman County Comprehensive Plan (2007).

City of Moro

The City of Moro lies nine miles south of the City of Wasco on US 97. Moro serves as the County Seat and most of the County Administrative Offices are located here. The town is bisected by US 97 and has a well-defined commercial area in the blocks alongside the highway. There has not been significant residential development in many years. The City Recorder's Office indicates just 14 new residences in the City since 2002. The current PSU Certified population is 325. The City did just revise and update its Subdivision Ordinance and in the course of doing so, revised its street standards in both the ordinance and in its Comprehensive Plan to require standard width streets for residential development.

The Buildable Lands Inventory Map prepared in 2007 indicates 186 vacant platted lots and over 170 acres of vacant land available in the City. Even with the 14 new homes, there is adequate land available to meet future residential needs.

City of Grass Valley

The City of Grass Valley lies 9 miles south of Moro, on US 97. It is also bisected by US 97, and has a long lineal commercial strip along the highway. There are some light industrial lands at the south end of the City. There is a municipal domestic water system, but the City does not have waste water collection and treatment facilities. The lack of a sewer system severely limits any growth to the City. The most recent addition for economic development has been the construction and operation of the Oregon Raceway Park located approximately 1½ miles east of Grass Valley. This raceway is a 2 ½ mile paved road course that is receiving national attention since opening in 2010. The City and County see this as a major factor in the south County economy going forward.

The City has a fairly stable population of 160 people and is forecast to grow to 183 in 2030. Over the last 25 years, the City of Grass Valley has represented less than 10 percent of the County's population, on average, as documented in the Sherman County Comprehensive Plan (2007).

The 2007 Buildable Lands Inventory indicated 150 vacant residential lots along with 100+ acres of vacant residential land in the City. There have just been a handful of new homes placed in the City since 2007. There is more than an adequate amount of residential property available to meet future needs of the City.

Priority Development Areas

Based on these inventories, areas prioritized to support existing and future economic development within the Cities and County include:

- Industrial development within the shovel-ready, 60-acre industrial area in Rufus;
- Existing commercial development within the cities, including Oregon Raceway Park near Grass Valley;

- Existing and future freight services at Biggs Junction, including truck parking and intermodal connections for wheat transfer from trucks to barges.
- Supporting infrastructure for transporting goods to support the wind turbine industry and agriculture.
- Dense residential development within the cities, particularly in the subdivision on the west side of Rufus and the subdivision in the northeast corner of Wasco.

Population Inventory

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 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 3-2 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 3-3, shrinks that number markedly, projecting a County population of just 1,745 by 2035, a net loss of 188 people or 9.7 percent of the 2010 population.

Table 3-2. Sherman County Population Projection, based on 2007 County Projections

Year	Population Projections					
	Sherman County (Total)	Unincorporated Area (39.4%)	Grass Valley (8.7%)	Moro (16.6%)	Rufus (15.2%)	Wasco (20.1%)
2010	1933	761	168	321	294	389
2015	1986	786	173	330	302	399
2020	2043	804	179	339	310	411
2025	2081	820	181	345	317	418
2026	2085	822	181	346	317	419
2030	2102	827	183	349	320	423

Table 3-3. Sherman County Population Projection, based on 2013 County 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

STREET SYSTEM AND TRAFFIC ANALYSIS

Four state highways and a network of highways, arterials, collectors, and local streets maintained by the County serve Sherman County. Primary roadway facilities, their characteristics, and existing operational performance are summarized below.

Street 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 roadways.

State Roadways

The state facilities within Sherman County provide interstate, statewide, and regional connectivity. These facilities include Interstate 84 (I-84), US Highway 97 (US 19), Oregon Highway 206 (OR 206), and Oregon Highway 216 (OR 216). The state facilities serve all four cities in Sherman County. I-84 provides 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 24-foot travel lanes and two-foot gravel shoulders. Gravel roads are typically 20 feet wide.

Street System Characteristics

The following set of figures and tables illustrate and summarize the current street characteristics within the County including roadway classifications, roadway standards, and intersection characteristics.

Functional classification levels for roadways are used to establish a hierarchy of roadways based on their primary function (moving people across regions or providing access to local destinations). These classification levels are identified by ODOT for state facilities, the County for County facilities, and local agencies for their own classification levels within their community. The classification levels also determine the recommended roadway cross-section for different facilities. The functional classification of roadways that local agencies typically establish is based on the following hierarchy:

- **Arterials** represent the highest class of roadway (other than Interstates). These roadways are intended to provide mobility by serving high volumes of traffic, particularly through traffic, at higher speeds. They also serve truck movements and should emphasize traffic movement over local land access. In some cases, arterial streets are further designated as “major/principal” or “minor.” Major/principal arterials have higher design speed, fewer accesses per mile, and usually do not permit direct private driveway access. Minor arterial provide slightly lower travel speeds and have a few more accesses than major/principal arterials.
- **Collectors** represent the intermediate roadway class. As their name suggests, these roadways collect traffic from the local street system and distribute it to the arterial street system. These roadways provide a balance between traffic movement and land access and should provide extended continuous stretches of roadway to facilitate traffic circulation through the county. Collector streets are sometimes divided into two categories – urban collector/rural major collector and minor collector. Urban collector/rural major collector have the same basic roadway design but are differentiated by urban features like bike lanes and sidewalk as well as adjacent land use (i.e., the land is inside or outside the Urban Growth Boundary). Minor collectors serve lower volume of traffic and have lower design speeds than the urban collector/rural major collector.
- **Local** roads and streets are the lowest roadway class. Their primary purpose is to provide local land access and to carry locally generated traffic at relatively low speeds to the collector street system. Local streets should provide connectivity through neighborhoods but should be designed to discourage cut-through vehicular traffic.

State Facilities

Figure 3-3 shows the ODOT functional classification for state facilities in the County. Table 3-4 summarizes the roadway characteristics of each of these facilities, including posted speed limit, number of lanes, and current pavement condition. Because the local cities are bisected by state

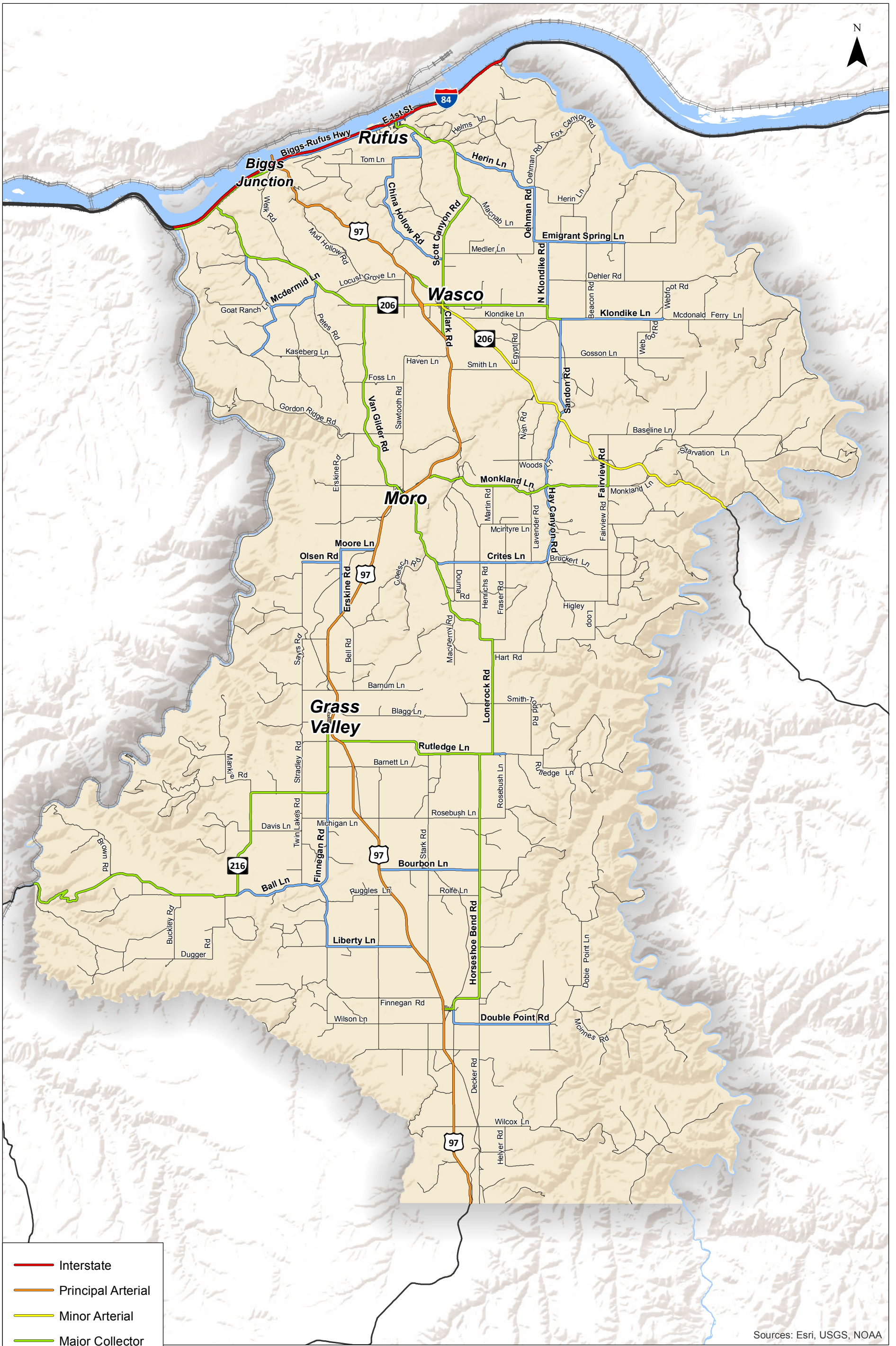
highways that are classified as minor arterials, the highways must balance carrying through traffic and accommodating access to local destinations.

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Table 3-4. State Functional Classification

Route Name	Facility Extents	ODOT Facility Designation	ODOT Functional Classification	Posted Speed Limit (mph)	Number of Lanes	Pavement Condition (2012)
Interstate 84	Entire Section within County Limits	Interstate	Rural Interstate	65	4	Fair (West of Rufus) to Very Good (East of Rufus)
	Rufus City Limits	Interstate		65	4	Fair
US 97 (Freight Route)	Outside City Limits	Statewide Highway	Other Rural Principal Arterial	40/45/55	2-4	Poor (south of Grass Valley) to Good (North of Grass Valley)
	Moro	Statewide Highway		25/30/45	2	Good
	Grass Valley	Statewide Highway		30/45	2	Poor to Good
	Biggs Junction (Unincorporated Community)	Statewide Highway		35/45	2	Good
	Kent (Unincorporated Community)	Statewide Highway		55	2	Poor
OR 206	Outside of Wasco City Limits, East of Wasco	Regional Highway	Rural Minor Arterial	55	2	Good
	Within Wasco City Limits, East of Clark Road	Regional Highway		30/40/55	2	Good
	Within Wasco City Limits, West of Clark Road	District Highway		35/45	2	Fair
	Outside Wasco City Limits, West of Wasco	District Highway	Rural Major Collector	55	2	Fair
OR 216	Within Grass Valley City Limits	District Highway	Rural Major Collector	25	2	Good
	Outside of Grass Valley City Limits			55	2	
Biggs – Rufus Highway (from OR 206 to Biggs Junction)	OR 206 to Biggs Junction	District Highway	Rural Major Collector	35/45/55	2	Fair

Figure 3-4 summarizes the lane configurations and traffic control devices at the study intersections. Each of the study intersections is unsignalized and under ODOT’s jurisdiction.



Sources: Esri, USGS, NOAA

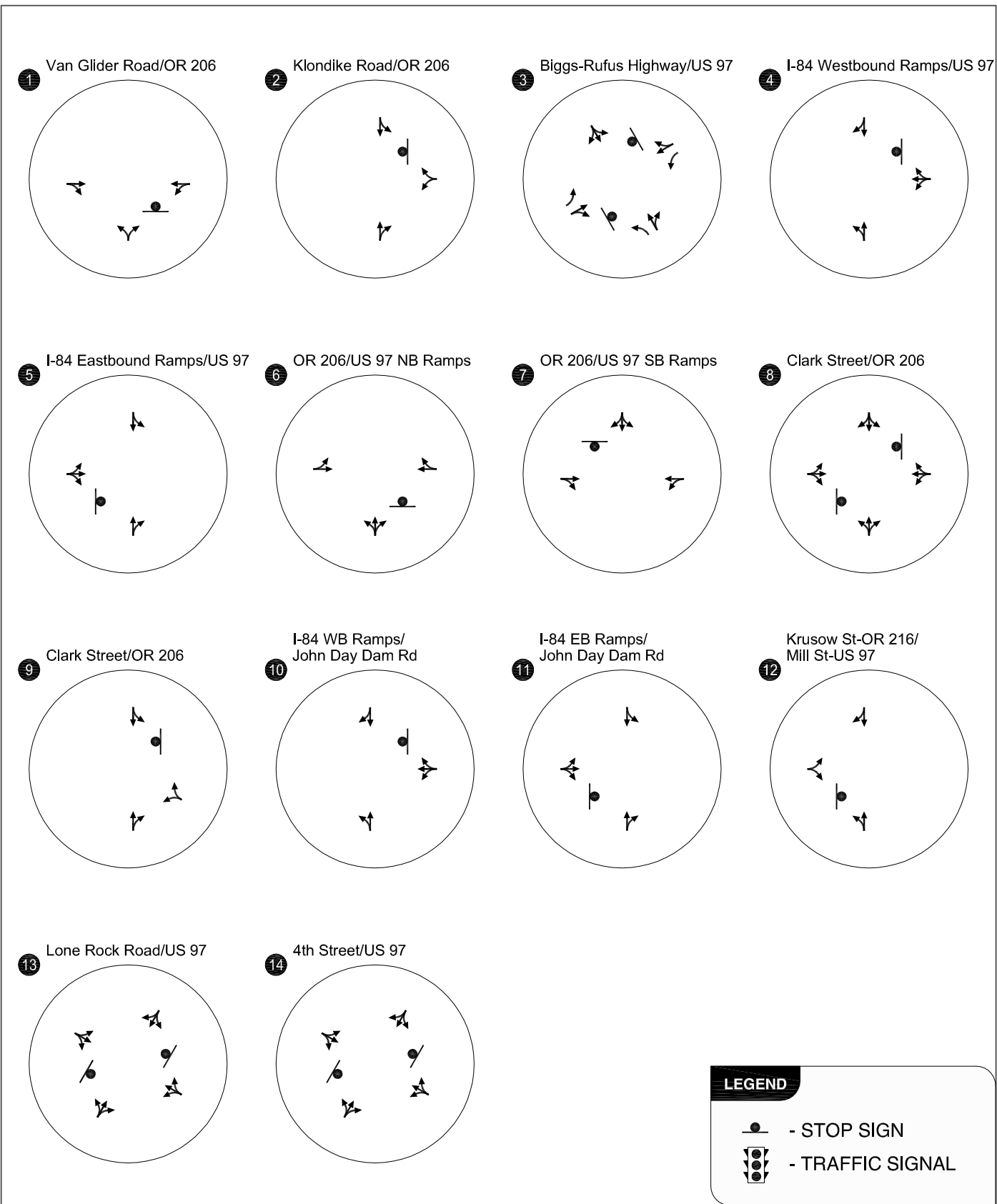
- Interstate
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

**Existing Roadway Functional Classification
Sherman County, Oregon**

**Figure
3-2**

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Existing Lane Configurations and Traffic Control Devices
Sherman County, Oregon

Figure
3-4

County Facilities

Sherman County follows ODOT’s roadway functional classification system by dividing county roads into three levels: urban collector/rural major collector, minor collector, and local roads. The existing functional classification system is summarized in Figure 3-3. Changes in development patterns and transportation trends (increased truck traffic, seasonal influences of the Cottonwood Canyon State Park, etc.) that have occurred in the past ten years will be reflected in proposed changes to functional classification during this TSP Update.

City Facilities

The local cities do not have a separate functional classification system. The majority of the roads within the Cities, other than the state highways, generally have the characteristics of local streets.

Roadway Cross-Section Standards

Roadway functional classifications typically reflect the roadway’s function and influence the recommended roadway cross-section design. The cross-section standards typically inform new roadways or roadway modification projects. Older roadways are only required to be upgraded to current standards if modified or reconstructed.

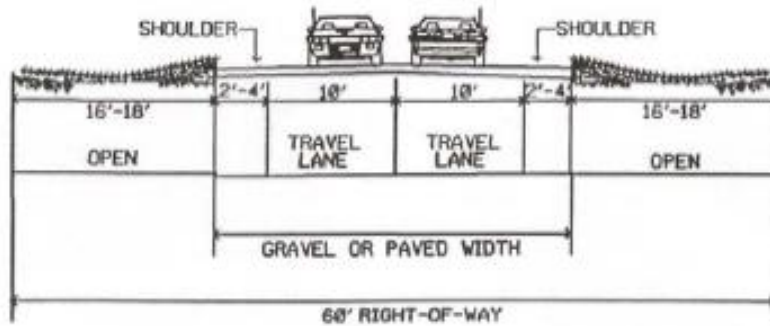
County Facilities

The County’s current TSP identifies rural roadway design standards, as summarized in Table 3-5. The County also has recommended roadway widths that are intended to serve the forecast future traffic demands in the County, as summarized in Exhibit 3-1.

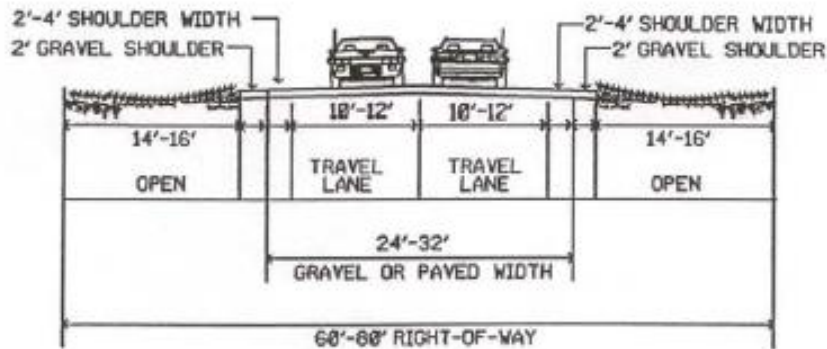
Rural roadways in the County are not currently required to have bike lanes or marked bicyclist facilities. The roadway design standards indicate that bicyclists shall be accommodated on the shoulder, when appropriate, based on the facility’s traffic volumes. Rural roadways are not required to have separate pedestrian facilities, which reflects the rural nature of the roadway.

Table 3-5. Sherman County Rural Roadway Design Standards

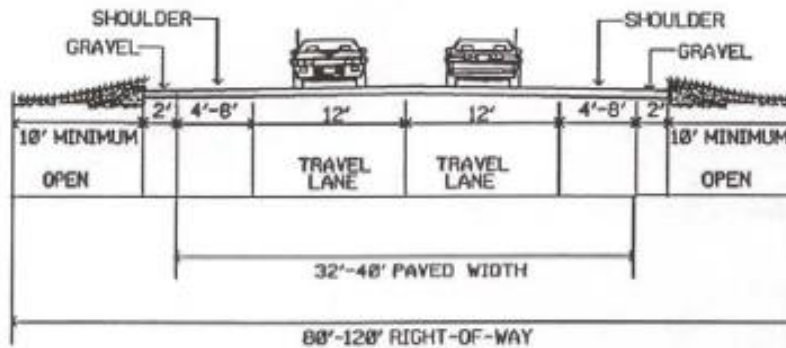
Classification	Right-of-Way Width (ft)	Roadway		Shoulder	
		Width (ft)	Surface	Width (ft)	Surface
Arterial Street	80-120	32-40	Paved	4-8	Paved
Collector Street	60-80	24-32	Paved/gravel	2-4	Paved/gravel
Local Street	60	24-28	Paved/gravel	2-4	Paved/gravel
Radius for cul-de-sac turn-around	50	40	-	-	-



Local Roads



Collector Roads



Arterial Roads

Exhibit 3-1. Rural Street Standards for Local Streets, Collectors, and Arterials from the 2003 TSP

Local Facilities

Street design standards for the local cities were developed during the last TSP Update. These design standards were based on ADT, storm drainage, type and density of development, fiscal constraints, and community character. The cities have only collector and local streets, except where state highways bisect the cities.

The exhibits in *Appendix A* illustrate the current design standards for each city and the roadways that these design standards are applied to. Since the primary purpose of local roadways is to provide access to properties, the recommended local roadway width is 20 to 24 feet. The roadway surfaces could be paved, but most local roadways are gravel. Although the standards do not call for sidewalks, there is space in the right-of-way to add these where appropriate.

Access Spacing and Access Management

Providing adequate access to other public roadways, land uses, and destinations is a critical part of an effective transportation system. However, it is necessary to balance access with the need for mobility and safety on the system. Providing access via other public streets and driveways to land uses creates friction from a traffic operations perspective thereby reducing mobility and introducing conflict points that increase the potential for crashes.

Access management strategies and implementation require careful consideration to balance access and mobility in a safe and efficient manner. In general, access management is generally more stringent on higher classified roads where mobility is the highest priority. Exhibit 3-2 illustrates the relationship between access and mobility relative to the street classifications in the Sherman County area. US 97, OR 216, and OR 206 bisect the cities of Grass Valley, Moro, and Wasco and run through the downtown commercial areas of both cities. Therefore, these facilities must balance carrying through traffic and providing access within the downtown cores.

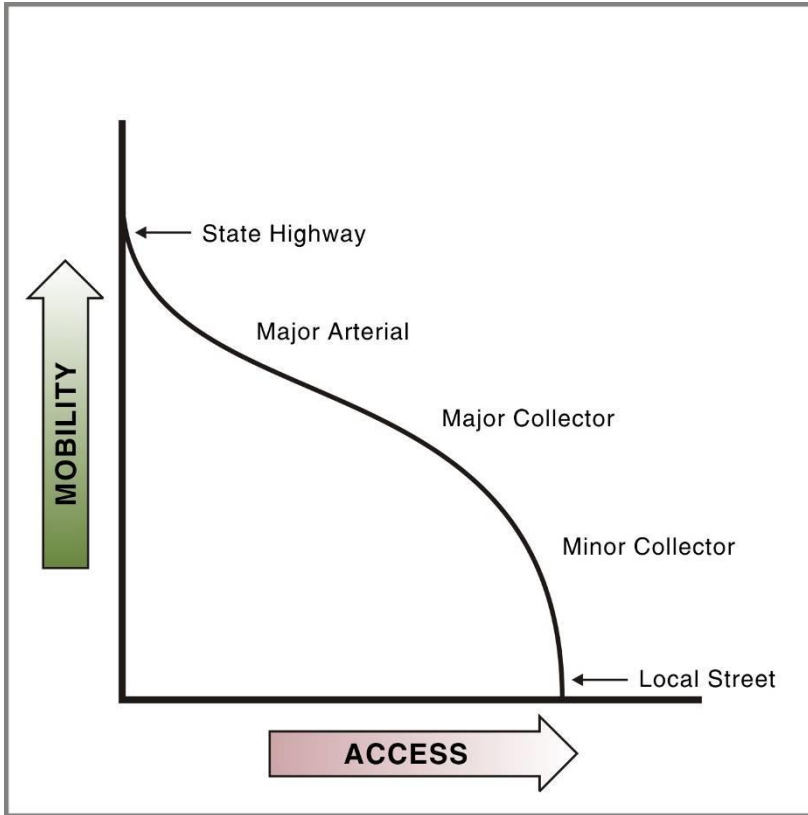


Exhibit 3-2. Relationship between Access, Mobility, and Functional Classification

State Facilities

ODOT specifies access management spacing standards for the state facilities in the Oregon Highway Plan (OHP, Reference 1). The corresponding access management spacing standards for state facilities within Sherman County are summarized in Table 3-6 and Table 3-7. On non-interstate facilities, these standards are based on the 2012 AADT (Annual Average Daily Traffic volume), posted speed limit, proximity to urban areas, and functional classification. Interchange spacing for interstates is not dependent on traffic volume or posted speed limit.

Table 3-6. Interchange Spacing Standards for Interstate Highways

Route Name	Facility Extents	Facility Designation	Area	Access Spacing Standard (feet)
Interstate 84	Entire Section within County Limits	Interstate	Rural	6 miles (interchange)
	Rufus City Limits	Interstate	Urban	3 miles (interchange)

Source: Oregon Highway Plan, Appendix C Revisions to Address Senate Bill 264 (2011) Table 12

Table 3-7. Access Management Spacing Standards for Highway Segments

Route Name	Facility Extents	Facility Designation	2012 ADT	Posted Speed Limit (mph)	Access Spacing Standard (feet)
US 97 (Freight Route)	Outside City Limits	Statewide Highway	<5000	40/45/55	990/990/1,320
	Moro	Statewide Highway	<5000	25/30/45	150/250/360
	Grass Valley	Statewide Highway	<5000	30/45	250/360
	Biggs Junction (Unincorporated Community)	Statewide Highway	<5000	35/45	425/750
	Kent (Unincorporated Community)	Statewide Highway	<5000	55	1,320
OR 206	Outside of Wasco City Limits, East of Wasco	Regional Highway	<5000	55	650
	Within Wasco City Limits, East of Clark Road	Regional Highway	<5000	30/40/55	250/360/650
	Within Wasco City Limits, West of Clark Road	District Highway	<5000	35/45	250/360
	Outside Wasco City Limits, West of Wasco	District Highway	<5000	55	650
OR 216	Within Grass Valley City Limits	District Highway	<5000	25	150
	Outside of Grass Valley City Limits		<5000	55	650
Biggs – Rufus Highway (from OR 206 to Biggs Junction)	OR 206 to Biggs Junction	District Highway	<5000	35/45/55	250/360/650

AADT = Average Annual Daily Traffic
 MPH = miles per hour

Source: Oregon Highway Plan, Appendix C Revisions to Address Senate Bill 264 (2011) Table 13

County Facilities

The County has access spacing standards for their roadways. These standards are intended to be applied as new development occurs, rather than to be used to eliminate existing driveways. The access spacing standards for County facilities are summarized in Table 3-8.

Table 3-8. Access Management Spacing Standards for Rural Sherman County Segments

Functional Classification	Intersection				Signal Spacing	Median Control
	Public Road		Private Drive			
	Type	Spacing	Type	Spacing		
Collector	At grade	¼ mile	Lt/Rt Turns	1,200 ft	N/A	N/A
Local Street	At grade	200-400 ft	Lt/Rt Turns	Vary	N/A	N/A

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. *Appendix B* contains the traffic count data obtained from ODOT and used in the analysis. *Appendix C* contains the Methodology Memorandum documenting the analysis method applied. *Appendix E* contains 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 (see *Appendix C*) 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 3-9 and Table 3-10, 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 3-9. 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 3-10. 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	4 th 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* 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 3-11 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 3-11. Roadway Segment Operations Analysis

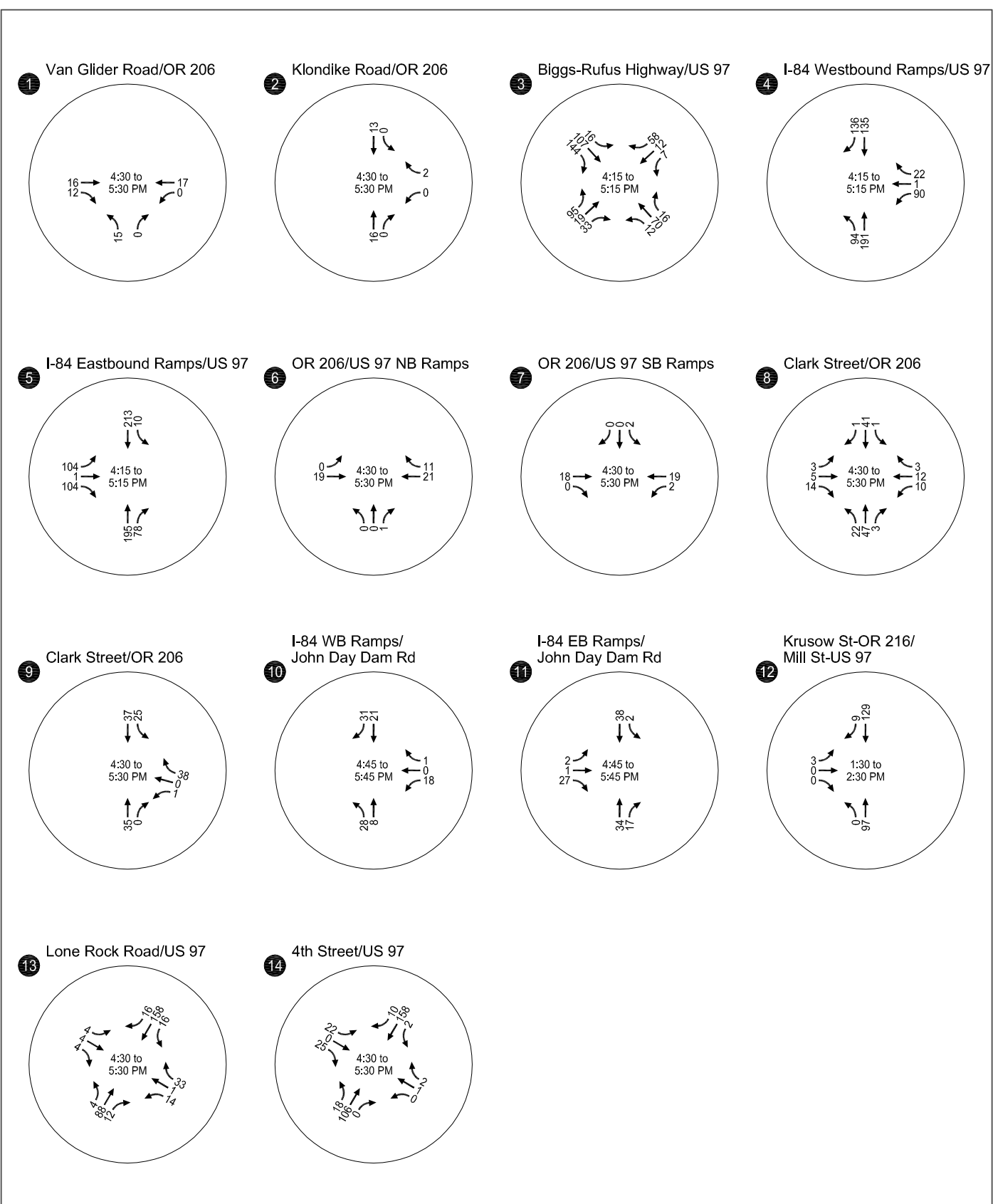
ID	Roadway	ADT from 2014 Traffic Counts	Peak Hour Time Period	Seasonally-Adjusted Peak Hour Count	PHF*	Two-Way Demand Flow	Critical Flow Rate	Units	Calculated V/C Ratio
A	Herin Lane, East of Scott Canyon Road	90	6:00 - 7:00 a.m.	16	0.67	26	3200	pc/h	0.0079
B	Main Street, South of 1 st Street in Rufus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

*PHF = peak hour factor

Weekday Peak Hour 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 throughout the County.

As summarized in the Methodology Memo (see *Appendix C*), traffic volumes were adjusted to reflect seasonal fluctuation in traffic patterns. Figure 3-4 shows the existing intersection traffic control and lane configurations. Figure 3-5 summarizes the existing peak hour traffic volumes after seasonal adjustments were applied and the peak hour time period for each intersection.



**Existing Traffic Volumes and Peak Hours
Sherman County, Oregon**

**Figure
3-5**

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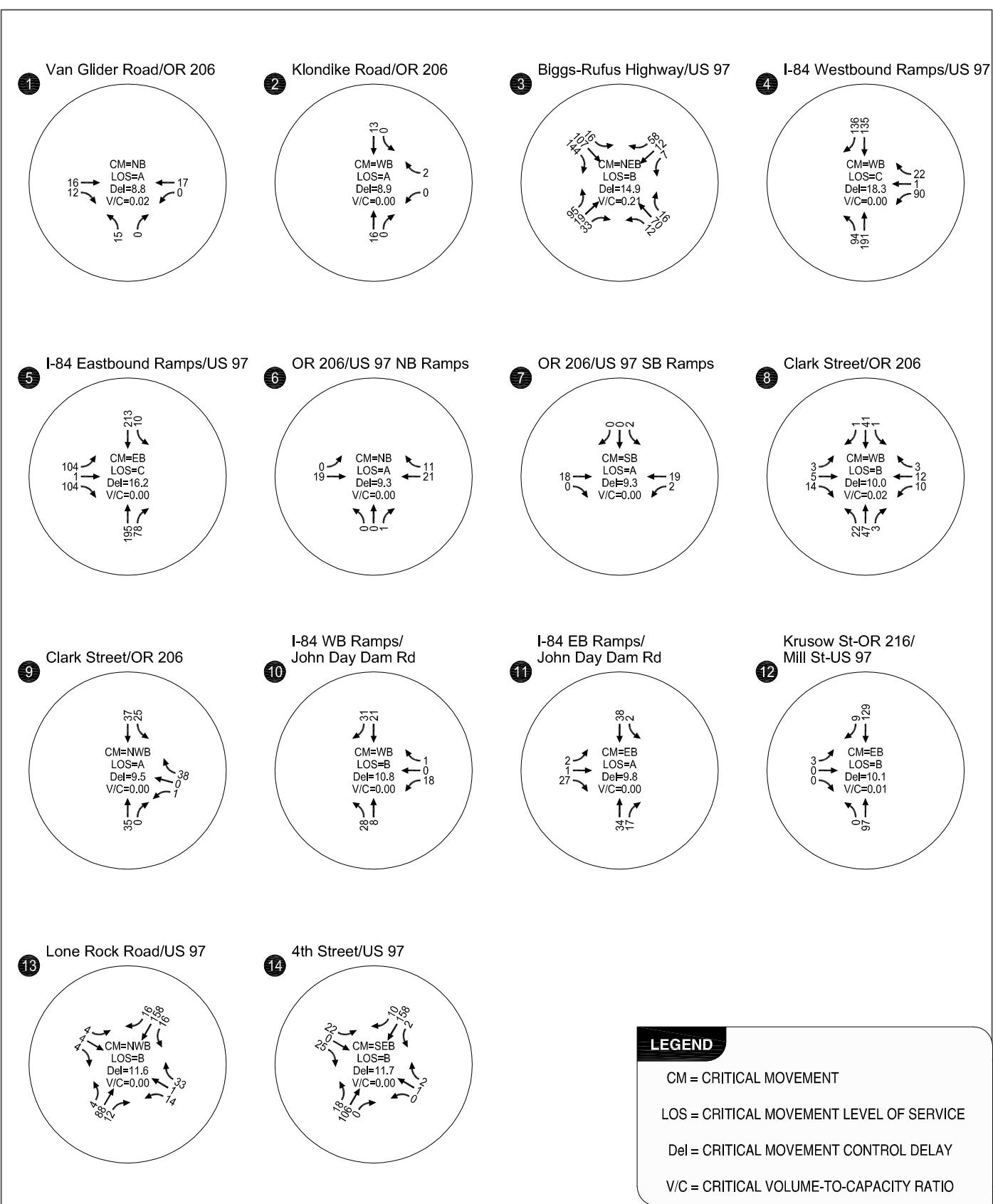
Intersection Traffic Operations Analysis Results

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 3-12 summarizes the results of this analysis as well as whether the corresponding operational targets for the study intersections are met. Figure 3-6 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 3-12. Existing Conditions Intersection Operational Analysis Results

ID	Name	Critical Movement	V/C Ratio	LOS	Delay (sec)	95 th % 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	4 th 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
 3-6**

Summary of Existing Traffic Conditions

Below is a summary of the major findings of the existing conditions operational analysis.

- The existing demand volume at the two study segments is below capacity.
- The fourteen study intersections currently operate 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.

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 3-7 illustrates reported crash locations throughout the County. As shown in Figure 3-7, the majority of reported crashes are located along state highways, particularly US 97 and I-84. Crash data is provided in *Appendix F*.

County Crash Patterns

A total of 334 crashes were reported in Sherman County between 2009 and 2013. Table 3-13 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. Of the 21 reported severe injury or fatal crashes, several trends were noted:

- Of the 21 severe crashes, 11 were fixed-object crashes, four were non-collision crashes, two were head-on collisions, one was a rear-end crash, one was a turning movement crash, one was a sideswipe crash, and one was not recorded.
- The roadway conditions were recorded as ice during four crashes, snow during one crash, wet during three crashes, and dry for the remainder.
- Six of the 21 severe crashes involved alcohol-impaired drivers.
- Ten of the 21 crashes occurred on Saturday or Sunday.
- Eight crashes occurred during dark light conditions.

The severe injury crashes were located throughout the County on the interstate, state highways, and County and local roads. Exhibit 3-3 shows the number of crashes reported by month and severity.

Table 3-13. Reported Crashes by Severity in Sherman County (2009 – 2013)

	Crash Severity					Total
	Fatal	Injury A	Injury B	Injury C	PDO	
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%

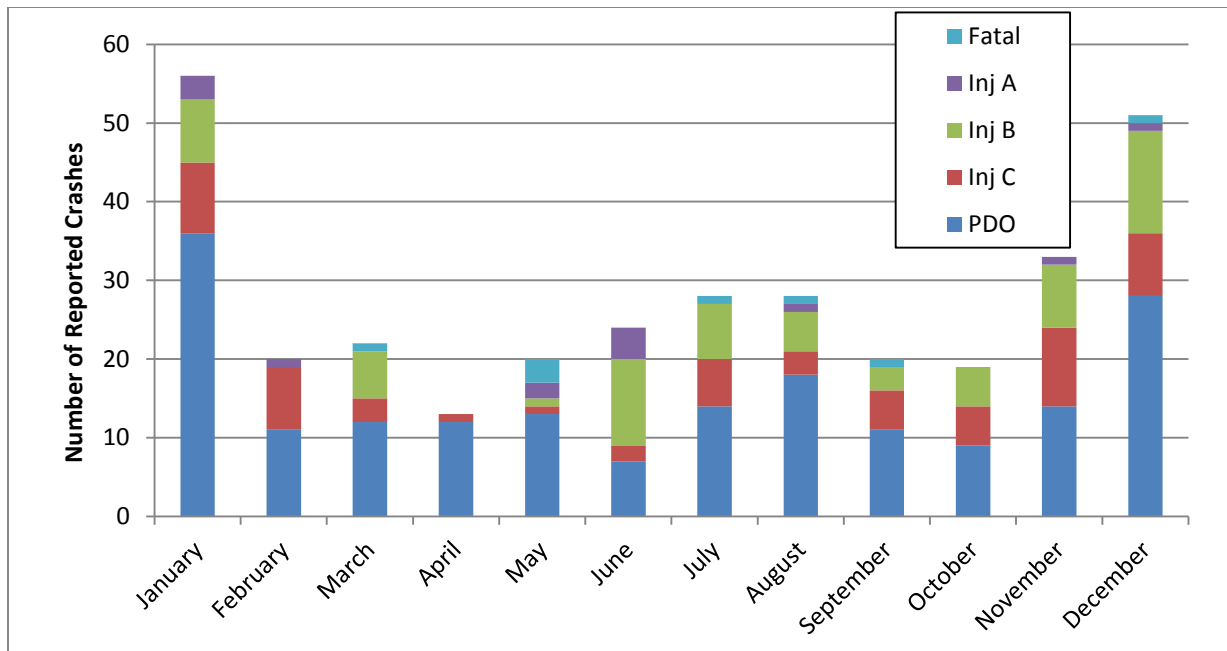
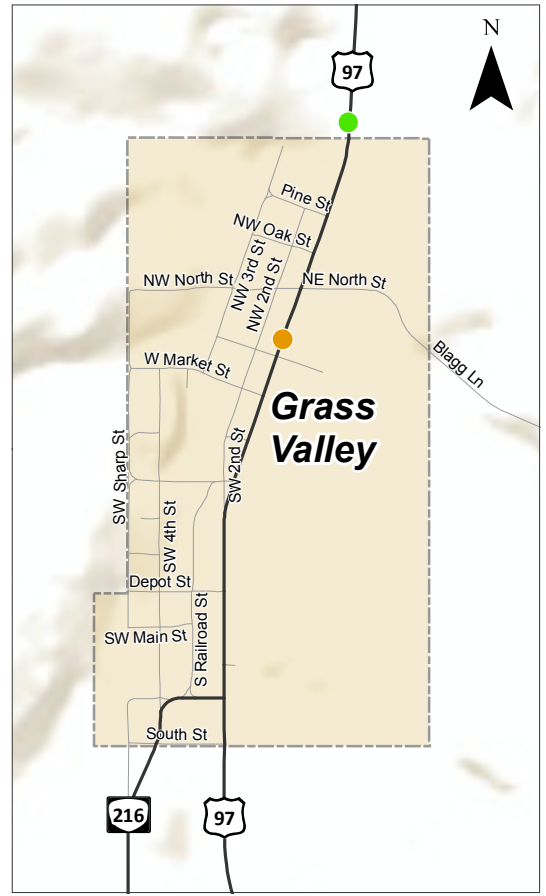
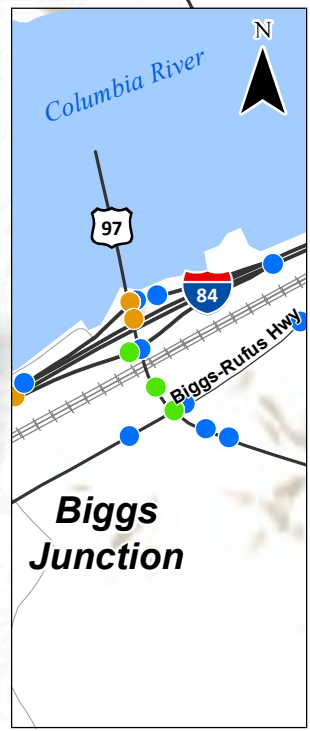
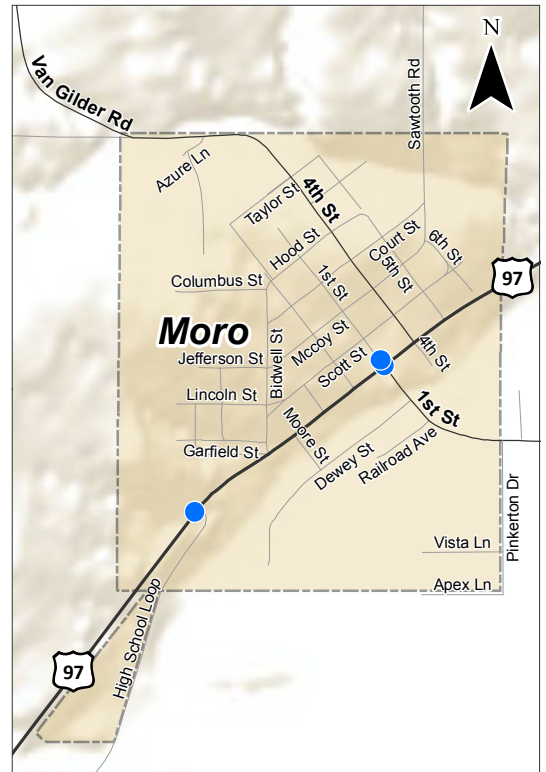
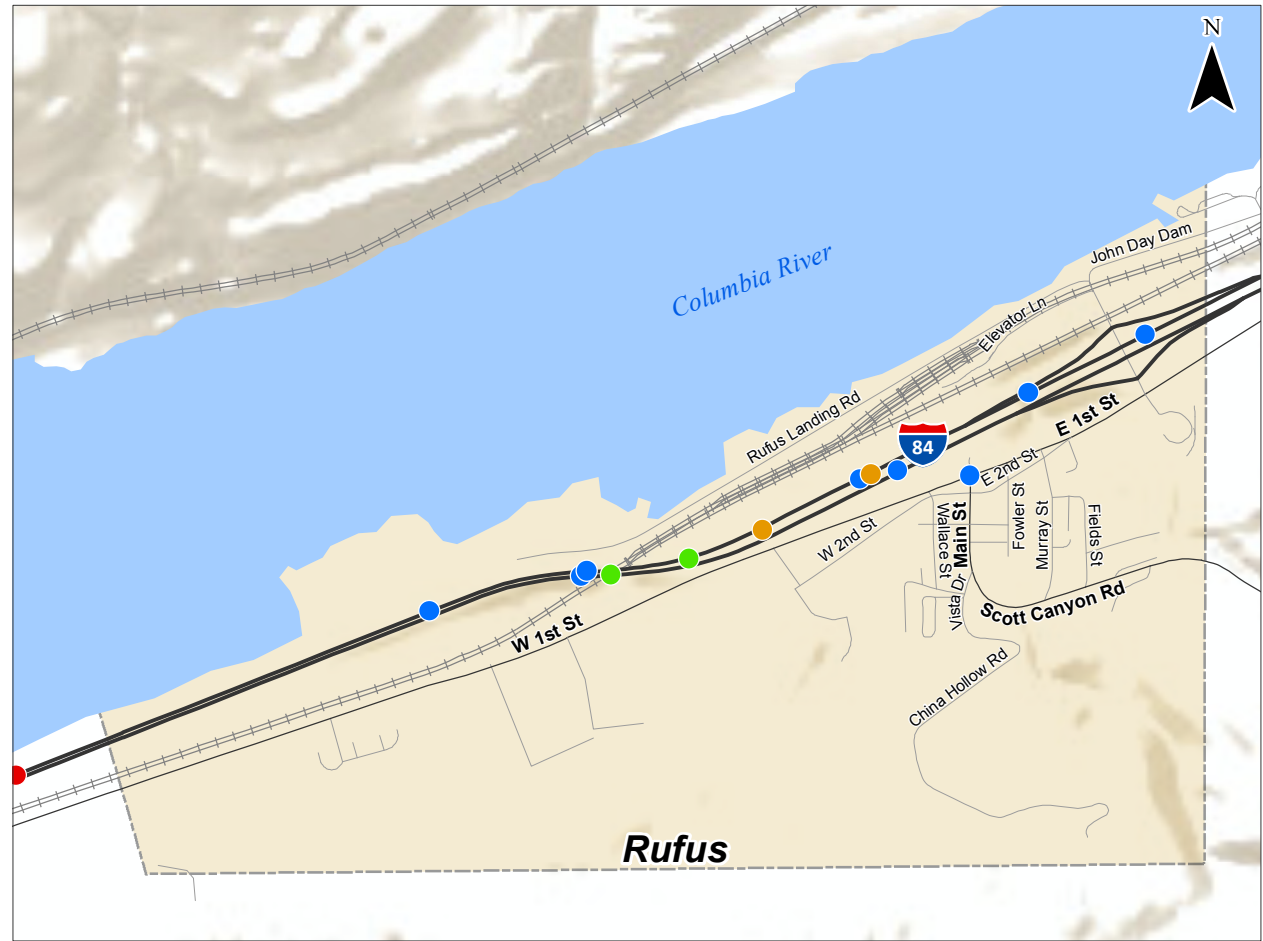
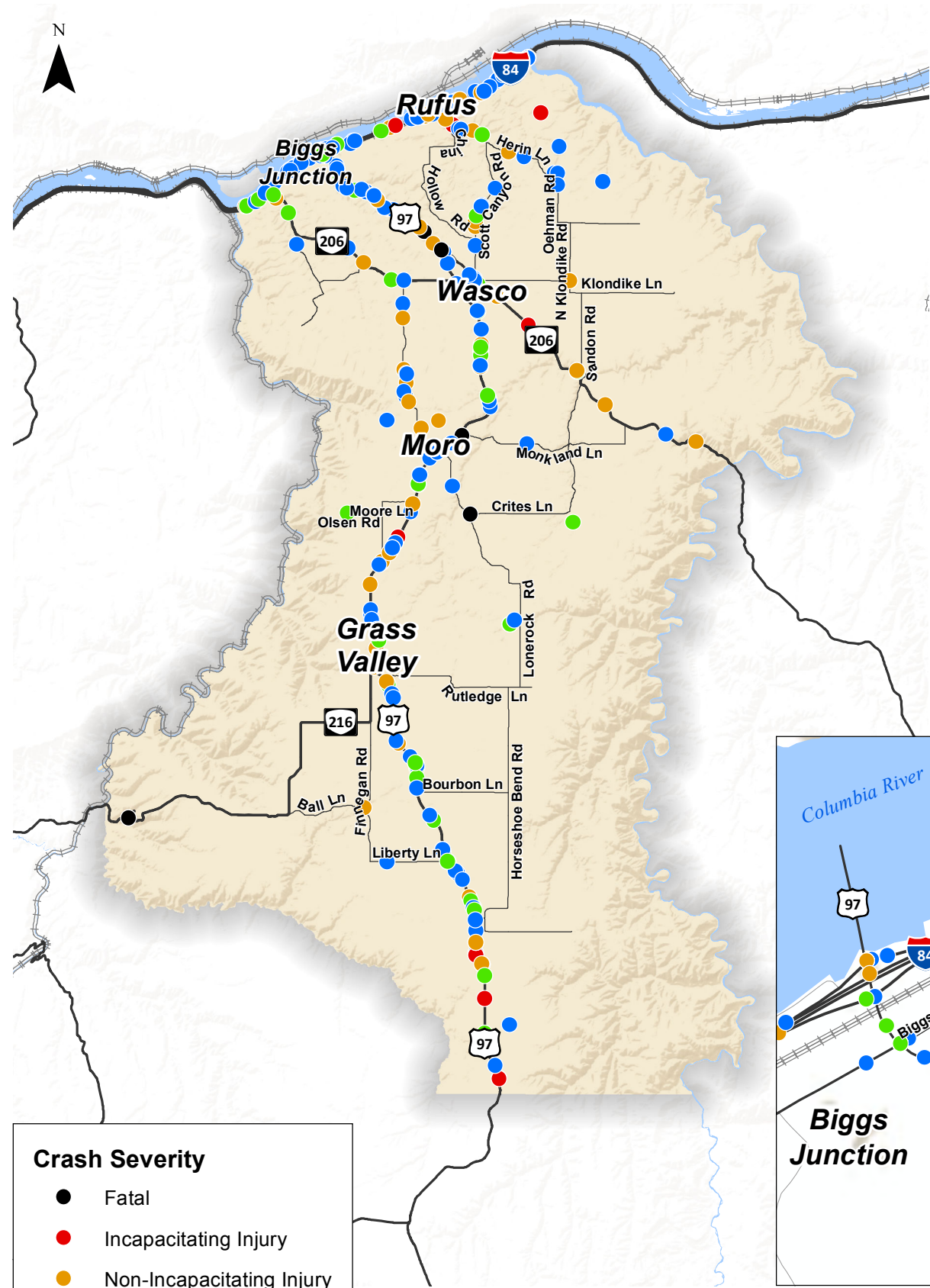


Exhibit 3-3. Reported Crashes by Month (2009-2013)

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- Crash Severity**
- Fatal
 - Incapacitating Injury
 - Non-Incapacitating Injury
 - Possible Injury
 - Property Damage Only

**Reported Crashes (2009 - 2013)
Sherman County, Oregon** Figure 3-7

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As shown in Exhibit 3-3, 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. Just over 43% (61 crashes) occurred in dark, dawn, or dusk lighting conditions. Just over 73% of the crashes between November and January (103 crashes) were reported as fixed-object or non-collision crashes.

Over the study period, approximately 65% of crashes (217 crashes) were reported as fixed object or non-collision crashes. The most commonly reported crash cause (40% of crashes) was drivers traveling at speeds too fast for conditions. Over 40% (135 crashes) occurred on roadway surfaces that were wet, icy, or snow-covered. Approximately 36% (121 crashes) occurred in dark, dawn, or dusk lighting conditions.

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.

Intersection and Segment Crash Analysis

Study intersections and segments were analyzed individually and compared to statewide averages for similar facilities, when possible.

Reported crashes at study intersections are summarized in Table 3-14. Several of the study locations did not experience any crashes during the five-year study period. Intersection exposure was measured in terms of total entering vehicles (TEV), derived from the peak hour volumes used in the intersection operational analysis. The peak hour was assumed to be ten percent of the daily volume. ODOT identifies 90th percentile crash rates in the Analysis Procedures Manual, Exhibit 4-1 (Reference 3). These crash rates are presented in Table 3-14. The ODOT APM indicates that intersections that exceed the 90th percentile should be further analyzed. Two of the study intersections in Sherman County exceeded the 90th percentile crash rates:

- 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 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 Table 3-14, 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. This intersection will be further evaluated for safety treatments during the TSP Update process.

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Table 3-14. Reported Crashes at Study Intersections

ID	Intersection Name	TEV ¹	# Reported Crashes (2009-2013)	Crash Rate per MEV ³	Statewide 90th Percentile Crash Rates	Crash Type					Crash Severity				
						Angle	Rear-End	Turning	Fixed-Object	Other	PDO ²	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal
1	Van Gilder Rd/ OR 206	56	1	0.98	0.46	0	0	1	0	0	1	0	0	0	0
2	Klondike / OR 206	29	0	0.00	0.46	0	0	0	0	0	0	0	0	0	0
3	Biggs-Rufus Highway / US 97	554	23	2.28	1.08	8	1	14	0	0	16	5	2	0	0
4	I-84 WB / US 97	530	7	0.72	1.08	0	5	1	1	0	3	1	2	1	0
5	I-84 EB / US 97	554	8	0.79	1.08	0	3	3	1	1	5	3	0	0	0
6	OR 206 / US 97 NB	46	0	0.00	1.08	0	0	0	0	0	0	0	0	0	0
7	OR 206 / US 97 SB	37	0	0.00	1.08	0	0	0	0	0	0	0	0	0	0
8	Clark St / OR 206 / Old Wasco-Heppner Highway	154	1	0.36	0.41	1	0	0	0	0	1	0	0	0	0
9	Clark St / OR 206	128	0	0.00	0.29	0	0	0	0	0	0	0	0	0	0
10	I-84 WB / John Day Dam Rd	91	0	0.00	0.41	0	0	0	0	0	0	0	0	0	0
11	I-84 EB / John Day Dam Rd	103	0	0.00	0.41	0	0	0	0	0	0	0	0	0	0
12	Krusow St / OR 216 / Mill St / US 97	194	0	0.00	0.29	0	0	0	0	0	0	0	0	0	0
13	Lonerock Road / US 97	277	2	0.40	0.41	2	0	0	0	0	2	0	0	0	0
14	4th St / US 97	280	0	0.00	0.41	0	0	0	0	0	0	0	0	0	0

¹TEV = Total entering vehicles

²PDO = Property damage only

³Crash Rate = Crashes per million entering vehicles

Reported crashes along study roadway segments are summarized in Table 3-15. Exposure on the segments was measured based on ADT calculated from 2014 24-hour volume counts. ODOT publishes statewide average roadway segment crash rates for the past five years for urban and rural areas, by functional classification. The statewide average roadway segment crash rates for rural minor collectors and urban collectors are provided in Table 3-15 for comparison to calculated crash rates for highways in Sherman County. Four crashes were reported on the Herin Lane segment during the five-year study period, and one crash was reported at the intersection of Main Street/1st Street in Rufus, where the Main Street segment began. The crash rate for the Main Street segment was below state average for urban collectors, but the crash rate for the Herin Lane segment was 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.

Table 3-15. Reported Crashes at Study Roadway Segments

Segment Name	Segment Boundaries	Segment Length (miles)	Number of Crashes	ADT	Crash Rate (2009 – 2013 average)	State Average
Herin Lane	Scott Canyon Road to Oehman Road	3.65	4	90	6.672	1.300
Main Street in Rufus	1st Street to East City Limits	0.6	1	558	1.637	1.882

Findings from the crash analysis indicate the following:

- 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.
- The intersection of Van Gilder / OR 206 had a crash rate higher than the state average, but there was only one crash at the intersection which did not result in an injury. The high crash rate at this location is likely due to low traffic volumes.
- The Herin Lane segment from Scott Canyon Road to Oehman Road had four crashes during the five-year study period, resulting in an average crash rate above the statewide average. All four crashes were fixed object or non-collision crashes, and two occurred during dark and icy conditions. One crash resulted in an injury.

- 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.

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 Project Advisory Committee may highlight 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 will also be reviewed as part of the TSP process and are summarized below.

- The Project Management Team noted that crashes frequently occur on US 97 between Grass Valley and Kent, especially during inclement weather.
- *Additional information to be added from the Project Advisory Committee.*

PEDESTRIAN SYSTEM

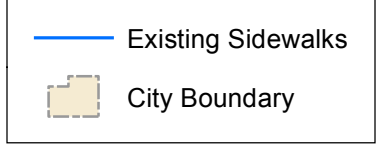
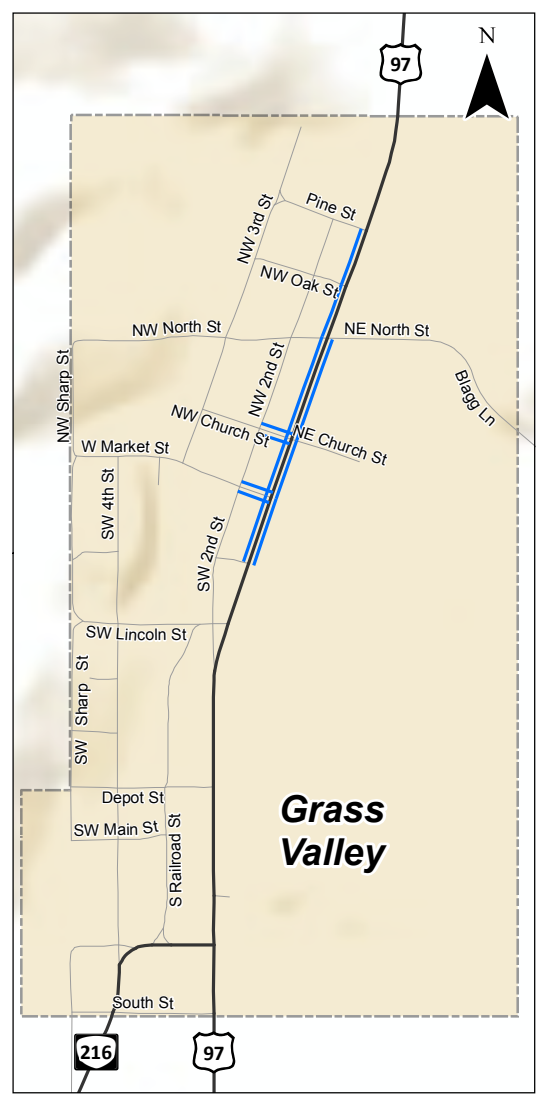
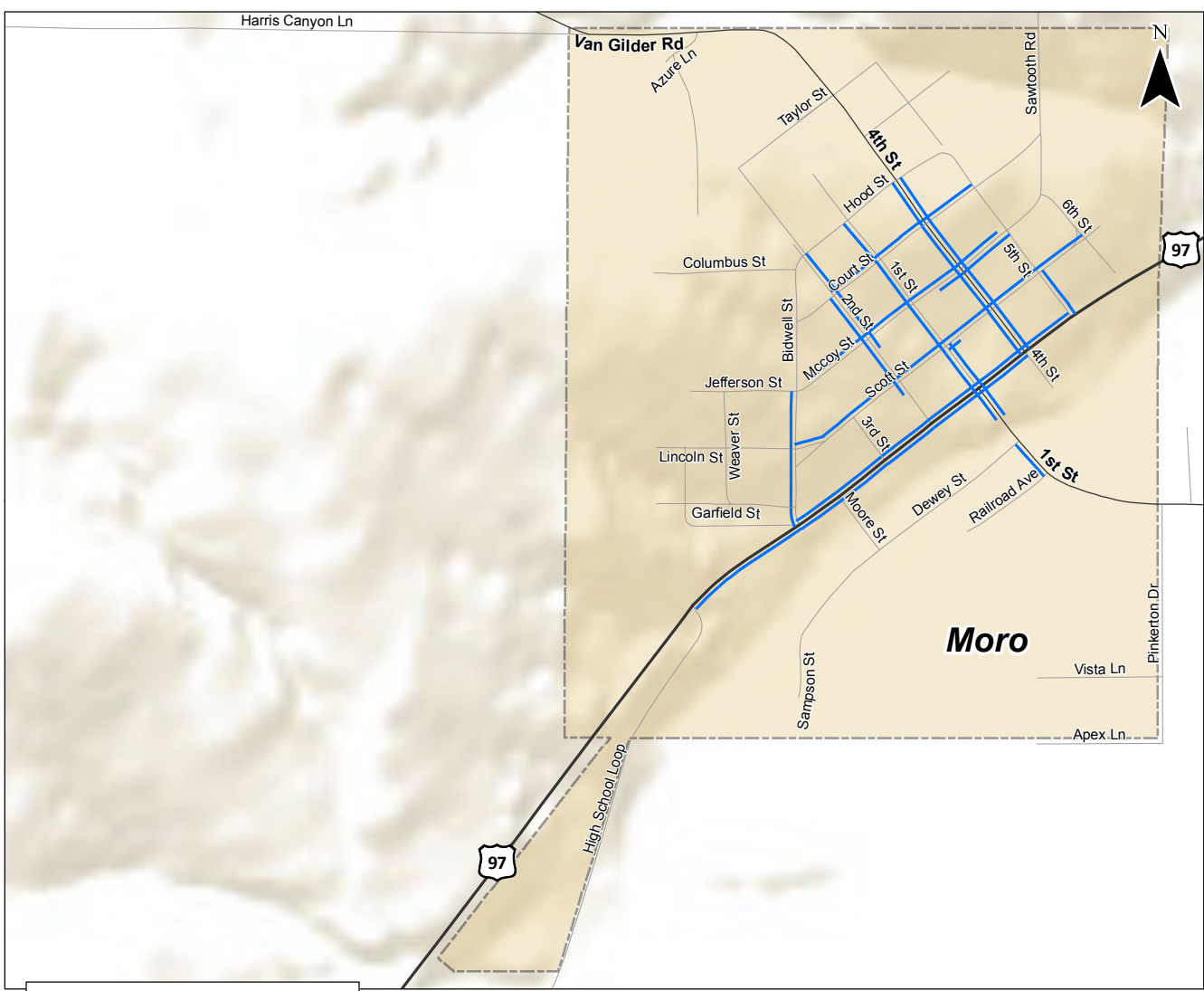
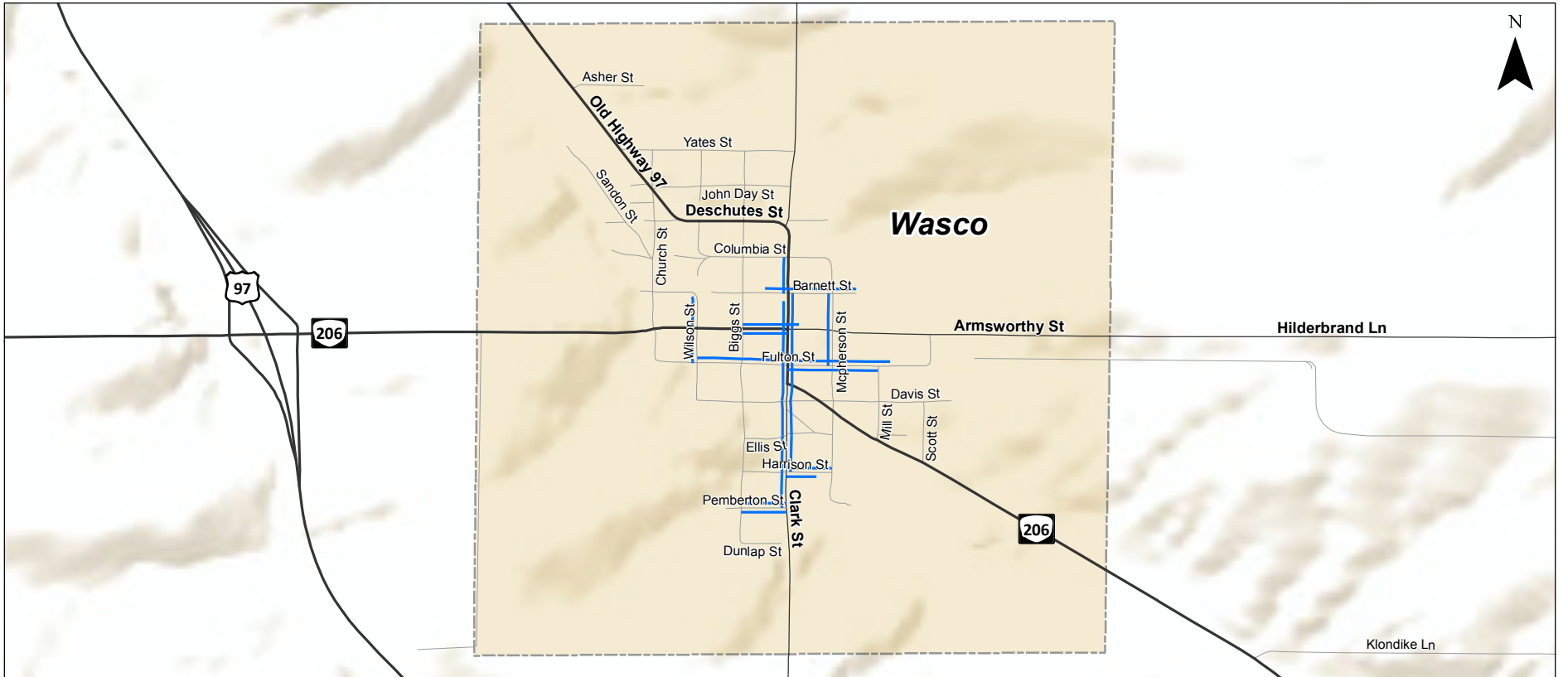
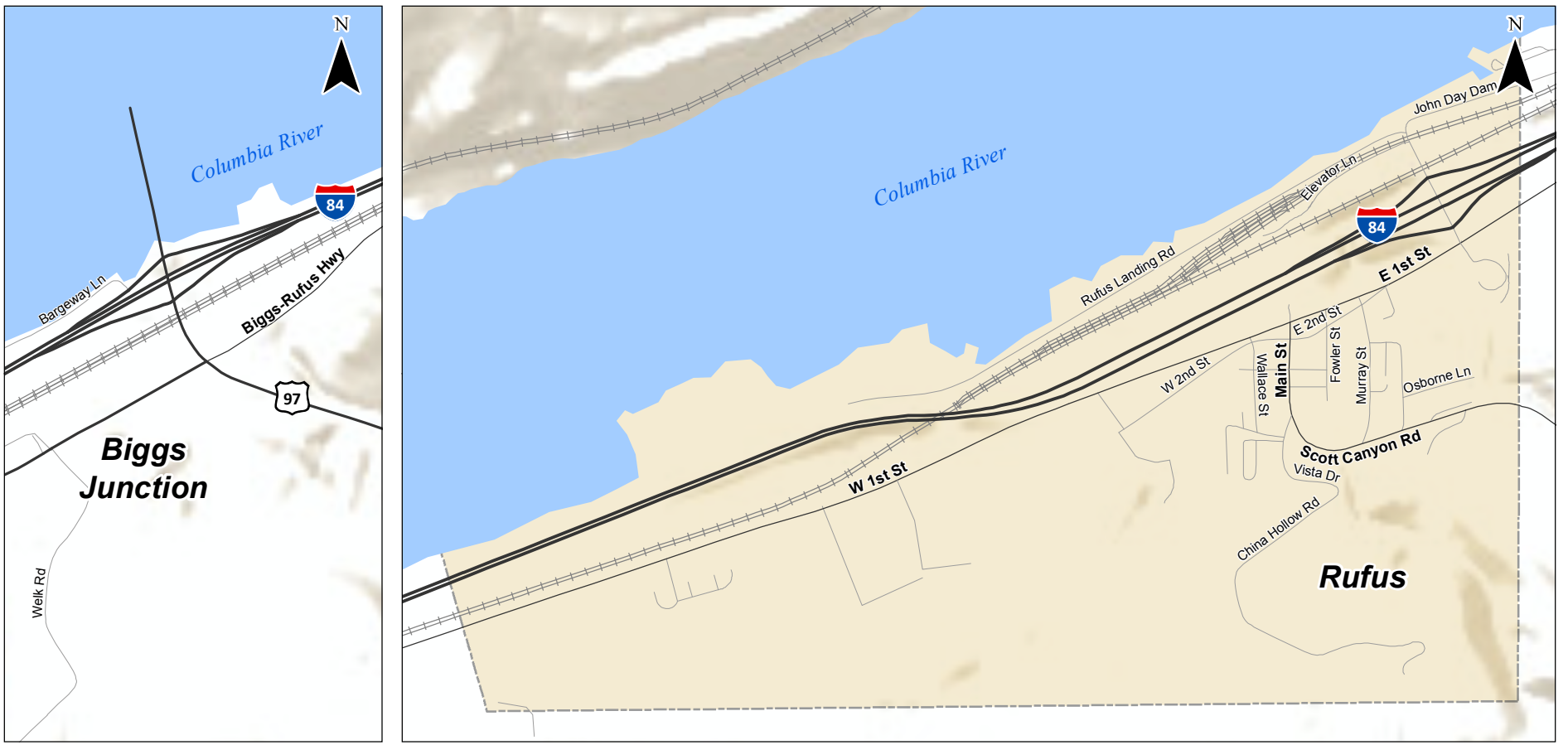
The pedestrian system in the Cities within Sherman County is summarized in Figure 3-8. The inventory was completed based on maps from the current TSP, a list of projects provided by the County that summarizes new sidewalks or treatments completed since the last TSP update, and a review of Google Earth imagery. No sidewalks are located within the City of Rufus.

The pedestrian facilities inventory map shows the location of existing sidewalks within the Cities of Wasco, Moro, and Grass Valley. 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.

Both County schools, the Sherman Elementary School in Grass Valley and the Sherman High School in Moro, are not connected with sidewalks to the rest of the pedestrian system. In Grass Valley, a short gap of approximately 0.05 mile in length exists between the school and the sidewalks along US 97. The Sherman High School is located approximately 0.6 miles south of the Moro City Limits. There are no sidewalks connecting the school with the rest of the City.

Many recreational walkers use the track at the Sherman High School in Moro to exercise. Others use the local roads leading out of the cities to 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.

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Sidewalk Inventory
Sherman County, Oregon

Figure
3-8

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BICYCLE SYSTEM

The only existing bicycle facilities in Sherman County are located in Moro. Within the City limits of Moro, striped bicycle lanes are located along both sides of US 97. Exhibit 3-4 illustrates the bike lanes along US 97 in Moro. The local, lower speed and lower volume residential streets within cities are typically not marked for bicyclists as the bicyclists can share the roadway with the slower vehicles.



Exhibit 3-4. Image illustrating the bicyclist and pedestrian facilities along US 97 in Moro

Recreational bicyclists commonly ride along US 97 and the local County roads. Occasionally larger groups of bicyclists pass through the County. Sherman County developed a marketing brochure of activities the County offers, and the brochure included a map with cyclist routes. The number of residents that commute via bicycle is 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.

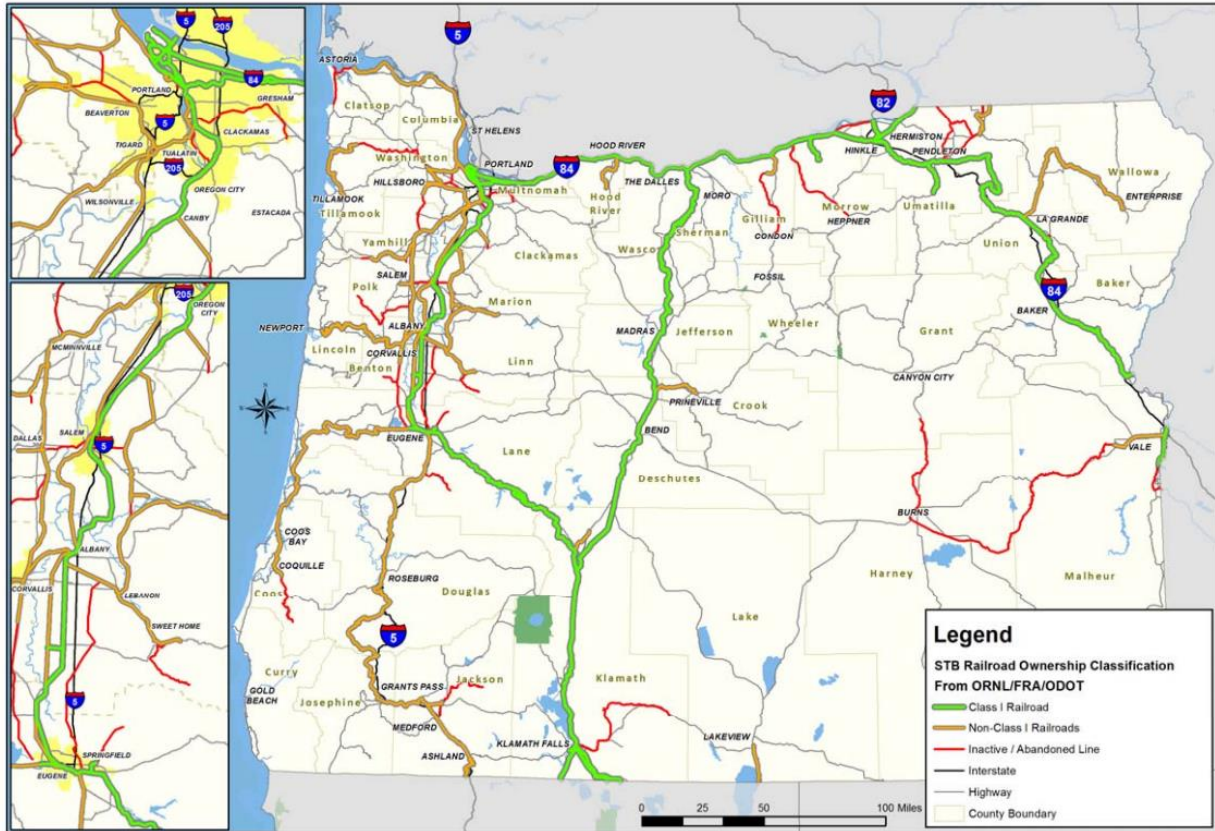
TRUCK FREIGHT ROUTES

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. Therefore, there are no train stops in Sherman County today. There is currently no passenger rail service in the County.

As shown in Exhibit 3-5, 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 3-5. State of Oregon Railroads

AIR TRANSPORTATION SYSTEM

The Wasco State Airport is located on the east side of Wasco in Sherman County. The airport dates back to 1946 and has been continuously operated by the State of Oregon since it acquired it in 1958. 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. As traffic at Biggs Junction continues to grow, the ability for more intermodal connections in this location may be evaluated.

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 several 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 Appendix G. 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 four 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.
- Bridge on River Trail by Blackberry, Bridge 20912 (State Park's jurisdiction): State Park Trail where it crosses Eagle Creek.
- Finnegan Creek, Finnegan Road, Bridge 5SC003 (County's jurisdiction): Finnegan Road where it crosses Finnegan Creek.

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

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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 could be developed for recreational or industrial purposes in the future if the demand exists.

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.

FUNDING INVENTORY & ANALYSIS

Roadways within Sherman County fall under the jurisdiction of the Cities, County, and ODOT. This section discusses the County's existing funding revenue sources for transportation capital improvement projects as well as operations and maintenance activities.

As summarized in Table 3-16, 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. Approximately half of the County's transportation revenue each year comes from property taxes. The remaining amounts are obtained from a variety of sources, including ODOT, as shown in Table 3-16 and vary by year. ODOT has historically been able to fund the County's transportation operations and maintenance activities for state facilities.

Table 3-17 summarizes the County's transportation expenditures over the past ten years. As shown in the table, the majority of the County's transportation expenditures are used to cover maintenance and system preservation projects throughout the County. The average annual expenditures over the past ten years was approximately \$2.0 million per year, leaving the County with approximately \$200,000 extra on average each year to invest in additional capital projects.

Table 3-16. Ten Year Sherman County Transportation Revenue Budget

Fiscal Year	STATE REVENUE					FEDERAL REVENUE			LOCAL REVENUE					TOTAL REVENUE
	State Hwy Fund App	Special Co Allotment	State Hwy Fund Exchange	ODOT Permit Fees	Other State Funds-SB 994	BLM Mineral Leases	Federal Flood Control	ARRA Stimulus Funds	Property Tax	Special Road Bond	Misc Local Revenue	SIP Revenue	Interest Income	
2004-05	137,621	472,026	87,349	6,016	-	200	-	-	609,579	236,270	49,577	-	16,741	1,615,379
2005-06	140,862	472,877	96,825	3,616	-	113	983	-	490,221	185,521	100,625	-	36,411	1,528,054
2006-07	138,123	469,544	91,336	11,065	-	211	66,861	-	547,619	-	73,178	-	50,648	1,448,586
2007-08	132,194	461,347	100,834	19,719	-	6,012	282	-	565,112	-	901,781	-	53,430	2,240,711
2008-09	120,561	151,239	124,143	17,561	761,973	1,228	29,027	-	663,775	-	107,022	241,802	37,605	2,255,936
2009-10	136,163	107,777	113,027	17,883	-	2,299	14,655	267,095	1,061,808	-	95,016	703,766	12,709	2,532,198
2010-11	163,216	110,295	117,890	7,206	-	1,859	14,628	-	927,776	-	115,389	564,451	9,651	2,032,361
2011-12	189,965	68,475	135,832	5,808	-	1,900	14,629	-	1,082,374	-	159,872	855,294	11,721	2,525,870
2012-13	196,868	101,240	134,794	6,027	-	1,371	13,165	-	1,064,854	-	225,336	2,233,527	14,317	3,991,499
2013-14	209,650	98,016	160,576	11,023	-	-	-	-	1,128,331	-	124,833	659,620	13,369	2,405,417

Table 3-17. Ten Year Sherman County Transportation Expenditures Budget

Fiscal Year	OPERATIONS & MAINTENANCE				CAPITAL PROJECTS			Admin & Engineering	Payments to Other Local Govts	Reimbursed Expenses for Work on Others' Roads	Debt Service	TOTAL EXPENDITURES
	General Maintenance	Safety & Traffic Mntc	Snow & Ice Removal	Extraordinary Mntc (FEMA)	New Facilities	System Preservation	System Enhancement					
2004-05	687,170	23,250	1,000	0	0	550,394	0	85,000	51,687	0	0	1,398,501
2005-06	569,623	21,780	1,000	85,195	0	452,758	0	85,000	162,304	0	0	1,377,660
2006-07	841,666	24,428	10,198	0	0	275,945	0	80,000	41,079	56,712	156,610	1,486,638
2007-08	652,576	25,650	13,879	0	0	607,882	0	80,000	43,795	67,002	156,609	1,647,393
2008-09	799,399	28,450	21,115	0	0	501,491	0	114,467	43,245	76,036	0	1,584,203
2009-10	1,307,919	32,681	9,590	0	0	1,348,541	0	154,270	51,719	68,276	0	2,972,996
2010-11	850,646	31,592	11,493	0	0	704,494	93,589	179,946	46,651	93,725	0	2,012,136
2011-12	1,037,443	9,854	13,066	0	106,560	787,041	0	8,189	57,011	112,556	0	2,131,720
2012-13	3,130,316	14,576	13,667	0	0	809,961	0	49,030	58,066	95,583	0	4,171,199
2013-14	950,223	51,786	17,691	0	0	649,114	0	63,013	62,219	80,712	0	1,874,758

DEVELOPMENT OF YEAR 2035 TRAFFIC FORECASTS

Traffic Forecast Projections

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). The same growth rate was used on state and county roadways.

The Methodology Memo, which is included as Appendix C, provides the traffic volumes projections for the locations that were used to develop the growth rate.

FUTURE TRAFFIC CONDITIONS AND NEEDS

The forecast 2035 traffic operations are summarized in the following sections. 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 Traffic Volumes

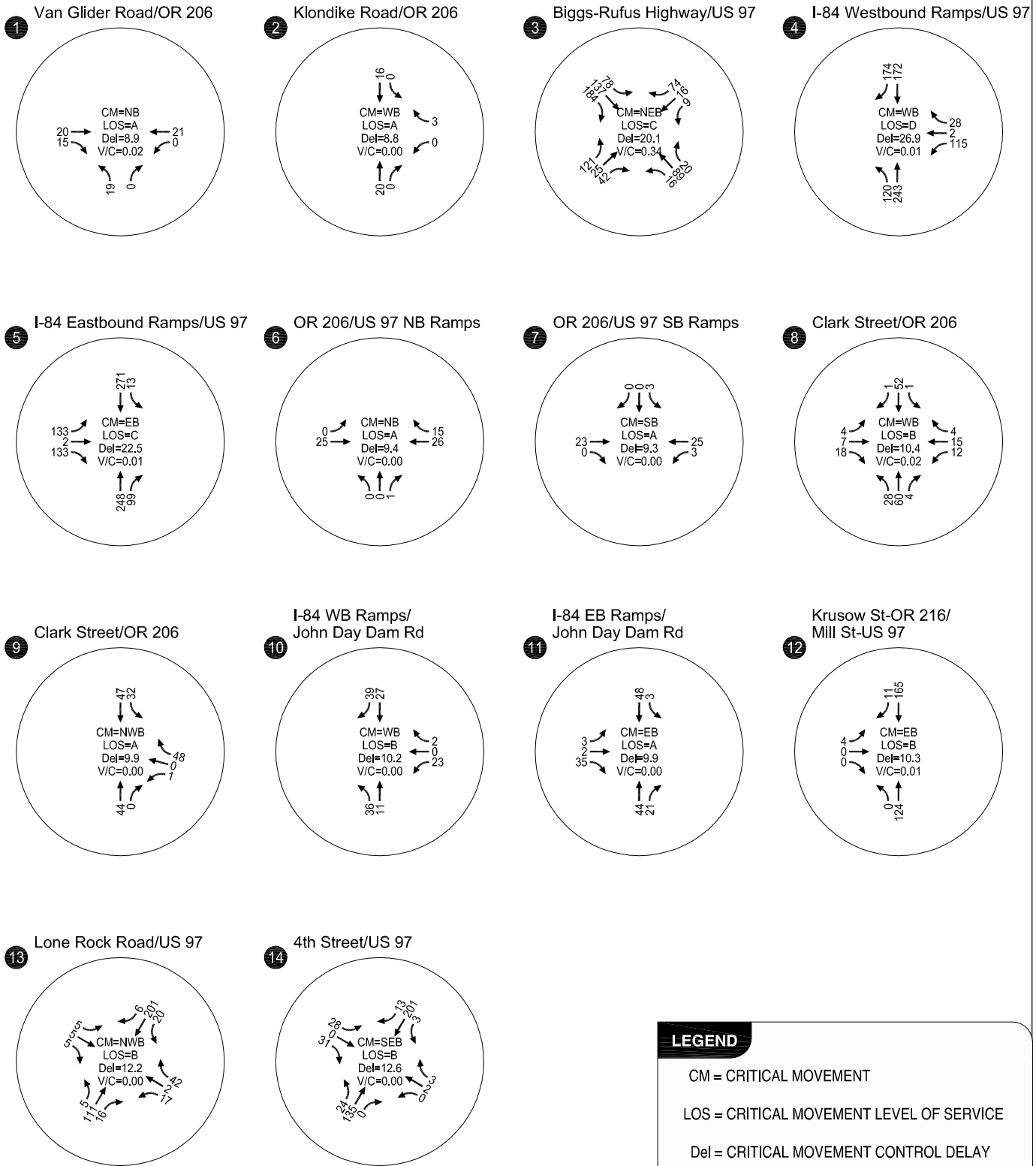
The projected 1.3 percent annual growth rate was applied to existing 2014 volumes to estimate forecast year 2035 traffic volumes.

Year 2035 Forecast Intersection Operations

Forecast 2035 transportation system capacity analysis was conducted based on forecast traffic volumes. The operational results indicate that no operational improvements are anticipated to meet State, County, or City operational standards for each respective facility in 2035.

The future conditions operational analysis was conducted based on the peak 15-minute period of traffic flow at each study intersection. No changes to the existing lane configurations and traffic control devices were incorporated in this analysis because there are no planned improvements at the intersections.

Figure 3-9 summarizes the 2035 30th highest hour traffic volumes and the resulting intersection operations. All study intersections are expected to operate with volume-to-capacity (v/c) ratio of less than 0.4. All intersections are expected to meet their performance standards in 2035. *Appendix H includes the operational analysis worksheets for all study intersections.*



LEGEND

- CM = CRITICAL MOVEMENT
- LOS = CRITICAL MOVEMENT LEVEL OF SERVICE
- Del = CRITICAL MOVEMENT CONTROL DELAY
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

**2035 Traffic Volumes and Operations Analysis Results
 Sherman County, Oregon**

**Figure
 3-9**

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FUTURE NEEDS

Based on the assessment of existing and future conditions, Table 3-18 documents future transportation needs within the County and Cities.

Table 3-18. Future Transportation Needs in Sherman County

Category	Name	Description
Safety	US 97 / Biggs - Rufus Highway Intersection	High frequency of crashes, particularly turning movement/angle crashes involving trucks. Crash rate is above the statewide 90th percentile.
Safety	Herin Lane	High frequency of crashes, particularly fixed object and non-collision crashes as well as icy road conditions. Crash rate is above the statewide 90 th percentile.
Safety	Fixed-object and non-collision crashes	High frequency of fixed-object and non-collision crashes.
Safety	US 97 from Grass Valley to Kent	Observations from the County indicate that there is a high frequency of crashes in this location.
Safety	Weather-related crashes	High frequency of weather-related crashes.
Active Transportation	Sidewalks to Elementary School in Grass Valley	No sidewalks exist.
Active Transportation	Sidewalks to High School south of Moro	No sidewalks exist.
Active Transportation	Recreational Walking Routes	No recreational walking paths exist. Potential locations may include from Moro to the fairgrounds, Fulton Canyon Road, and to the high school.
Active Transportation	Sidewalks along Lonerock Road	No sidewalks exist.
Active Transportation	Bicyclist Routes	Bicyclists are uncomfortable riding on US 97.
Bridge	Columbia River, Hwy 42 (Biggs Rapids, Sam Hill)	Review bridge characteristics to determine contributing factors to low sufficiency rating and determine whether repair or upgrade is needed.
Bridge	Spanish Hollow Cr, Hwy 42 Rt @ MP2.18 (Mud Hollow)	Review bridge characteristics to determine contributing factors to low sufficiency rating and determine whether repair or upgrade is needed.
Bridge	Bridge on River Trail by Blackberry	Review bridge characteristics to determine contributing factors to low sufficiency rating and determine whether repair or upgrade is needed.
Bridge	Finnegan Creek, Finnegan Rd Bridge	Review bridge characteristics to determine contributing factors to low sufficiency rating and determine whether repair or upgrade is needed.
Modernization	Roadway Design Guidelines	Roadway design guidelines for cities are not reflective of the rural character of the communities.

Category	Name	Description
Roadway	Fulton Canyon Road Truck Access	Fulton Canyon Road access is restricted; trucks cannot use this road due to limited width. This is a popular alternate route to I-84 to avoid Biggs Junction.
Roadway	Scott Canyon Road Truck Access	Scott Canyon Road is difficult for trucks to traverse; trucks are discouraged from using this route. This is a popular alternate route to I-84 to avoid Biggs Junction.
Intermodal	Intermodal connections at Biggs Junction	Intermodal connections are limited at Biggs Junction – opportunities for improved connections between trucks, rail, and river cargo may be evaluated.

CONCLUSION

The assessment of the existing and future land use and transportation system conditions identified the following:

- Multiple jurisdictions own and manage the public roadway system within Sherman County, including the Oregon Department of Transportation (ODOT), Sherman County, and the cities of Moro, Rufus, Wasco, and Grass Valley.
- Sherman County is connected to the national and statewide highway network via one Interstate Highway (I-84), one Statewide Highway (US 97), one Regional Highway (OR 206), and two District Highways (OR 206 and OR 216).
- Population projections for Sherman County show a decrease in population over the next 20 years. The County would like to promote economic development.
- Existing traffic volumes do not exceed capacity, and future traffic volumes are not expected to exceed capacity at the fourteen study intersections.
- County two-lane roads are not subject to ODOT standards; however, both County roadways studied operate well below ODOT standards in terms of delay under existing conditions as well as projected future volumes.
- The intersection of Biggs-Rufus Highway / US 97 and the segment of Herin Lane both have crash rates above the 90th percentile statewide crash rate for similar facilities. Both locations will be further evaluated during the TSP update to determine if opportunities for safety treatments are available.
- General County-wide trends indicate that fixed object crashes and weather related crashes are common in Sherman County. Low-cost systemic treatments will be considered.
- Both County schools lack continuous sidewalks connecting the school with the surrounding areas. The City of Rufus does not have any existing sidewalks.
- Four bridges in the County were identified as having low sufficiency ratings. Further evaluation will determine whether the reason for these ratings is structural or functional.
- There is no fixed route transit service in the County. The County operates a dial-a-ride service, available to all residents, twice a week.

- The County's largest industries are agriculture and wind energy. There is an industrial ready piece of land in Rufus.
- Freight traffic travel occurs by truck, rail, and boat. Biggs Junction is a major hub for the trucking industry and experiences high truck volumes. Better intermodal connections between rail, freight, and marine transportation may further encourage economic development of the region.
- Historically, the County and ODOT have funded the general maintenance and upkeep of the Sherman County roadways. No additional funds are available for large capital projects.

The needs documented in this memorandum will be used to develop project alternatives after input from the Project Advisory Committee has been received.

REFERENCES

1. Oregon Highway Plan
2. 2010 Highway Capacity Manual
3. ODOT Analysis Procedures Manual

APPENDICES

Appendix A Current Roadway Cross-Section Guidelines for Cities

Appendix B Traffic Count Data

Appendix C Methodology Memorandum

Appendix D Roadway Segment Traffic Volume Profiles

Appendix E Existing Conditions Traffic Operations Analysis Worksheets & Queue Length Calculations

Appendix F ODOT Crash Data (2009-2013)

Appendix G Bridge Inventory

Appendix H 2035 Operational Analysis Worksheets & Queue Length Calculations

Appendix A Current Roadway Cross-
Section Guidelines for Cities

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**Recommended
Street
Standards
For Rufus**

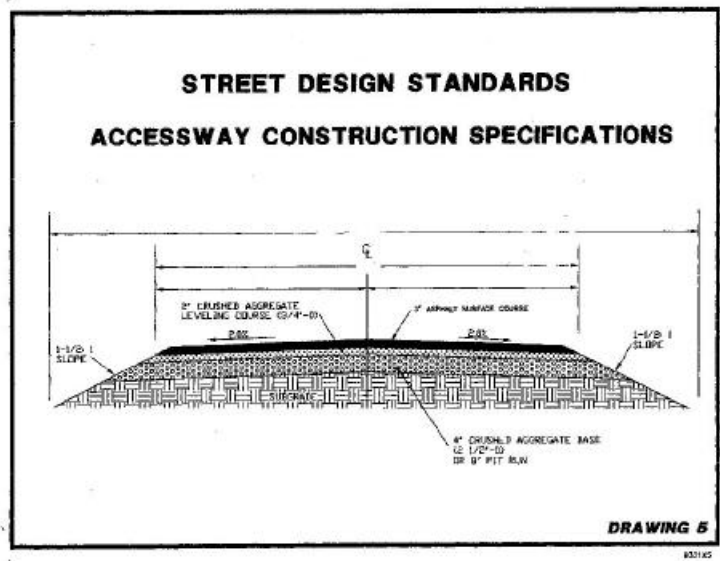
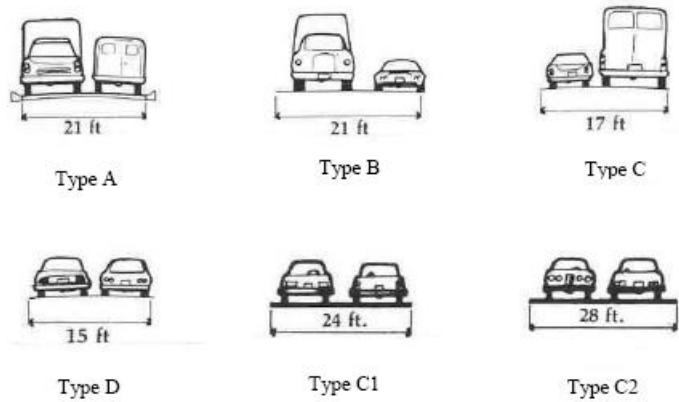


Figure 7-3

Exhibit A-1. Street Design Standards for Rufus

Figure 7-3
City of Rufus
Recommended Street and Sidewalk
Plan and Design

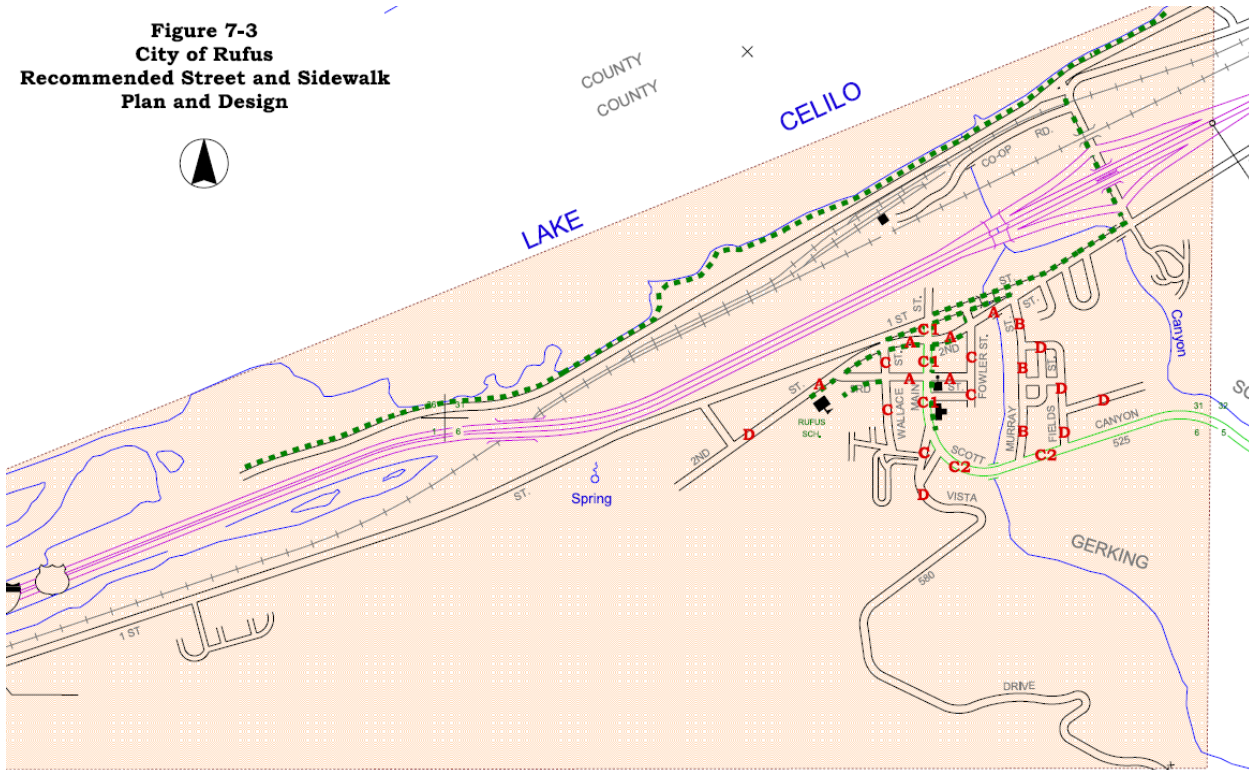


Exhibit A-2. Map of Street Design Standards for Rufus

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Recommended Street Standards
For
City of Wasco

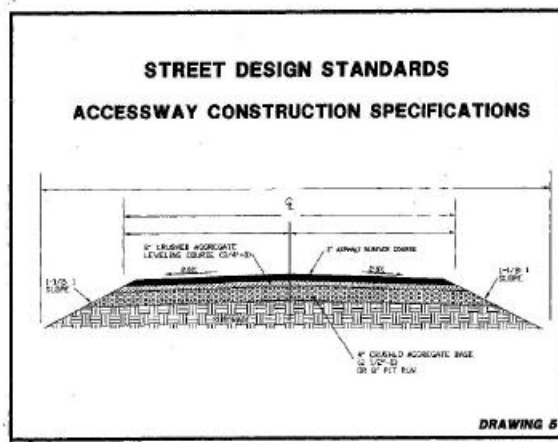
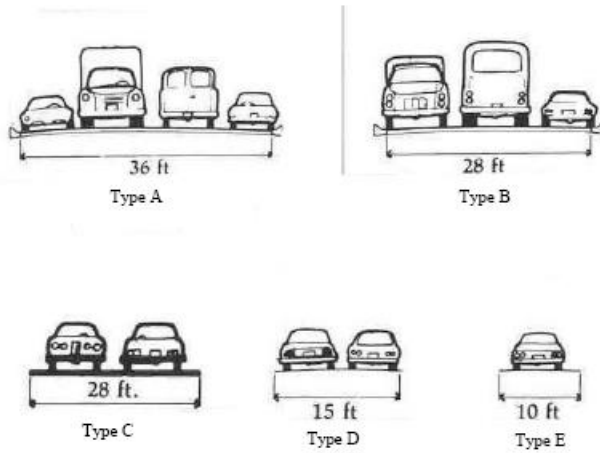


Figure 7-4

Exhibit A-3. Street Design Standards for Wasco

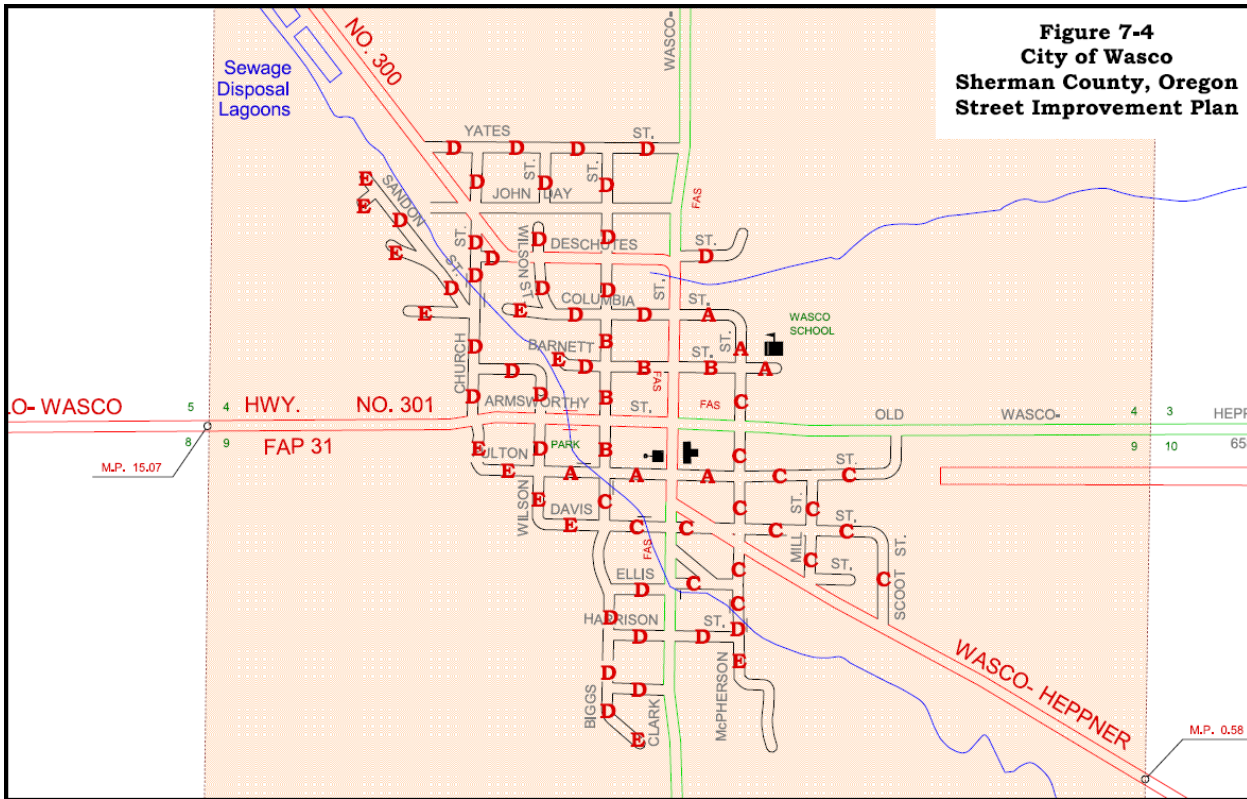


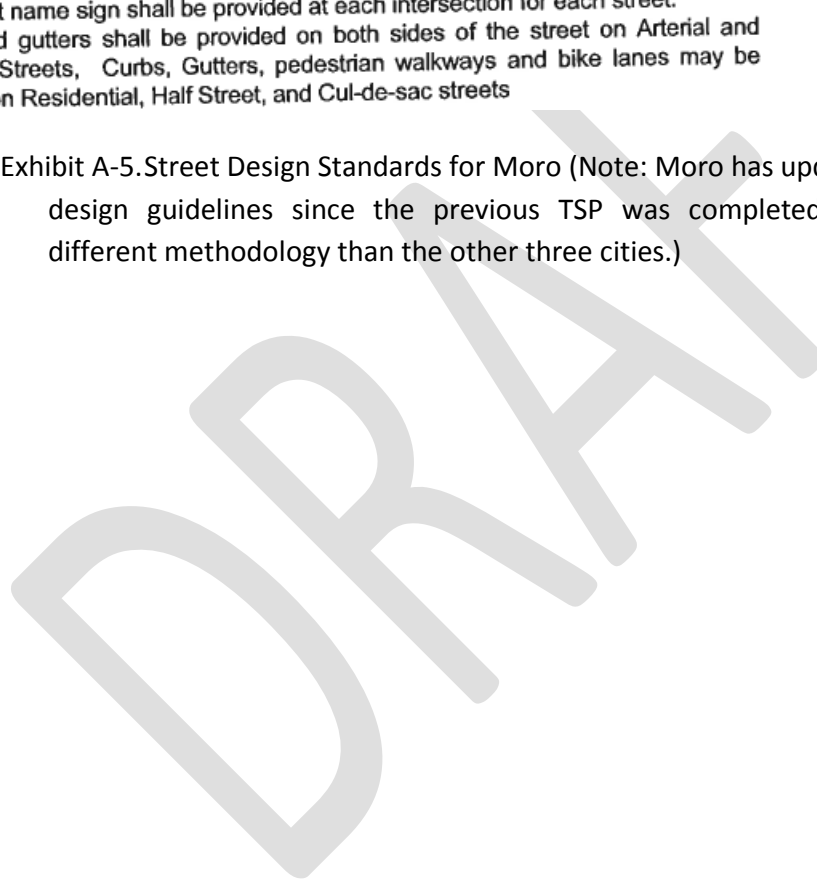
Exhibit A-4. Map of Street Design Standards for Wasco

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TYPE OF STREET	RIGHT-OF-WAY WIDTH	PAVING WIDTH BETWEEN CURBS	CURB RETURN RADIUS	MAXIMUM PERCENT OF GRADE	MINIMUM RADIUS OF CURVATURE
Arterial (4)	60'	36-42'	35'	10%	400'
Collector (4)	50'	24-28	35'	10%	300'
Residential (4)	50'	20-24	25'	10%	150'
Half Street (4)	50'	18-20	25'	10%	150'
Cul-de-sac (4)	50-60' (1)	26'-36' (1)	25'	10%	150'
Alley	20'	15-20	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-sac streets

Exhibit A-5. Street Design Standards for Moro (Note: Moro has updated their street design guidelines since the previous TSP was completed, resulting in a different methodology than the other three cities.)



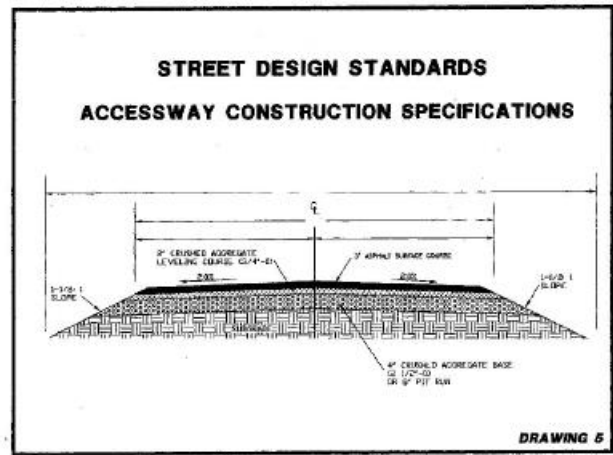
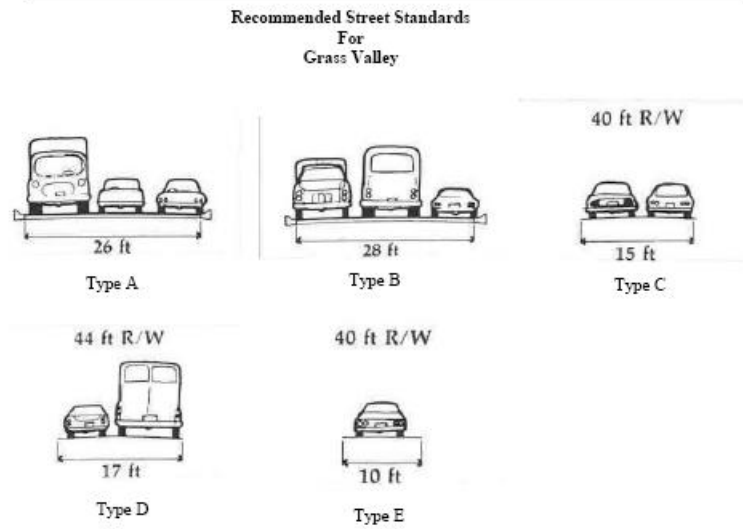


Figure 7-6

Exhibit A-6. Street Design Standards for Grass Valley

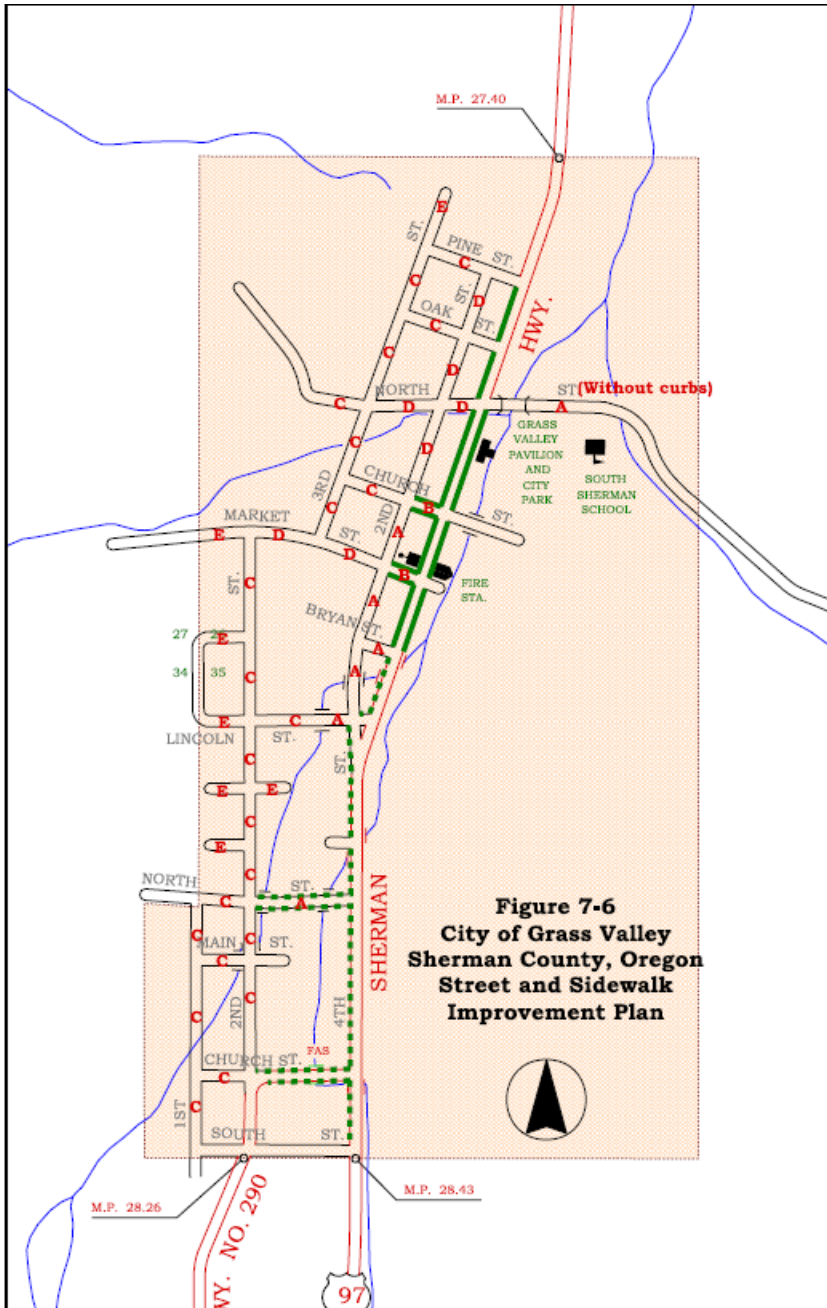


Exhibit A-7. Map of Street Design Standards for Grass Valley

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Appendix B Traffic Count Data

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Appendix C Methodology
Memorandum

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Appendix D Roadway Segment Traffic
Volume Profiles

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Appendix E Existing Conditions Traffic
Operations Analysis
Worksheets & Queue
Length Calculations

Appendix F ODOT Crash Data (2009-
2013)

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Appendix G Bridge Inventory

Bridge ID	Year Built	Owner Name	Structure Name	Length (ft)	Deck Area (Sq Ft)	Functional Classification of Roadway	Carries	Crosses	Sufficiency Rating	Posting	Operating Load (Tons)	Inventory Load (Tons)
00332C	1964	ODOT	Deschutes River, Hwy 2	580	43495.9	01 Rural Interstate	I-84 (HWY 002)	DESCHUTES RIVER	86.1	A Open, No Restriction	81	49
00340	1920	City	Gurkin Canyon Creek, E. 2nd Street	21	251.99	19 Urban Local	E. 2nd Street	GURKIN CANYON CREEK	80.5	A Open, No Restriction	75	45
00817	1961	ODOT	Slaughterhouse Creek, Hwy 42	30	1259.97	02 Rural Other Princ	US 97 (HWY 042)	SLAUGHTERHOUSE CREEK	93	A Open, No Restriction	58.8	45.4
00842A	1922	ODOT	Gordon Hollow Creek, Hwy 42	8	1175.97	02 Rural Other Princ	US 97 (HWY 042)	GORDON HOLLOW CREEK	97.6	A Open, No Restriction	""	""
00845	1922	ODOT	Slaughterhouse Creek, Hwy 42	15	0	02 Rural Other Princ	US 97 (HWY 042)	SLAUGHTERHOUSE CREEK	97.8	A Open, No Restriction	""	""
00849A	1962	ODOT	Columbia River, Hwy 42 (Biggs Rapids, Sam Hill)	2567	82142	02 Rural Other Princ	US 97 (HWY 042)	COLUMBIA R. BIGGS	48.9	A Open, No Restriction	63.49	38.69
01170	1925	ODOT	Carolyn Creek, Hwy 42 (E Fork Grass Valley Creek)	7	0	02 Rural Other Princ	US 97 (HWY 042)	CAROLYN CREEK	100	A Open, No Restriction	""	""
01171	1925	ODOT	East Fork Grass Valley Creek, Hwy 42	11	0	02 Rural Other Princ	US 97 (HWY 042)	EAST FK GRASS VALLEY CR	98	A Open, No Restriction	""	""
01750A	1955	ODOT	Fulton Canyon Creek, Hwy 301 at MP 4.76	140	4829.88	07 Rural Mjr Collector	HWY 301	FULTON CANYON CREEK	79.4	A Open, No Restriction	40	24
01750B	1964	ODOT	Fulton Canyon, Hwy 2 EB	114	4753.68	01 Rural Interstate	I-84 (HWY 002) EB	FULTON CANYON	85.2	A Open, No Restriction	41	25
01833	1933	ODOT	Gurkin Canyon Creek, Hwy 2 Frontage Rd	47	1569.76	08 Rural min Collector	FRONTAGE RD HWY 02	GURKIN CANYON CREEK	60.9	A Open, No Restriction	28.9	22.3
01839	1919	ODOT	Scott Creek, Hwy 2 Frontage Rd	18	703.48	01 Rural Interstate	FRONTAGE RD HWY 02	SCOTT CREEK	76	A Open, No Restriction	""	""
02133	1936	ODOT	Spanish Hollow Creek, Hwy 2 Frontage Rd	404	14341.65	08 Rural min Collector	I-84 (HWY 002) FR	SPANISH HOLLOW CREEK	61.2	A Open, No Restriction	39	23
02133A	1964	ODOT	Spanish Hollow Creek, Hwy 2	130	14637.64	01 Rural Interstate	I-84 (HWY 002)	SPANISH HOLLOW CREEK	96.8	A Open, No Restriction	68	35
04604	1951	ODOT	Culvert, Hwy 300 at MP "" .10	7	0	07 Rural Mjr Collector	OR 206 (HWY 300)	CREEK	88.9	A Open, No Restriction	""	""
04607	1963	ODOT	Cattlepass, Hwy 42 at MP 16.63	7	0	02 Rural Other Princ	US 97 (HWY 042)	CATTLEPASS	98.4	A Open, No Restriction	""	""
04623A	1962	ODOT	John Day River, Hwy 300	441	13582.47	06 Rural Minor Arterial	OR 206 (HWY 300)	JOHN DAY RIVER	58.3	A Open, No Restriction	29.9	23
05208	1947	ODOT	Buck Hollow Creek, Hwy 290	190	5965.85	07 Rural Mjr Collector	OR 216 (HWY 290)	BUCK HOLLOW CREEK	83.1	A Open, No Restriction	43	26
06922A	1925	ODOT	Grass Valley Canyon, Hwy 42	7	0	02 Rural Other Princ	US 97 (HWY 042)	CREEK	100	A Open, No Restriction	""	""
08099	1956	ODOT	Culvert, Hwy 42 at MP 22.09	7	0	02 Rural Other Princ	US 97 (HWY 042)	CULVERT	98.6	A Open, No Restriction	""	""
08613	1959	ODOT	Hay Canyon, Hwy 300	146	4511.29	06 Rural Minor Arterial	OR 206 (HWY 300)	HAY CANYON	80.9	A Open, No Restriction	48	29
08614	1959	ODOT	Grass Valley Canyon Creek, Hwy 300	185	5716.36	06 Rural Minor Arterial	OR 206 (HWY 300)	GRASS VALLEY CANYONCREEK	82.9	A Open, No Restriction	52	31
08618A	1959	ODOT	Spanish Hollow Creek, Hwy 300	8	0	06 Rural Minor Arterial	OR 206 (HWY 300)	SPANISH HOLLOW CREEK	99.3	A Open, No Restriction	""	""
08619A	1959	ODOT	Buck Canyon, Hwy 300 at MP 6.77	10	0	06 Rural Minor Arterial	OR 206 (HWY 300)	BUCK CANYON	99.5	A Open, No Restriction	""	""
08855	1962	ODOT	Spanish Hollow Creek, Hwy 42 at MP 0.39	393	13754.67	02 Rural Other Princ	US 97 (HWY 042)	SPANISH HOLLOW	65.1	A Open, No Restriction	24.1	18.6
08892	1963	ODOT	Spanish Hollow Cr, Hwy 42 Rt @ MP2.18 (Mud Hollow)	46	1614.56	09 Rural Local	MUD HOLLOW RD	SPANISH HOLLOW CREEK	40.9	A Open, No Restriction	35.9	27.7
08893	1963	ODOT	Spanish Hollow Creek, Hwy 42 at MP 2.37	130	4523.89	02 Rural Other Princ	US 97 (HWY 042)	SPANISH HOLLOW CREEK	68.3	A Open, No Restriction	26.7	20.6
08894	1963	ODOT	Spanish Hollow Creek, Hwy 42 at MP 2.48	165	5774.86	02 Rural Other Princ	US 97 (HWY 042)	SPANISH HOLLOW CREEK	63.1	A Open, No Restriction	24.3	18.7

Bridge ID	Year Built	Owner Name	Structure Name	Length (ft)	Deck Area (Sq Ft)	Functional Classification of Roadway	Carries	Crosses	Sufficiency Rating	Posting	Operating Load (Tons)	Inventory Load (Tons)
08895	1963	ODOT	Spanish Hollow Creek, Hwy 42 at MP 3.11	336	11826.91	02 Rural Other Princ	US 97 (HWY 042)	SPANISH HOLLOW CREEK	79	A Open, No Restriction	36.1	27.8
08896	1963	ODOT	Spanish Hollow Creek, Hwy 42 at MP 3.25	332	11652.92	02 Rural Other Princ	US 97 (HWY 042)	SPANISH HOLLOW CREEK	68.3	A Open, No Restriction	26.6	20.5
08942	1963	ODOT	Hwy 2 over Conn (W John Day Intchg)	36	2836.73	01 Rural Interstate	I-84 (HWY 002)	CONN RD	91.8	A Open, No Restriction	58	35
09213	1965	ODOT	Hwy 2 WB over UPRR	458	16487.6	01 Rural Interstate	I-84 (HWY 002) WB	UPRR	78.3	A Open, No Restriction	43.4	33.5
09213A	1965	ODOT	Hwy 2 EB over UPRR	450	16199.61	01 Rural Interstate	I-84 (HWY 002) EB	UPRR	77.2	A Open, No Restriction	41.7	32.2
09218	1963	ODOT	Gordon Hollow Creek, Hwy 42	7	0	02 Rural Other Princ	US 97 (HWY 042)	GORDON HOLLOW CREEK	97.7	A Open, No Restriction	""	""
09225	1965	ODOT	Hwy 2 EB over Rufus Conn	126	5291.87	01 Rural Interstate	I-84 (HWY 002) EB	RUFUS CONN	82	A Open, No Restriction	44	26
09225A	1965	ODOT	Hwy 2 WB over Rufus Conn	127	5333.87	01 Rural Interstate	I-84 (HWY 002) WB	RUFUS CONN	86.5	A Open, No Restriction	37.6	29
09232	1965	ODOT	Scott Canyon, Hwy 2 WB	186	12740.69	01 Rural Interstate	I-84 (HWY 002) WB	SCOTT CANYON WEST	75.3	A Open, No Restriction	25.5	19.7
09232A	1965	ODOT	Scott Canyon, Hwy 2 EB	189	9222.98	01 Rural Interstate	I-84 (HWY 002) EB	SCOTT CANYON EAST	79	A Open, No Restriction	29.4	22.7
09456	1966	ODOT	Fulton Canyon Creek, Hwy 301 at MP 5.64	40	1439.96	07 Rural Mjr Collector	HWY 301	FULTON CANYON CREEK	94.1	A Open, No Restriction	40.6	31.3
09997	1973	ODOT	Spanish Hollow Creek, Hwy 42 at MP 6.20	132	6098.25	02 Rural Other Princ	US 97 (HWY 042)	SPANISH HOLLOW CREEK	94.7	A Open, No Restriction	41.6	32.1
09998	1973	ODOT	Spanish Hollow Creek, Hwy 42 at MP 6.98	122	5660.66	02 Rural Other Princ	US 97 (HWY 042)	SPANISH HOLLOW CREEK	98	A Open, No Restriction	45.5	35.1
09999	1973	ODOT	Spanish Hollow Creek, Hwy 42 at MP 7.56	12	0	02 Rural Other Princ	US 97 (HWY 042)	SPANISH HOLLOW CREEK	84.4	A Open, No Restriction	60	36
0M073	1963	ODOT	China Hollow Creek, Hwy 42	9	0	02 Rural Other Princ	US 97 (HWY 042)	CHINA HOLLOW CREEK	97.2	A Open, No Restriction	""	""
0M090	1925	ODOT	Cattlepass, Hwy 282 at MP 17.59	6	182	07 Rural Mjr Collector	OR 216 (HWY 290)	CATTLEPASS	94.3	A Open, No Restriction	""	""
0M091	1947	ODOT	Michael Creek, Hwy 290	6	0	07 Rural Mjr Collector	OR 216 (HWY 290)	MICHAEL CREEK	93.7	A Open, No Restriction	""	""
0M093	1920	ODOT	Culvert, Hwy 301 at MP 6.45	25	749.98	07 Rural Mjr Collector	HWY 301	FULTON CANYON CREEK	92.2	A Open, No Restriction	60	36
0M094	1920	ODOT	Culvert, Hwy 301 at MP 6.14	13	285.99	07 Rural Mjr Collector	HWY 301	FULTON CANYON CREEK	92.2	A Open, No Restriction	""	""
0M095	1955	ODOT	Culvert, Hwy 301 at MP 6.77	15	1109.97	07 Rural Mjr Collector	HWY 301	CREEK	99.3	A Open, No Restriction	""	""
0M096	1920	ODOT	Culvert, Hwy 301 at MP 7.27	10	0	07 Rural Mjr Collector	HWY 301	CREEK	71.9	A Open, No Restriction	""	""
0M097	1920	ODOT	Fulton Canyon Creek, Hwy 301 at MP 10.26	8	0	07 Rural Mjr Collector	HWY 301	FULTON CANYON CREEK	70.8	A Open, No Restriction	25	15
0M106	1964	ODOT	Equipment Pass, Hwy 2 at MP 100.15	14	1399.97	01 Rural Interstate	I-84 (HWY 002)	EQUIPMENT PASS	75.1	A Open, No Restriction	""	""
0M116	1955	ODOT	Culvert, Hwy 301 at MP 7.05	29	0	07 Rural Mjr Collector	HWY 301	CREEK	95.3	A Open, No Restriction	60	36
0M117	1920	ODOT	Culvert, Hwy 301 at MP 7.66	8	0	07 Rural Mjr Collector	HWY 301	CREEK	88.2	A Open, No Restriction	""	""
0M118	1920	ODOT	Dry Creek, Hwy 301 at MP 12.05	15	0	07 Rural Mjr Collector	HWY 301	DRY CREEK	96.9	A Open, No Restriction	""	""
0M119	1920	ODOT	Spanish Hollow Creek, Hwy 301	10	342.99	06 Rural Minor Arterial	HWY 301	SPANISH HOLLOW CREEK	100	A Open, No Restriction	""	""
0P107	1964	ODOT	Finnigan Creek, Hwy 42	6	0	02 Rural Other Princ	US 97 (HWY 042)	FINNIGAN CREEK	100	A Open, No Restriction	""	""

Bridge ID	Year Built	Owner Name	Structure Name	Length (ft)	Deck Area (Sq Ft)	Functional Classification of Roadway	Carries	Crosses	Sufficiency Rating	Posting	Operating Load (Tons)	Inventory Load (Tons)
OP107S	1961	ODOT	Finnigan Creek, Hwy 42 SB at MP 35.28	8	0	02 Rural Other Princ	US 97 (HWY 042) SB	FINNIGAN CREEK	100	A Open, No Restriction	""	""
OP118	1966	ODOT	Creek, Hwy 301 at MP 8.97	6	0	07 Rural Mjr Collector	HWY 301	CREEK	99.3	A Open, No Restriction	""	""
OP124	1959	ODOT	Cattlepass, Hwy 300 at MP 6.08	6	0	06 Rural Minor Arterial	OR 206 (HWY 300)	CATTLEPASS	99	A Open, No Restriction	""	""
OP125	1959	ODOT	Buck Canyon & Cattlepass, Hwy 300 at MP 7.31	17	0	06 Rural Minor Arterial	OR 206 (HWY 300)	CATTLEPASS & DRAINAGE	99.8	A Open, No Restriction	""	""
OP126	1959	ODOT	Buck Canyon & Cattlepass, Hwy 300 at MP 7.55	16	0	06 Rural Minor Arterial	OR 206 (HWY 300)	CATTLEPASS & DRAINAGE	99.8	A Open, No Restriction	""	""
OP127	1959	ODOT	Buck Canyon & Cattlepass, Hwy 300 at MP 8.52	16	2783.93	06 Rural Minor Arterial	OR 206 (HWY 300)	CATTLEPASS & DRAINAGE	99.8	A Open, No Restriction	""	""
OP128	1959	ODOT	Cottonwood Canyon & Cattlepass, Hwy 300 at MP 9.73	7	559.99	06 Rural Minor Arterial	OR 206 (HWY 300)EB	COTTONWOOD CANYON	92.4	A Open, No Restriction	""	""
OP129	1959	ODOT	Drainage & Cattlepass, Hwy 300 at MP 10.65	6	0	06 Rural Minor Arterial	OR 206 (HWY 300)	CATTLEPASS & DRAINAGE	92.4	A Open, No Restriction	""	""
OP130	1959	ODOT	Cottonwood Canyon & Cattlepass, Hwy300 at MP 11.07	7	0	06 Rural Minor Arterial	OR 206 (HWY 300)EB	COTTONWOOD CANYON	92.4	A Open, No Restriction	""	""
OP131	1959	ODOT	Cottonwood Canyon & Cattlepass, Hwy300 at MP 11.28	7	0	06 Rural Minor Arterial	OR 206 (HWY 300)EB	COTTONWOOD CANYON	92.4	A Open, No Restriction	""	""
OP132	1959	ODOT	Cattlepass, Hwy 300 at MP 14.68	7	0	06 Rural Minor Arterial	OR 206 (HWY 300)	CATTLEPASS	89	A Open, No Restriction	""	""
OP141	1964	ODOT	Helms Creek, Hwy 2	22	5609.86	01 Rural Interstate	I-84 (HWY 002)	HELMS CREEK	65	A Open, No Restriction	60	36
OP184	1959	ODOT	Cattlepass, Hwy 300 at MP 3.61	7	412.99	06 Rural Minor Arterial	OR 206 (HWY 300)	CATTLEPASS	99.3	A Open, No Restriction	""	""
OP416	1973	ODOT	Cattlepass, Hwy 42 at MP 6.55	7	0	02 Rural Other Princ	US 97 (HWY 042)	CATTLEPASS	80	A Open, No Restriction	""	""
OP417	1973	ODOT	Cattlepass, Hwy 42 at MP 7.66	7	909.98	02 Rural Other Princ	US 97 (HWY 042)	CATTLEPASS	80	A Open, No Restriction	""	""
OP418	1973	ODOT	Cattlepass, Hwy 42 at MP 7.73	7	909.98	02 Rural Other Princ	US 97 (HWY 042)	CATTLEPASS	65	A Open, No Restriction	""	""
OP419	1973	ODOT	Cattlepass, Hwy 42 at MP 9.16	7	923.98	02 Rural Other Princ	US 97 (HWY 042)	CATTLEPASS	84	A Open, No Restriction	""	""
OP420	1973	ODOT	Cattlepass, Hwy 42 at MP 10.85	7	923.98	06 Rural Minor Arterial	US 97 (HWY 042)	CATTLEPASS	80	A Open, No Restriction	""	""
OP434	1959	ODOT	South Fork Spanish Hollow Creek, Hwy 300	7	0	06 Rural Minor Arterial	HWY 300	CREEK	88	A Open, No Restriction	""	""
13548	1973	ODOT	Hwy 301 over Hwy 42 (Wasco Intchg)	208	7238.22	06 Rural Minor Arterial	HWY 301	O-XING HWY 42(WASCO INT)	96.1	A Open, No Restriction	43.9	33.8
16072	1973	ODOT	Gordon Hollow Creek, Hwy 301	12	0	07 Rural Mjr Collector	HWY 301	GORDON HOLLOW CREEK	98.6	A Open, No Restriction	""	""
18017	1957	City	Grass Valley Canyon, Blagg Ln	23	602.76	09 Rural Local	BLAGG LANE	GRASS VALLEY CANYON	64	A Open, No Restriction	25	15
18715	1986	ODOT	Cattlepass, Hwy 42 at MP 25.87	7	4499.89	02 Rural Other Princ	US 97 (HWY 042)	CATTLEPASS	98	A Open, No Restriction	75	45
20074	2004	County	Barnum Canyon, Monkland Lane	20	0	07 Rural Mjr Collector	MONKLAND LANE	BARNUM CANYON	100	A Open, No Restriction	60	36
20912	1995	State Park	Bridge on River Trail by Blackberry	0	-10.76	Not Applicable	State Park Trail	Eagle Creek	-2	A Open, No Restriction	""	""
21487	2014	ODOT	Hwy 42 over UPRR	145	12759.69	02 Rural Other Princ	US 97 (HWY 042)	UPRR	78.5	G New Structure, not yet Open to Traffic	75	45
21488	2014	ODOT	Hwy 42 over Hwy 2	113	9491.77	02 Rural Other Princ	US 97 (HWY 042)	I-84 (HWY 002)	73.8	G New Structure, not yet Open to Traffic	75	16.2
558391	1957	County	Grass Valley Canyon, Monkland Ln	88	2529.46	07 Rural Mjr Collector	MONKLAND LANE	GRASS VALLEY CANYON	91.4	A Open, No Restriction	61	37

Bridge ID	Year Built	Owner Name	Structure Name	Length (ft)	Deck Area (Sq Ft)	Functional Classification of Roadway	Carries	Crosses	Sufficiency Rating	Posting	Operating Load (Tons)	Inventory Load (Tons)
558812	1960	County	Grass Valley Canyon, Lone Rock Rd	114	3304.44	07 Rural Mjr Collector	LONE ROCK ROAD	GRASS VALLEY CANYON	85.3	A Open, No Restriction	47	28
55C002	1919	County	Hay Canyon, Hay Canyon Rd	34	1356.22	07 Rural Mjr Collector	HAY CANYON ROAD	HAY CANYON	96.3	A Open, No Restriction	56	34
55C003	1920	County	Finnegan Creek, Finnegan Rd	30	871.86	08 Rural min Collector	FINNEGAN ROAD	FINNEGAN CREEK	38.7	A Open, No Restriction	46	27
55C004	1957	County	Rosebush Creek, Rutledge Rd	28	828.8	07 Rural Mjr Collector	RUTLEDGE ROAD	ROSEBUSH CREEK	80	A Open, No Restriction	48	29
55C010	1930	County	Mud Hollow Canyon, Mud Hollow Rd	31	688.87	09 Rural Local	MUD HOLLOW RD	MUD HOLLOW CANYON	91.1	A Open, No Restriction	48	29
55C011	1970	County	Barnum Canyon, Henrichs Rd	26	774.98	09 Rural Local	HENRICHS ROAD	BARNUM CANYON	85	A Open, No Restriction	91	54
55C012	1957	County	Rosebush Creek, Blagg Rd	33	861.09	09 Rural Local	BLAGG ROAD	ROSEBUSH CREEK	88.5	A Open, No Restriction	43	26
55C013	1961	County	Hay Canyon, Hay Canyon Rd	38	1173.24	09 Rural Local	HAY CANYON ROAD	HAY CANYON	94.1	A Open, No Restriction	52	31
W1750B	1964	ODOT	Fulton Canyon, Hwy 2 WB	114	4753.68	01 Rural Interstate	I-84 (HWY 002) WB	FULTON CANYON	85.2	A Open, No Restriction	41	25

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Appendix H 2035 Operational Analysis
Worksheets & Queue
Length Calculations