

Section 6
Greater McLoughlin Area

OVERVIEW OF KEY FINDINGS – GREATER MCGLOUGHLIN AREA

Existing and 2035 future conditions analysis was conducted for the transportation system in the Greater McLoughlin area. Key findings from this analysis are summarized below. The full analysis of the existing conditions and future base conditions follows.

Existing Conditions:

Transportation Disadvantaged Populations

- The transportation disadvantaged populations in the subarea are located heavily along OR 99, surrounding Park Avenue on the Milwaukie/unincorporated Clackamas County border (a future light-rail station area), and between Webster Road and I-205

Roadways

- All 25 study intersections are operating at volume-to-capacity ratios that meet performance standards under existing conditions.
- Roadway segments are primarily less congested during the weekday evening peak hour under existing conditions. Relatively short segments of SE River Road and SE Thiessen Road are estimated to experience congestion during the weekend evening peak hour.

Pedestrian System

- Nearly all roadways have significant gaps with regards to pedestrian facilities, including OR 99E which is categorized as only 76-99% complete with respect to the presence of sidewalks.
- Sidewalks are a required standard on all roadways in the County's urban areas; however the Essential Pedestrian Network in the County's comprehensive plan (see Appendix 5) provides guidance on which local roadways are critical parts of the pedestrian network. It also includes all collectors and arterials in the subarea.
- Existing gaps in the pedestrian network include all roadways identified on the Essential Pedestrian Network that do not have an existing sidewalk facility.
- The County's Pedestrian Master Plan identifies priorities for filling in the pedestrian network gaps which will be reviewed using the TSP Vision and Goals evaluation criteria.

Bicycle System

- A significant portion of the area has bicycle lanes. In addition to the Trolley Trail multi-use path that runs from Milwaukie to Gladstone, there are bike lanes on most of the north-south corridors (providing good alternative routes to OR 99E) and many east-west corridors.
- Bicycle facilities should be provided on all roadways designated as Collectors or higher. The County's current comprehensive plan identifies all collector and arterial roadways plus many local roadways in the Greater McLoughlin Area subarea as part of the County's Existing Bikeway Network.
- Existing gaps in the network include all roadways identified on the Existing Bicycle Network (nearly all collectors and arterials) that do not have an existing bicycle facility.

- The County’s Bike Master Plan identifies priorities for filling in the bicycle network gaps which will be reviewed using the TSP Vision and Goals evaluation criteria.

Safety Corridors

- The following candidate road safety audit corridors (listed in no particular order) were identified based on the crash data review and analysis:
 - OR 99E from SE Park Avenue to bridge across the Clackamas River
 - SE Jennings Avenue from Webster Road to OR 99E
 - Oatfield Road from SE Jennings Avenue to SE Lake Road

Transit

- **Transit Service Frequency:** A majority of the service currently operates at LOS D or below throughout the day with respect to frequency. TriMet Line 33, however, operates at LOS C throughout most of the day and Line 99 operates at LOS C during the morning and evening peak time periods. Although the service is typical of most suburban areas, if headways are decreased (and buses are more frequent), service will become more appealing to a broader range of users and ridership could increase.
- **Transit Hours of Service:** The services provided operate between LOS A and LOS E throughout the day. Service at this level is generally used by a variety of people, including those who have no other transportation alternative. Increasing the hours of service on the routes that operate at LOC C or below will make bus service usable for a broader range of trip purposes.
- **Transit Service Coverage:** The current population and employment service coverage is LOS C. Some of the transit supportive areas not currently served by transit may require additional transit routes or new connections to existing routes in order to be served.
 - The number of transit supportive areas is expected to increase significantly throughout most of the area by 2035. While many of these areas are expected to be served by existing transit services, the remaining areas will require additional service routes or connections to existing routes in order to be served.

2035 Future Base Conditions:

- Of the four study intersections that do not meet performance standards in the low build scenario, none are directly impacted by capacity low build projects and all are impacted by capacity full build projects:
 - SE Thiessen Road/SE Hill Road
 - SE Thiessen Road/SE Aldercrest Road
 - SE Roots Road/SE Webster Road
 - SE Jennings Avenue/SE Webster Road
- Three of the 25 study intersections operate at volume-to-capacity ratios in excess of performance standards under both the low build and full build future conditions:

- SE Thiessen Road/SE Hill Road
- SE Thiessen Road/SE Aldercrest Road
- SE Jennings Avenue/SE Webster Road
- One intersections was found to operate at volume-to-capacity ratios in excess of performance standards under the low build scenario, but meet performance standards under the full build future conditions:
 - SE Roots Road/SE Webster Road
- Demand for travel is highest along OR 99E, Oatfield Road, Webster Road, SE Thiessen Road, and SE River Road under both the low build and full build future conditions.
- Five roadway segments operate at volume-to-capacity ratios over 0.80 and are thus considered to be nearing congestion or have some level of congestion under both the low build and full build future conditions:
 - SE River Road (SE Silver Springs Road to SE Park Avenue)
 - SE Oatfield Rd (SE Park Avenue to SE Lake Road)
 - SE Thiessen Rd (SE Hill Road to SE Webster Road)
 - SE Webster Rd (SE Jennings Avenue to SE Roots Road)
 - OR 99E (E Arlington to South border of subarea)
- Overall, moderate growth is forecast for the study roadways. The most significant increases in traffic volumes are projected on OR 99E.

EXISTING CONDITIONS – GREATER MCLOUGHLIN AREA

INTRODUCTION

The Greater McLoughlin Area is located in the northwest portion of Clackamas County, roughly bound by the Willamette River to the south and west, and by OR 224 and I-205 to the north and east. It is located inside the Metro urban growth boundary (UGB) and largely composed of unincorporated pieces of land straddling McLoughlin Boulevard/OR 99E. Portions of the incorporated communities of Gladstone, Milwaukie and Johnson City are located in the area, as well as the unincorporated communities of Oak Grove, Jennings Lodge and Oatfield Ridge. The extent of the Greater McLoughlin Area is illustrated in Figure M 1.

LAND USE AND POPULATION

This section provides a general overview of existing land uses and population patterns in the Greater McLoughlin Area. It identifies the activity centers in the area, reviews current land uses and zoning designations, assesses population density, and identifies transportation disadvantaged populations.

Activity Centers

Throughout the Greater McLoughlin area there are several destinations that attract people and therefore generate travel by vehicle, bicycle and foot. These uses attract visitors from outside the County and Clackamas County residents. Major activity centers including libraries, park/ride stops, shopping centers, schools and parks are illustrated in Figure M 2. The activity areas shown are intended to serve as an indication of the many areas where activity occurs, not an exhaustive inventory. As the TSP update completes the existing and future conditions analyses, the location of activity centers will be integrated into considerations to improve access to these destinations.

The Greater McLoughlin Area includes the unincorporated communities of Oak Grove and Jennings Lodge. Both have histories serving as town sites and communities since the late 1900's. The Oak Grove community extends north-south from the northern boundary of the Jennings Lodge area to the southern boundary of the City of Milwaukie. In the east-west direction, Oak Grove extends from the Willamette River to approximately Oatfield Road. Jennings Lodge extends north-south from the northern boundary of the City of Gladstone to the southern boundary of the Oak Grove area. In the east-west direction, Jennings Lodge extends from the Willamette River to approximately Oatfield Road.

Oak Grove includes the planned Park Avenue Light Rail Station, the southernmost station for the Portland/Milwaukie Light Rail Line. It is located west of McLoughlin Boulevard (OR 99E) in unincorporated Clackamas County. The station will provide access to over 50 miles of light rail connecting the local community to points throughout the Portland Metropolitan area. The light rail station is currently estimated to provide a 350 space park/ride facility planned to open in 2015. In 2011, Clackamas County completed a planning study (Park Avenue Station Area Planning Project) in collaboration with area neighbors, businesses and stakeholders. The project developed a land use and transportation vision for the Park Avenue Station Area, which identifies opportunities to improve local street connectivity, enhance existing streets, and

facilitate in-fill and redevelopment. For more information about the Park Avenue Station Area Planning Project, visit <http://www.clackamas.us/transportation/planning/parkstation.html>.

The central commercial activity within the Greater McLoughlin Area is oriented towards McLoughlin Boulevard (OR 99E). A variety of commercial uses along it include auto dealerships, fast-food restaurants, and big box retail. McLoughlin Boulevard (OR 99E) is oriented to primarily serve auto traffic -- both motorists making local trips to the land uses along McLoughlin Boulevard (OR 99E) and motorists traveling through the area.

OR 99E extends further north and south of the Greater McLoughlin Area and beyond Clackamas County's boundaries into Multnomah and Marion counties. There are two park/ride stations located along McLoughlin Boulevard (OR 99E) that provide TriMet bus service to and from Portland. There are also intermittent sidewalks and bicycle lanes along McLoughlin Boulevard (OR 99E).

Since 2009, residents of the area have worked together to identify a vision for their community and identify short-term priority projects for the area through the McLoughlin Area Plan process. The McLoughlin Area described within the plan includes the communities of Oak Grove, Jennings Lodge and Oatfield Ridge. As noted above, McLoughlin Boulevard (OR 99E) serves as the commercial corridor for the area, as well as an important transportation corridor for the Portland Metropolitan region.

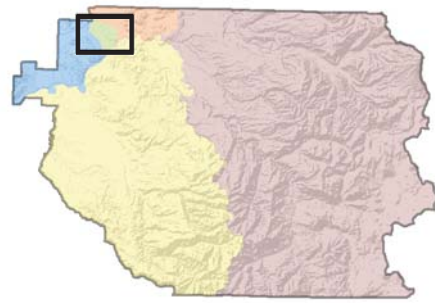
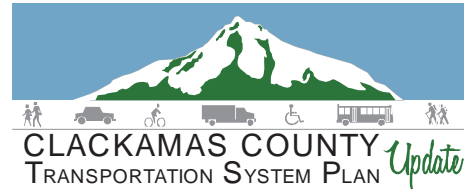
The McLoughlin Area Plan vision includes a focus on “strengthening the area’s transportation connections.” There is a desire to improve the transportation system to facilitate safe travel by biking, walking, transit and automobile. The short-term strategic priorities specifically related to transportation in this area include:

- Construct improved pedestrian crossings on McLoughlin Blvd;
- Construct streetscape improvements along McLoughlin Blvd;
- Improve lighting at key locations to improve safety for motorists and pedestrians;
- Improve pedestrian and bike connections to the Trolley Trail;
- Construct street improvements on existing significant transportation routes; and
- Improve pedestrian and bike connections to schools, parks and other key community destinations.

In addition to the short-term strategic priorities related to transportation, a few long-term strategies were also identified. Those include:

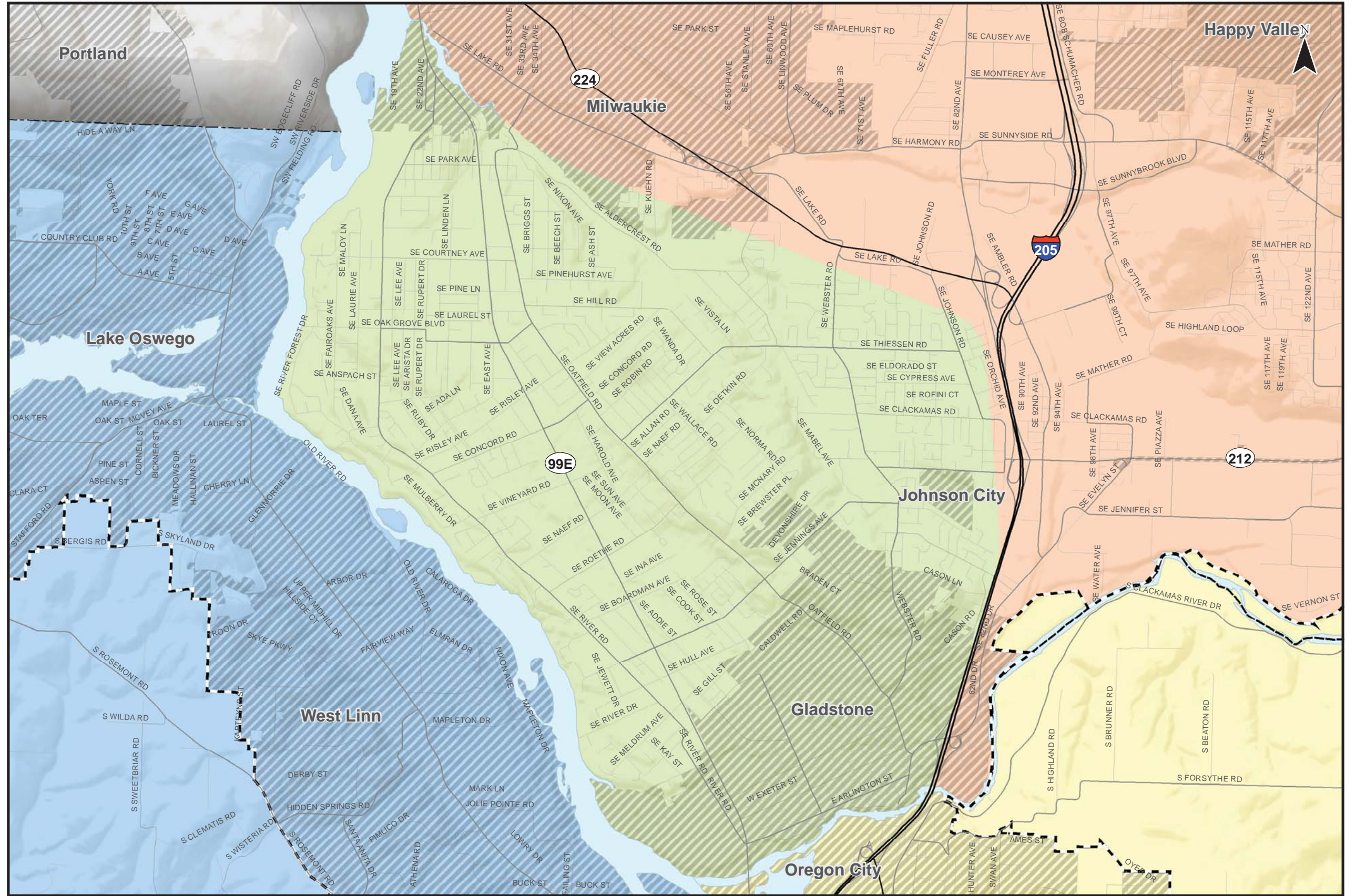
- Construct new local street connections;
- Improve east-west connections to improve access to I-205;
- Develop an area-wide way-finding system for motorists, bicycles and pedestrians; and
- Construct a new bike/pedestrian bridge over the Willamette River.

These short- and long-term transportation priorities will be integrated into the potential projects, programs, studies, and policies discussed in the next phase of the TSP update process.



Geographic Analysis Sub Areas

- East County
- Southwest County
- Greater McLoughlin Area
- Greater Clackamas Regional Center/ Industrial Area
- Northwest County
- Incorporated Areas
- County Boundary
- UGB
- Metro Area

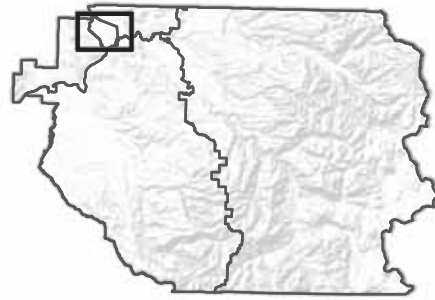
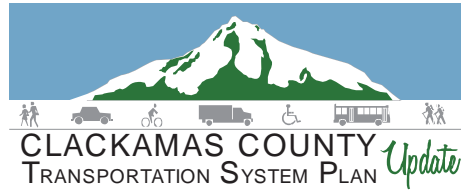


Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

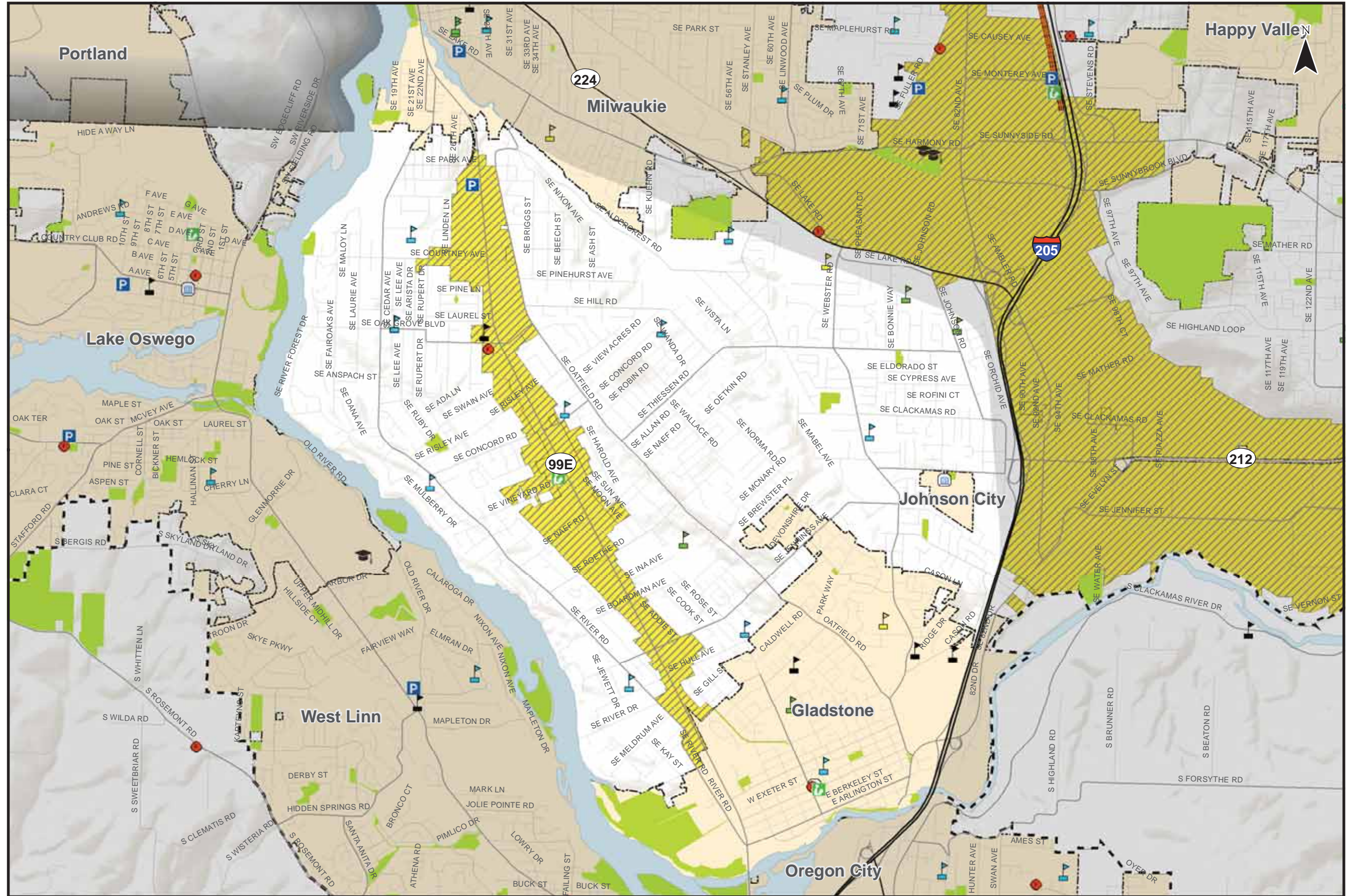
**Greater McLoughlin Area
Geographic Analysis Sub Areas**

Figure
M 1

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\01 Geographic Analysis Sub Areas.mxd



- Fire Stations
- Museum
- City Hall
- Libraries
- Park & Ride
- Light Rail
- Schools**
 - Public Elementary
 - Public Middle School
 - Public High School
 - Private K-12
 - College or University
- Parks
- State Parks
- Mt. Hood National Forest
- Urban Activity Centers
- Incorporated Areas
- Rural Centers
- County Boundary
- UGB



0 1
Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center

**Activity Centers
Greater McLoughlin Area**

Figure
M 2

H:\profile11732 - Clackamas County TSP\gis\11x17 Maps\02 Activity Centers.mxd

Land Use and Zoning

Figure M 3 illustrates the current basic land use zoning designations throughout the Greater McLoughlin area. Each land use's purpose, area of application, uses, and regulations are described in the *Clackamas County Zoning and Development Ordinance*. As seen in the figure, the majority of the area is zoned Urban Low Density Residential, with small areas zoned for Open Space Management and High or Medium Density Residential. Commercial development is concentrated along McLoughlin Boulevard (OR 99E).

Population Inventory

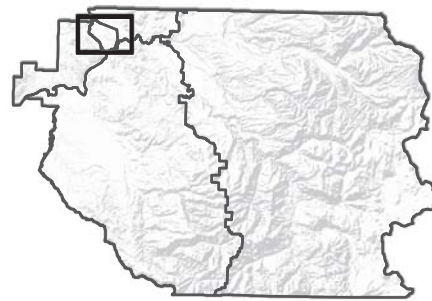
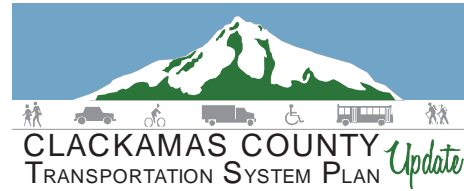
Figure M 4 illustrates the population density by census tract. From this figure, it is evident that the highest population density is in Gladstone, north of Gladstone east of OR 99E, Oak Grove, and north and south of Johnson City. Figures M 5 through M 8 illustrate demographic information about the households. Respectively, these figures show the elderly (age 65 and older) population, youth (age 17 and younger) population, low-income population, and vehicle ownership. The data within each of these figures were combined and used to identify the transportation disadvantaged populations within Clackamas County.

Figure M 9 illustrates the location of transportation disadvantaged populations in the area. Transportation disadvantaged populations are defined as populations who have historically had significant unmet transportation needs or who have experienced disproportionate negative impacts from the transportation system. Transportation disadvantaged populations were mapped by census block and calculated by considering the location of elderly populations, youth populations, low-income populations earning less than 200% of the poverty line, non-white and non-Hispanic populations, households with 0-1 vehicles, households where no adult speaks English well, and residential areas within 500 feet of a freeway or highway. The transportation disadvantaged populations are located heavily along OR 99 throughout the area, surrounding Park Avenue at the Milwaukie/unincorporated Clackamas County border (a future light-rail station area), and between Webster Road and I-205.

The purpose of mapping this information is to be aware of where this population is living while considering their needs to access different destinations. Population density and the location of disadvantaged populations will both be considered when identifying transportation projects to include in the TSP Update.

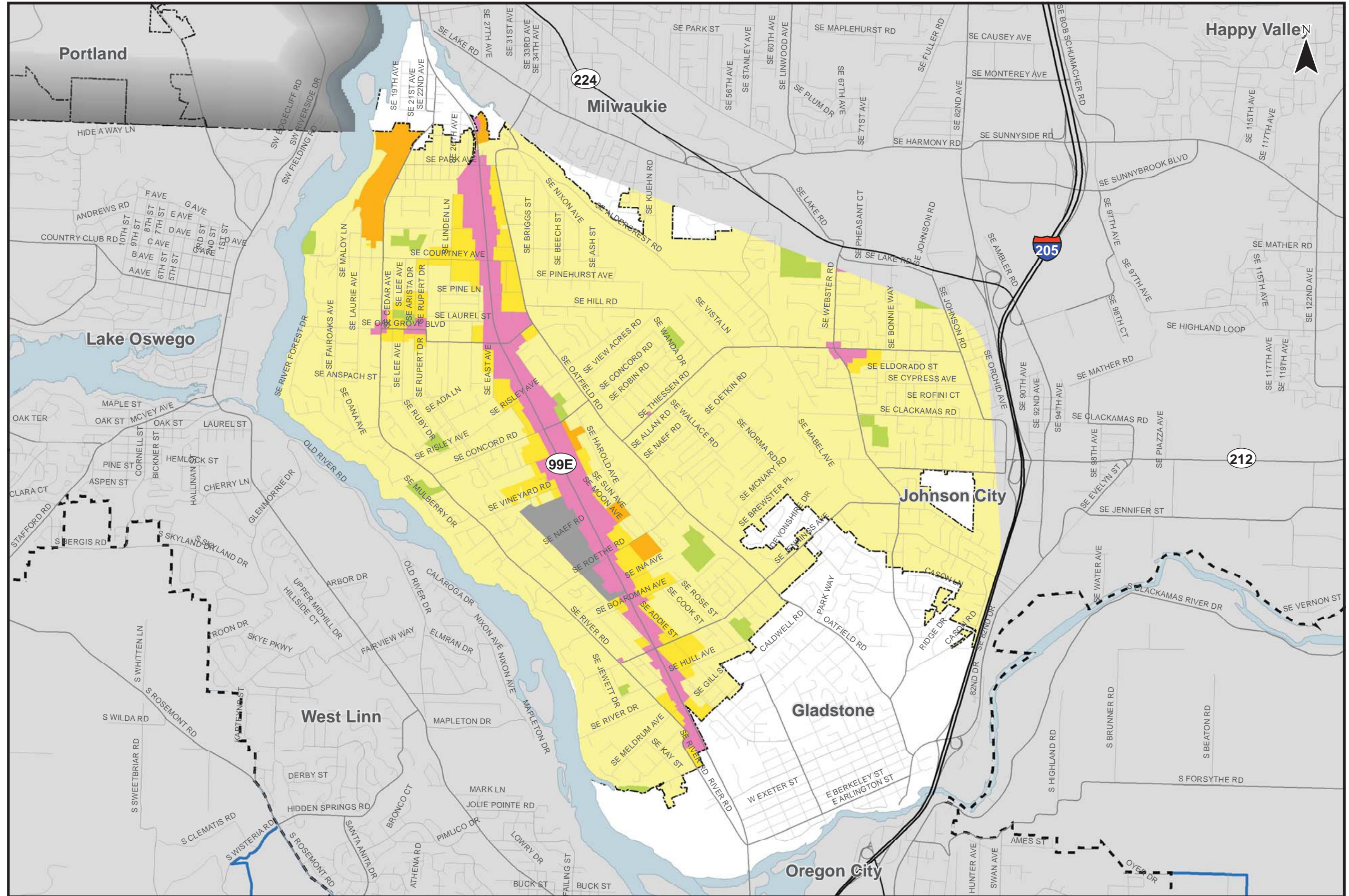
TRANSPORTATION SYSTEM OPERATIONS ANALYSIS

This section summarizes the existing transportation system operations within the Greater McLoughlin area. It includes a review of the roadway and intersection operations with a focus on vehicular travel, as well as the pedestrian and bicycle system, public transportation system, and crash analysis. A discussion of the methodology and approach for this analysis is provided in *Section 3 Assumptions and Methods* of this report. While this report attempts to accurately reflect the existing conditions of the transportation system, it is not meant to serve as an all-encompassing and comprehensive final assessment. Rather, it is meant to serve as a starting point for discussion by the broader community about the current state of the transportation system. This information will be used to help inform the development of the Clackamas County TSP.



Zoning Designations

- Exclusive Farm Use
- Ag. / Forest District
- Timber District
- Rural Center
- Rural Residential, Future Urban
- Urban Low Density Residential
- Village Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Planned Mixed Use
- Village Community Service
- Open Space Management
- Urban Reserves
- Rural Centers
- Incorporated Areas
- County Boundary
- UGB

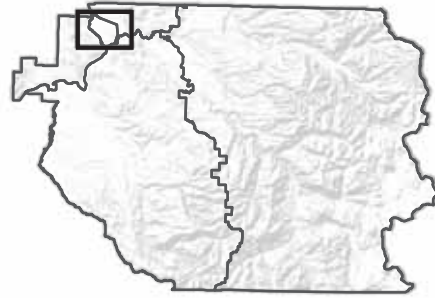
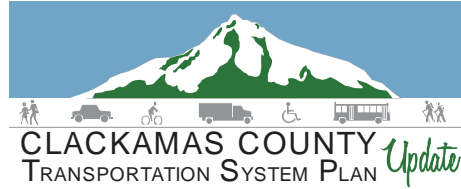


Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

**Land Use Zoning Designations
Greater McLoughlin Area**

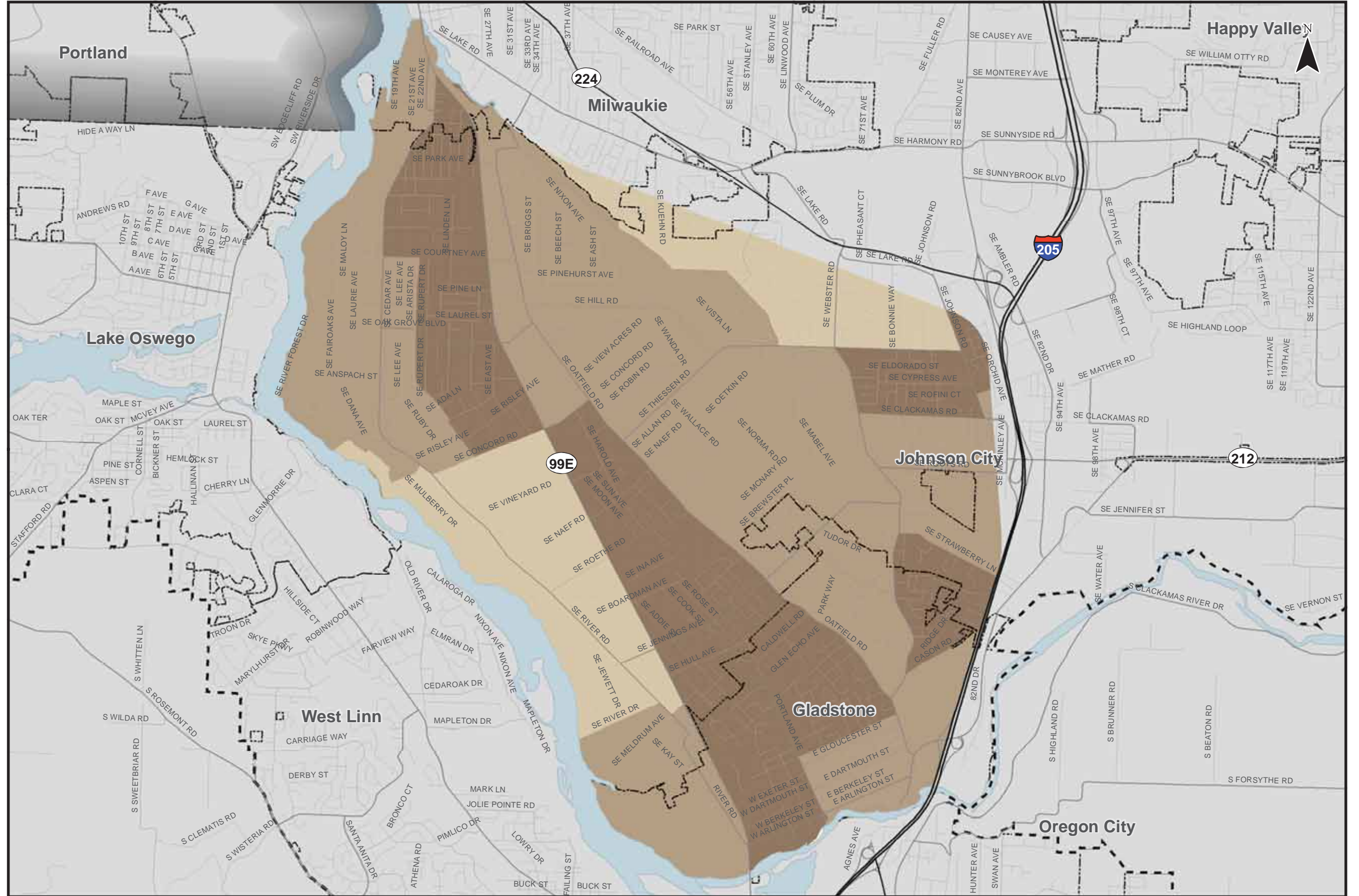
Figure
M 3

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\03 Land Use Zoning Designations.mxd



People Per Acre

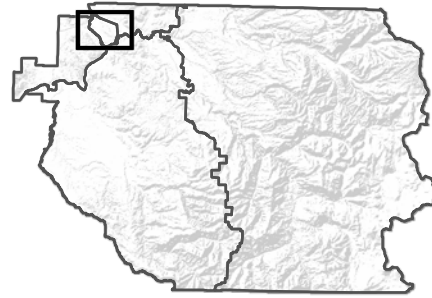
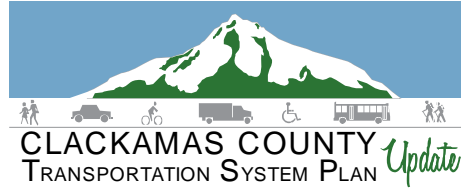
- <1
- 1 - 5
- 6 - 8
- 9 - 12
- 13 - 17
- Incorporated Areas
- County Boundary
- UGB



Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center

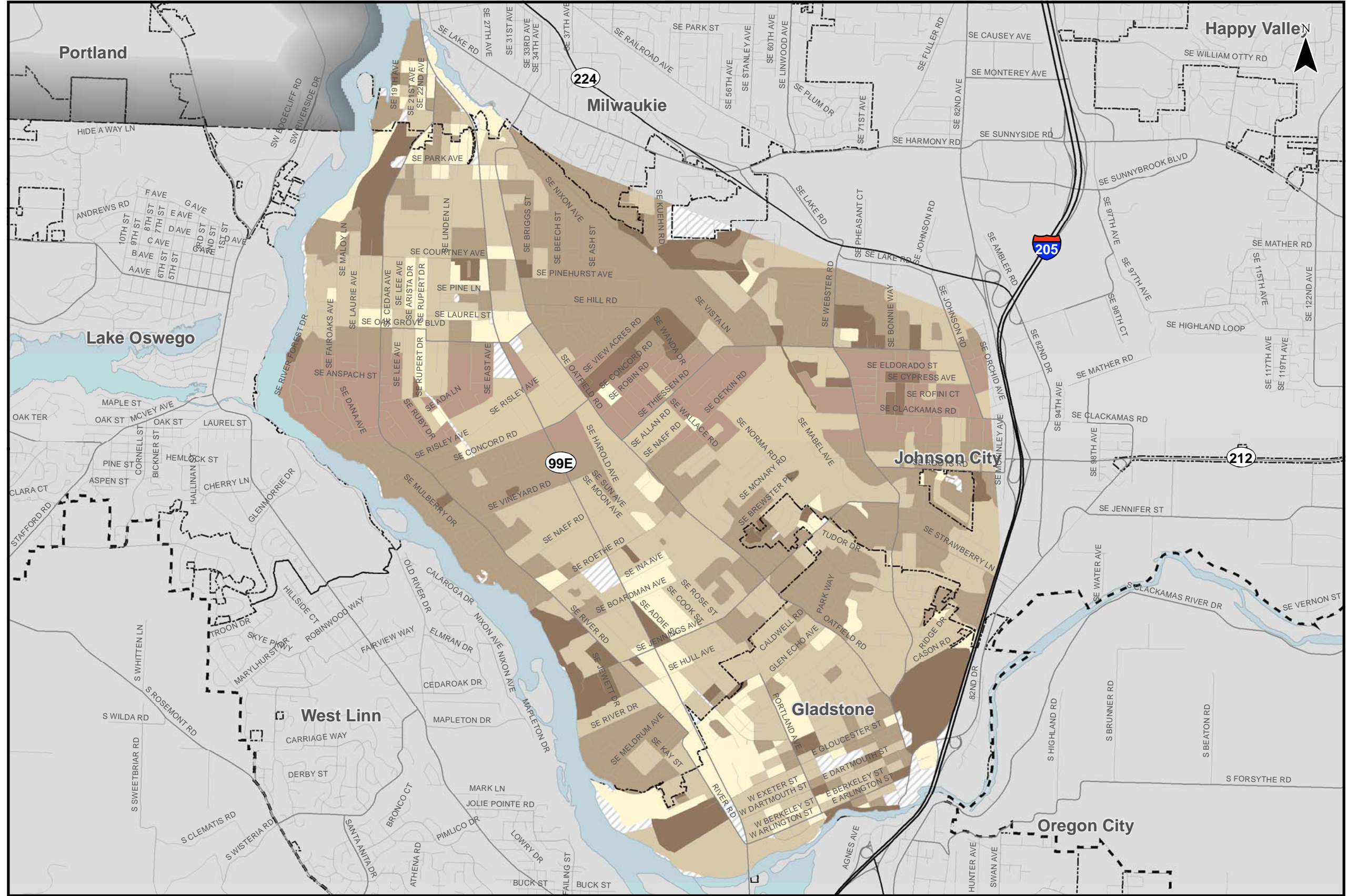
**Population Density by Census Tract
Greater McLoughlin Area**

Figure
M 4



Population Age 65 and Older

- 0% - 6%
- 6% - 15%
- 15% - 30%
- 30% - 100%
- No Data
- Incorporated Areas
- County Boundary
- UGB



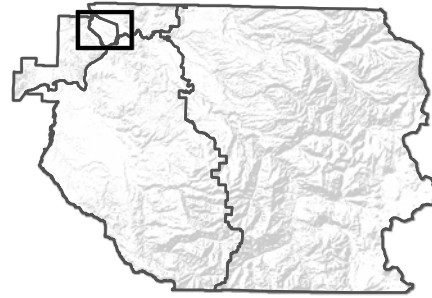
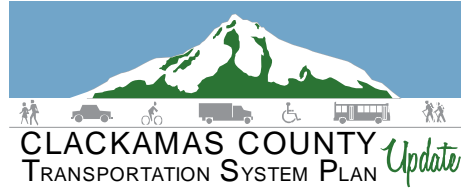
0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, TigerLine Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute Clackamas County, Metro Data Resource Center

**Elderly Population by Census Block
Greater McLoughlin Area**

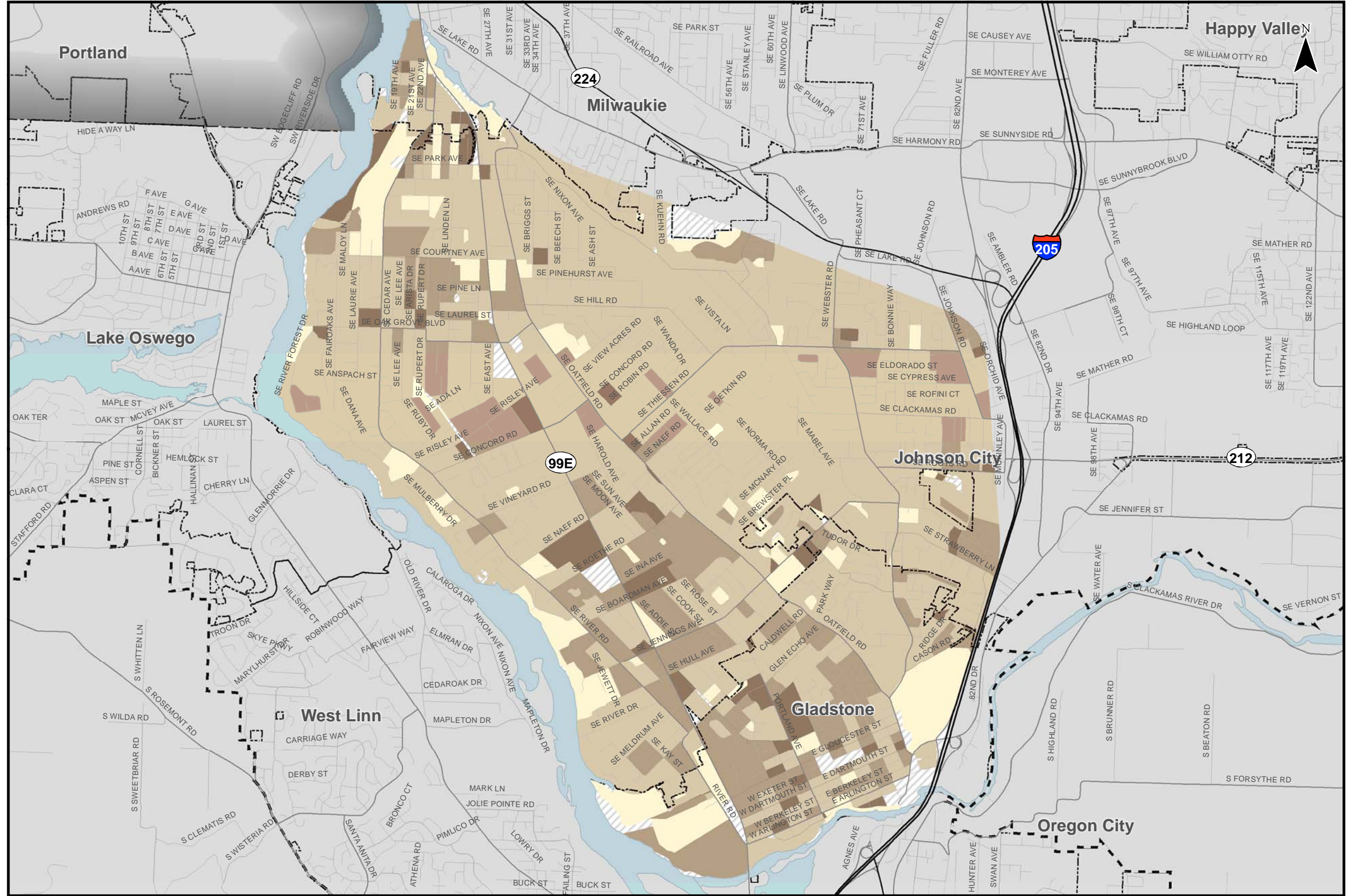
Figure
M 5



Population Under Age 18

- 0% - 10%
- 10% - 25%
- 25% - 33%
- 33% - 100%

- No Data
- Incorporated Areas
- County Boundary
- UGB



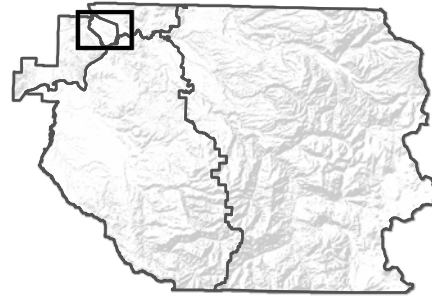
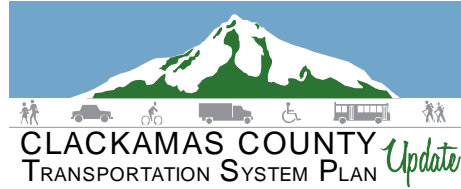
0 1
Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, TigerLine Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute Clackamas County, Metro Data Resource Center

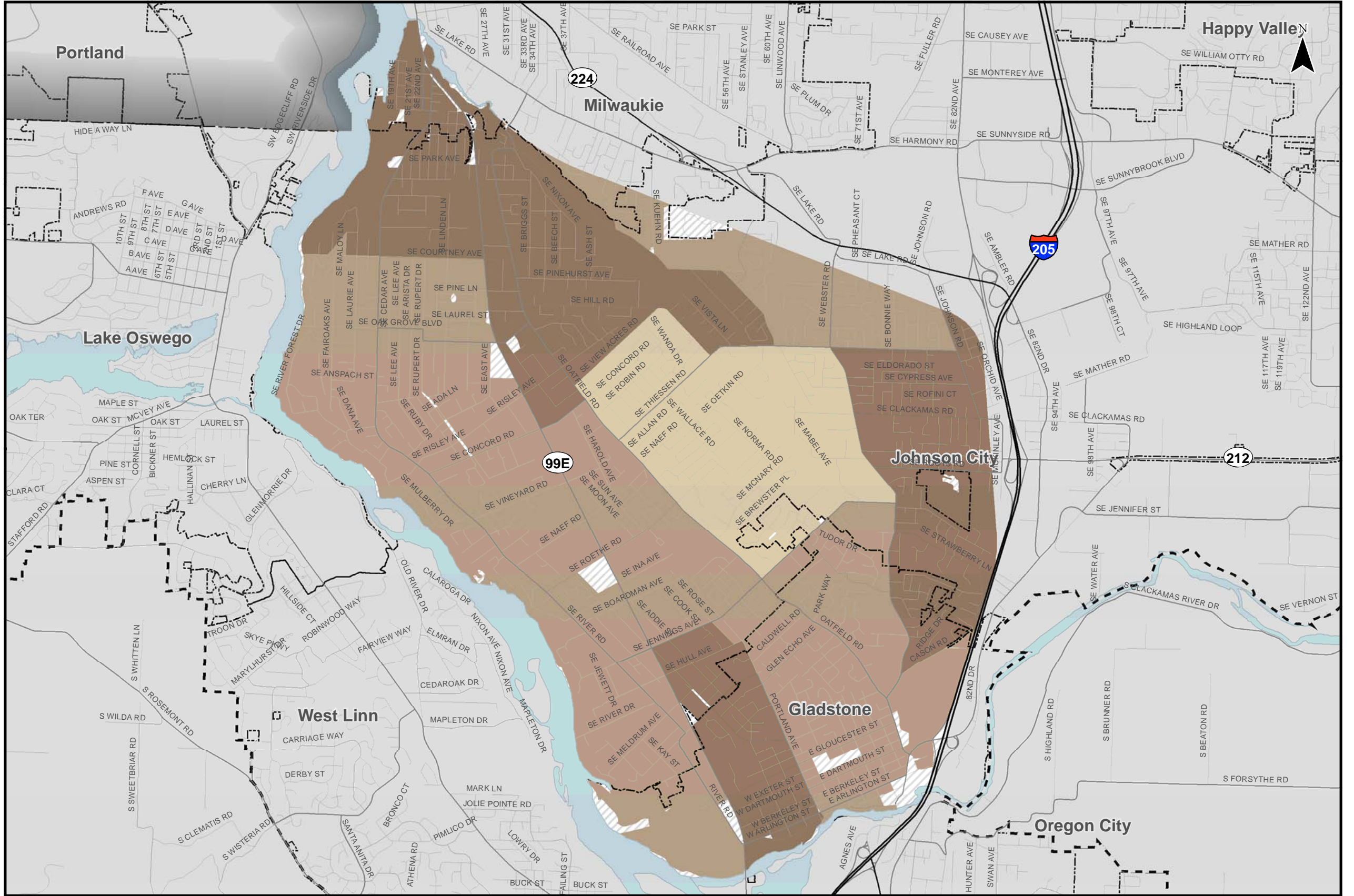
**Youth Population by Census Block
Greater McLoughlin Area**

Figure
M 6



**Population Under
200% Poverty**

- 0% - 10%
- 10% - 20%
- 20% - 33%
- 33% - 100%
- No Data
- Incorporated Areas
- County Boundary
- UGB



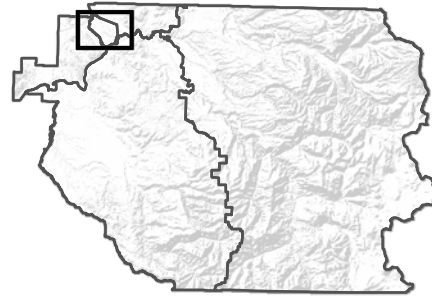
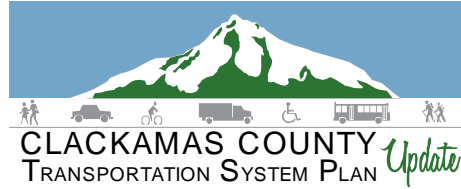
0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, Tiger/Line Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute Clackamas County, Metro Data Resource Center

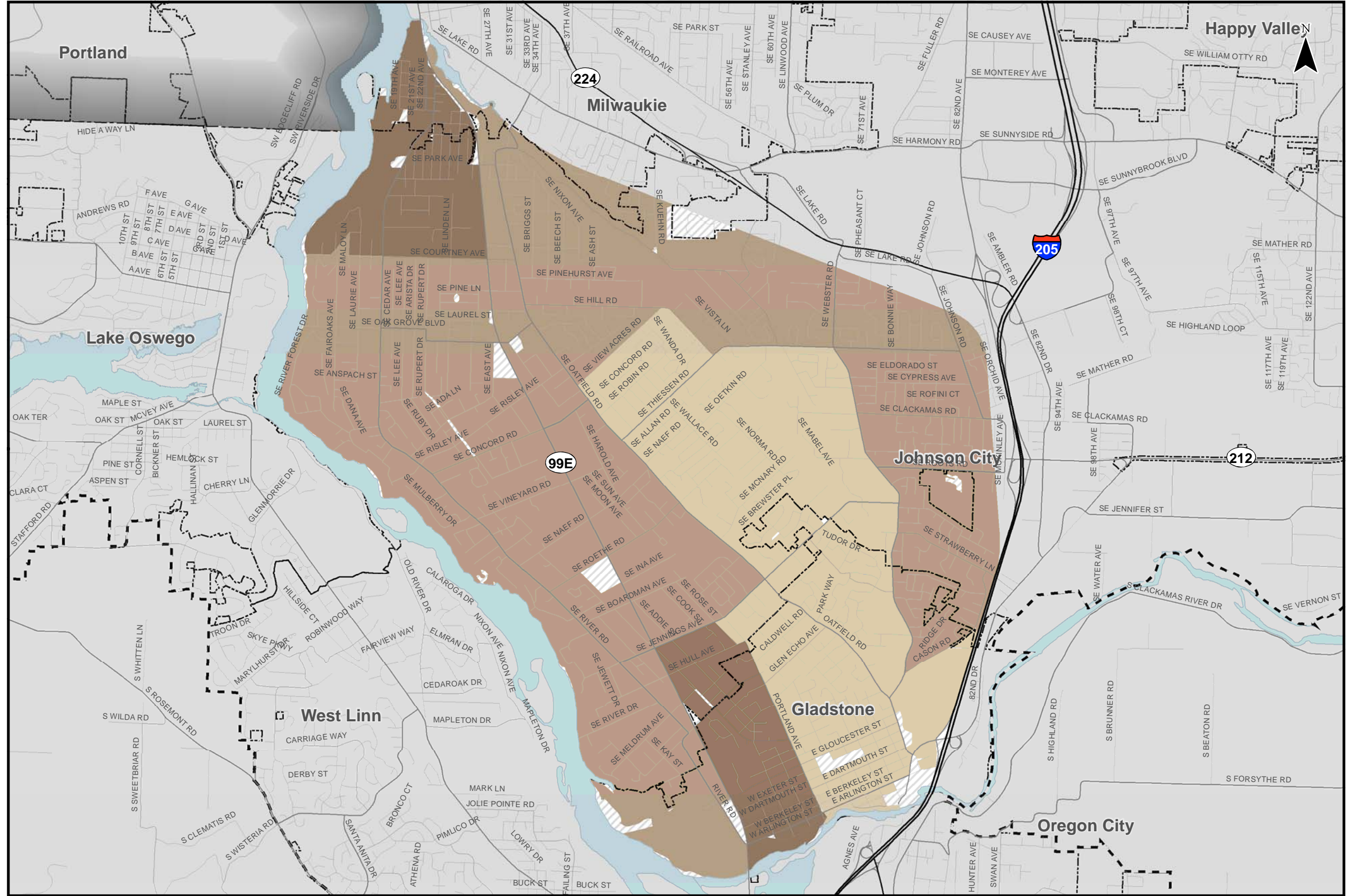
**Low Income Population by Census Block
Greater McLoughlin Area**

Figure
M 7



Households with Less Than Two Vehicles

- 0% - 10%
- 10% - 15%
- 15% - 25%
- 25% - 100%
- No Population/No Data
- Incorporated Areas
- County Boundary
- UGB



0 1 Miles

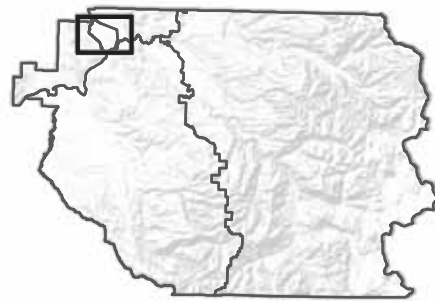
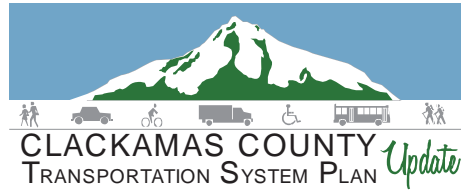
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, Tiger/Line Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute Clackamas County, Metro Data Resource Center

**Vehicle Ownership by Census Block
Greater McLoughlin Area**

Figure
M 8

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\08 Vehicle Ownership by Census Block.mxd



Transportation Disadvantaged

- No Data
- Least Disadvantaged
- Somewhat Disadvantaged
- Disadvantaged
- Most Disadvantaged
- Incorporated Areas
- County Boundary
- UGB

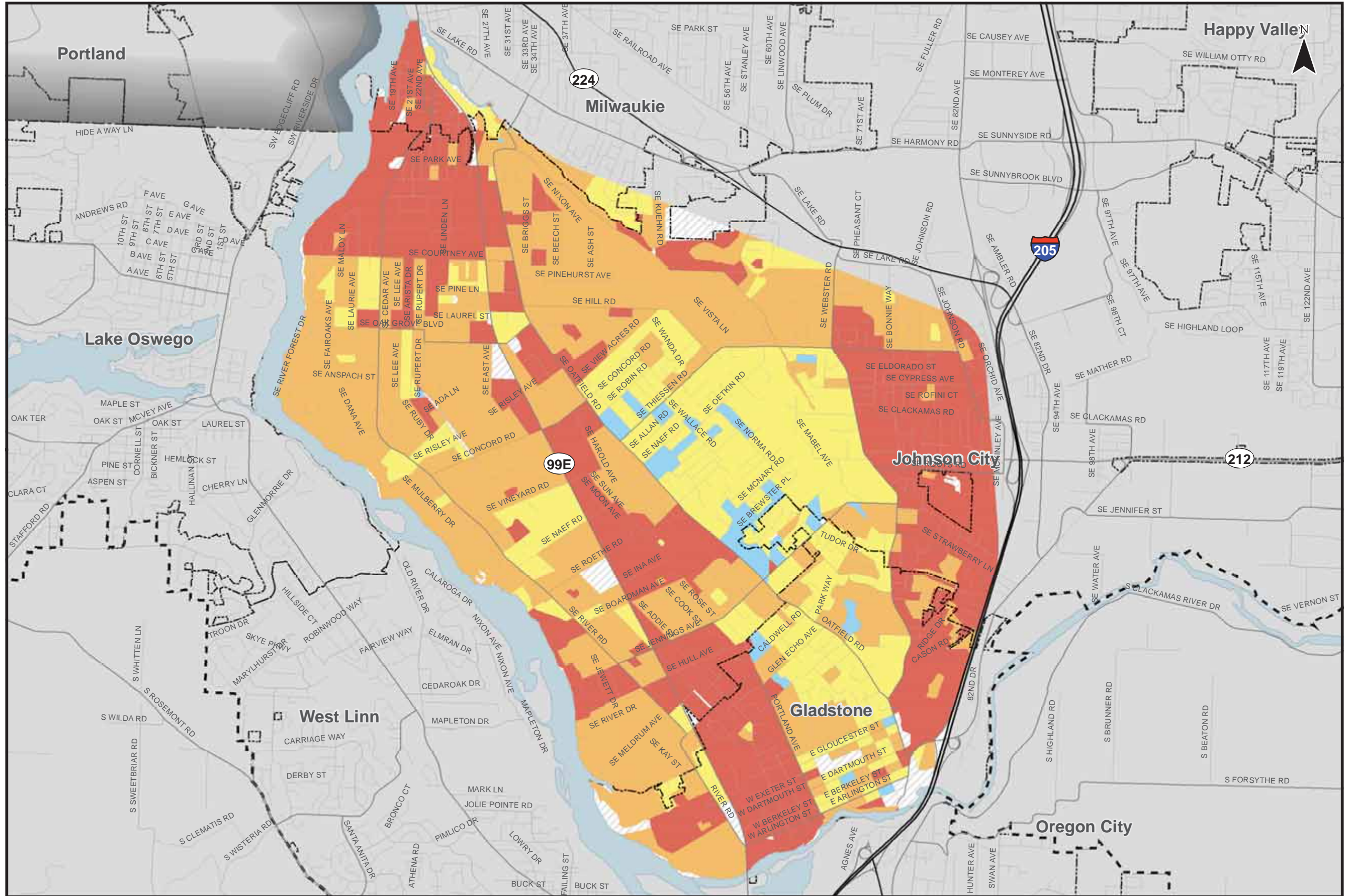
The Transportation Disadvantaged Index takes into account a number of demographic characteristics including age, income, ethnicity, vehicle ownership, ability to speak English, and proximity of freeway or highways to a household. The higher the index number the more disadvantaged the population is with respect to transportation.

More specifically the index is calculated at the census block level as the sum of people 65 and older, 17 and younger, under 200% of the poverty line, non-white and non-Hispanic, living in households with 0-1 vehicles, and living in households where no adult speaks English well. That sum is divided by total block population; twenty-five is added for areas within 500 feet of a freeway or highway. People fitting into multiple vulnerability categories are counted multiple times. Data at the household level is multiplied by 2.56 to convert it to a person unit. The number 2.56 is the average household size for Clackamas County. Data only available by tract is distributed among blocks based on the distribution of tract population.



Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, Tiger/Line Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute, Clackamas County, Metro Data Resource Center



Transportation Disadvantaged Populations by Census Block Greater McLoughlin Area

Figure
M 9

H:\profile11732 - Clackamas County TSP\GIS\11x17 Maps\09 Transportation Disadvantaged Populations by Census Block.mxd

Figure M 10 illustrates the functional classification designations of the streets within the Greater McLoughlin area. A street's functional classification reflects its role in the transportation system and defines desired operational and design characteristics. Clackamas County has six functional street classifications:

- Freeway and Expressway,
- Major Arterial,
- Minor Arterial,
- Collector,
- Connector, and
- Local Street.

These classifications and the role they play in defining a street's design and character are further described in *Section 3 Assumptions and Methods* of this report.

Figure M 11 illustrates the existing signal locations in the Greater McLoughlin area and notes which roadways are maintained by the County. As seen in the figure, most signalized intersections are on OR 99E and SE Oatfield Road. The County does not maintain most roadways in the incorporated areas of Gladstone or Johnson City. OR 99E is maintained by ODOT.

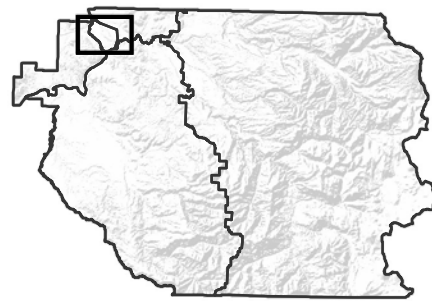
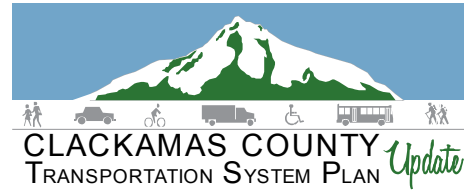
Figure M 12 maps at-grade railroad crossing locations. There are several railroad crossings along the Portland/Western rail line on the southwest edge of Milwaukie. There is also a railroad crossing in east Gladstone along the Union Pacific rail line.

Intersection and Road System Operations Analysis

This section summarizes the analysis and findings related to existing traffic operations with a focus on auto transportation modes. Operations were analyzed at key study intersections and roadway segments.

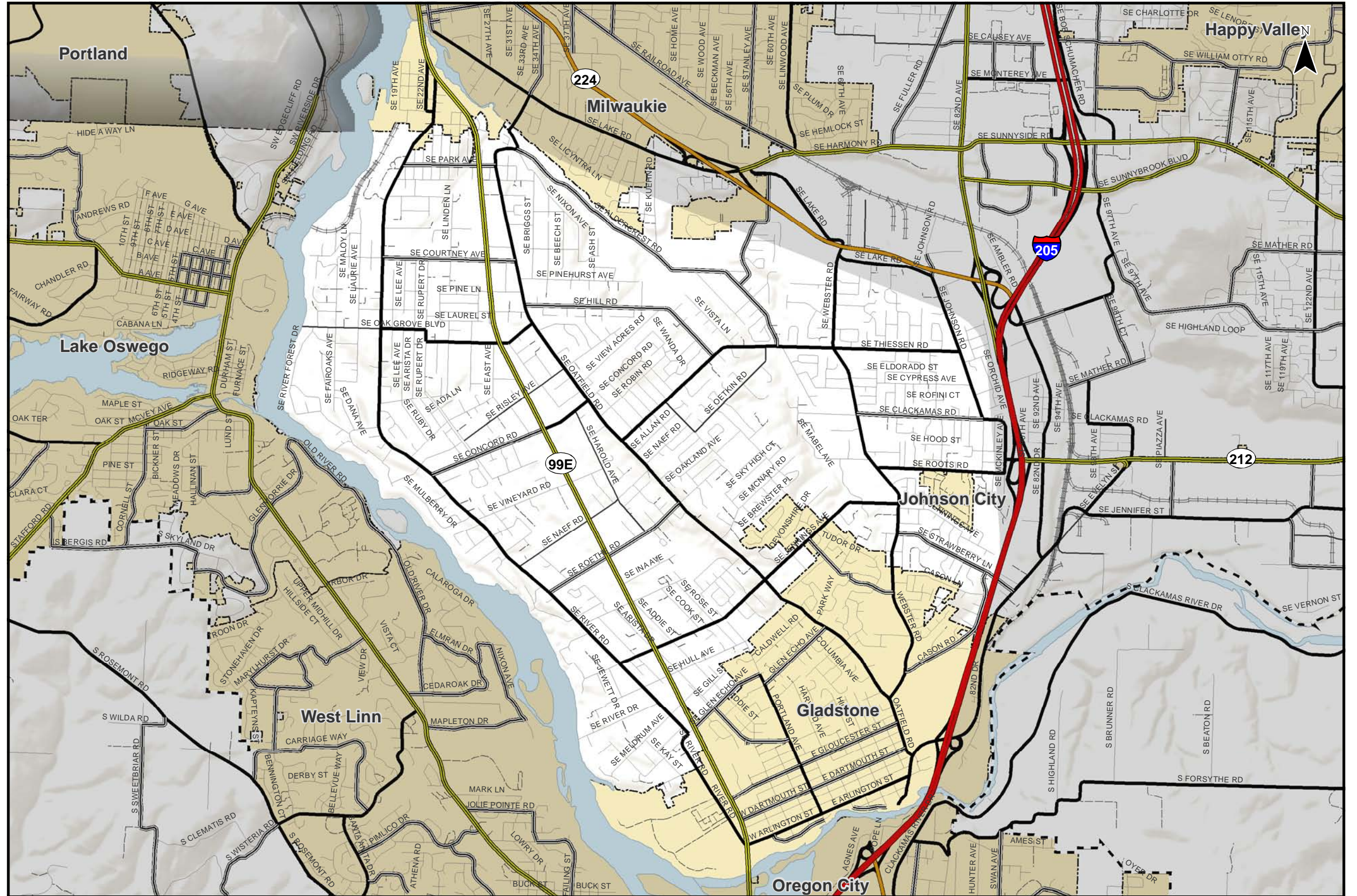
Study Intersection Traffic Operations Analysis

TSP study intersections were selected based on input from ODOT, city, and County staff. Figure M 13 shows the location of each study intersection and notes whether intersections fall under the County's jurisdiction or the Oregon Department of Transportation's (ODOT) jurisdiction. There are 25 study intersections in the Greater McLoughlin area, seven of which are located on Oregon 99E and thus fall under ODOT's jurisdiction. Figure M 14 shows the existing lane configurations and traffic control devices at each location. Ten of the study intersections are signalized; the remaining intersections are stop-controlled.



Functional Classifications

- Freeway
- Expressway
- Major Arterial
- Minor Arterial
- Collector
- Connector
- Local
- Forest Service Paved
- Forest Aggregate Road
- General dirt, road or trail
- Other
- Railroads
- Ferry
- Incorporated Areas
- County Boundary
- UGB

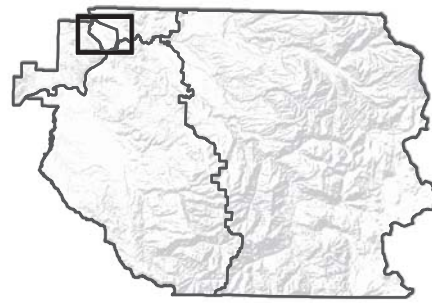
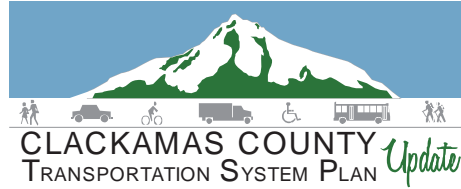


0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

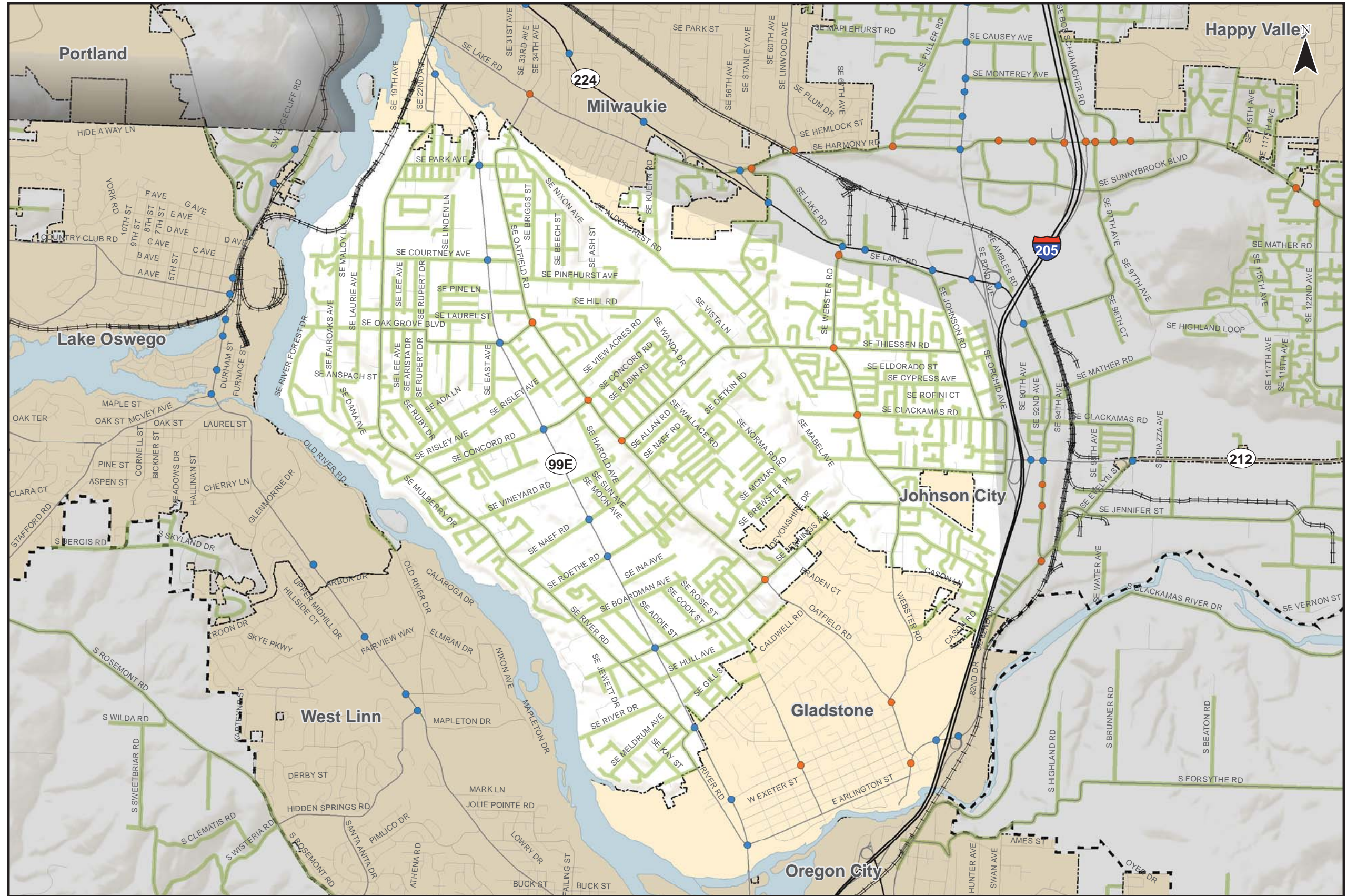
**Roadway Functional Classifications
Greater McLoughlin Area**

Figure
M 10



Existing Traffic Signals

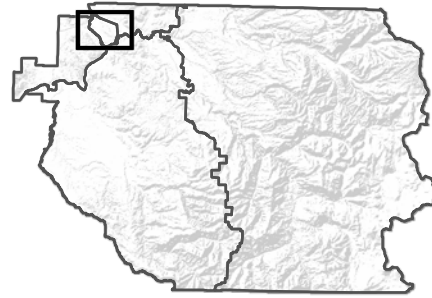
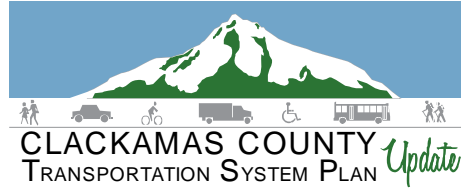
- County Owned
- ODOT Owned
- ▲ Ped Crossing Flasher
- County Maintained Roads
- Incorporated Areas
- County Boundary
- UGB



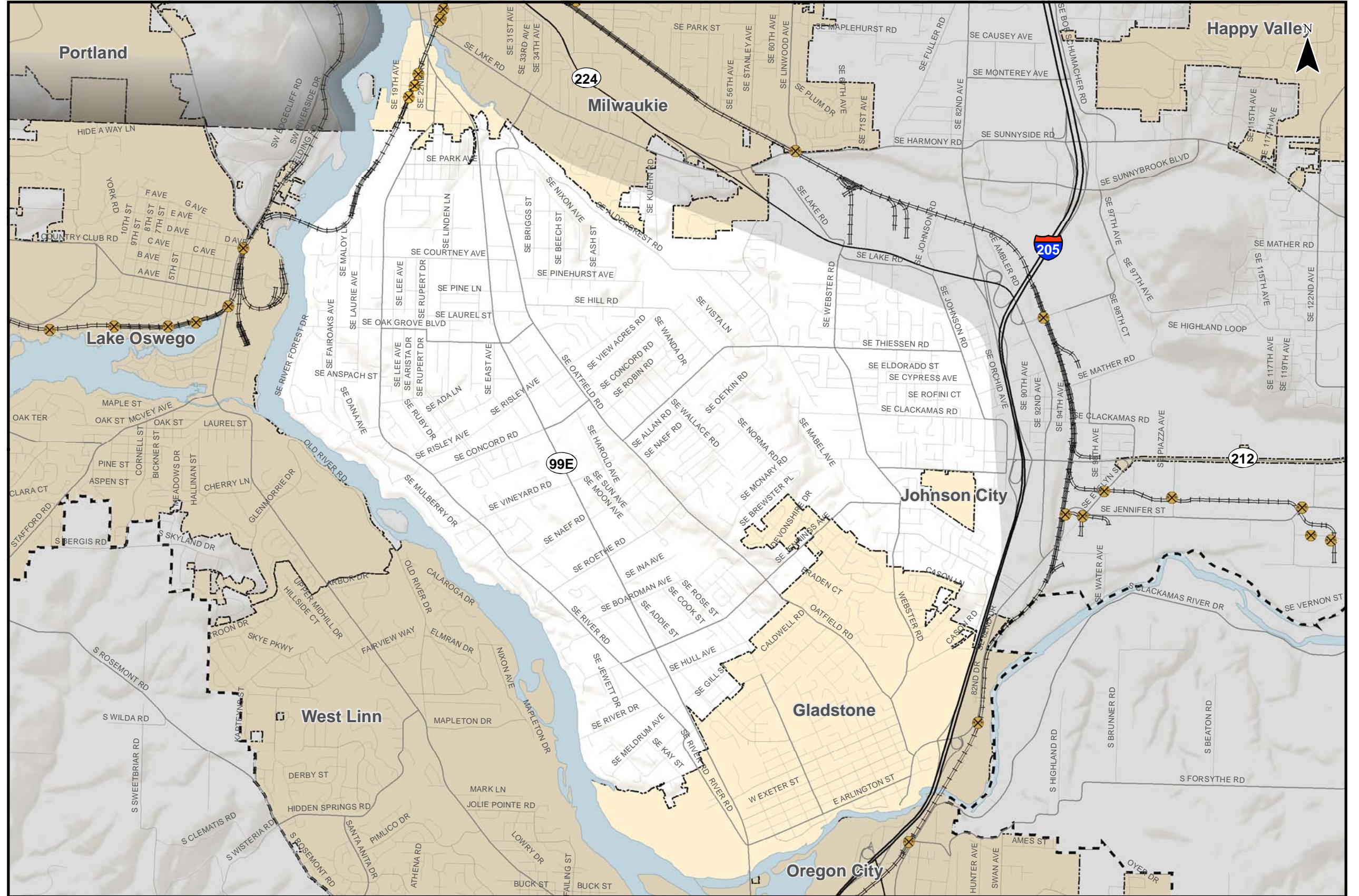
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

**Existing Signal Locations
Greater McLoughlin Area**

Figure
M 11



- At-Grade Rail Crossings
- Railroads
- Incorporated Areas
- County Boundary
- UGB

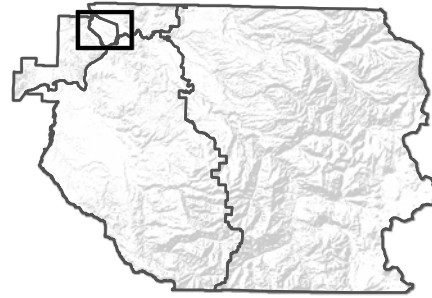
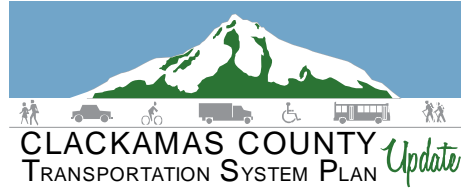


Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

**At-Grade Railroad Crossing Locations
Greater McLoughlin Area**

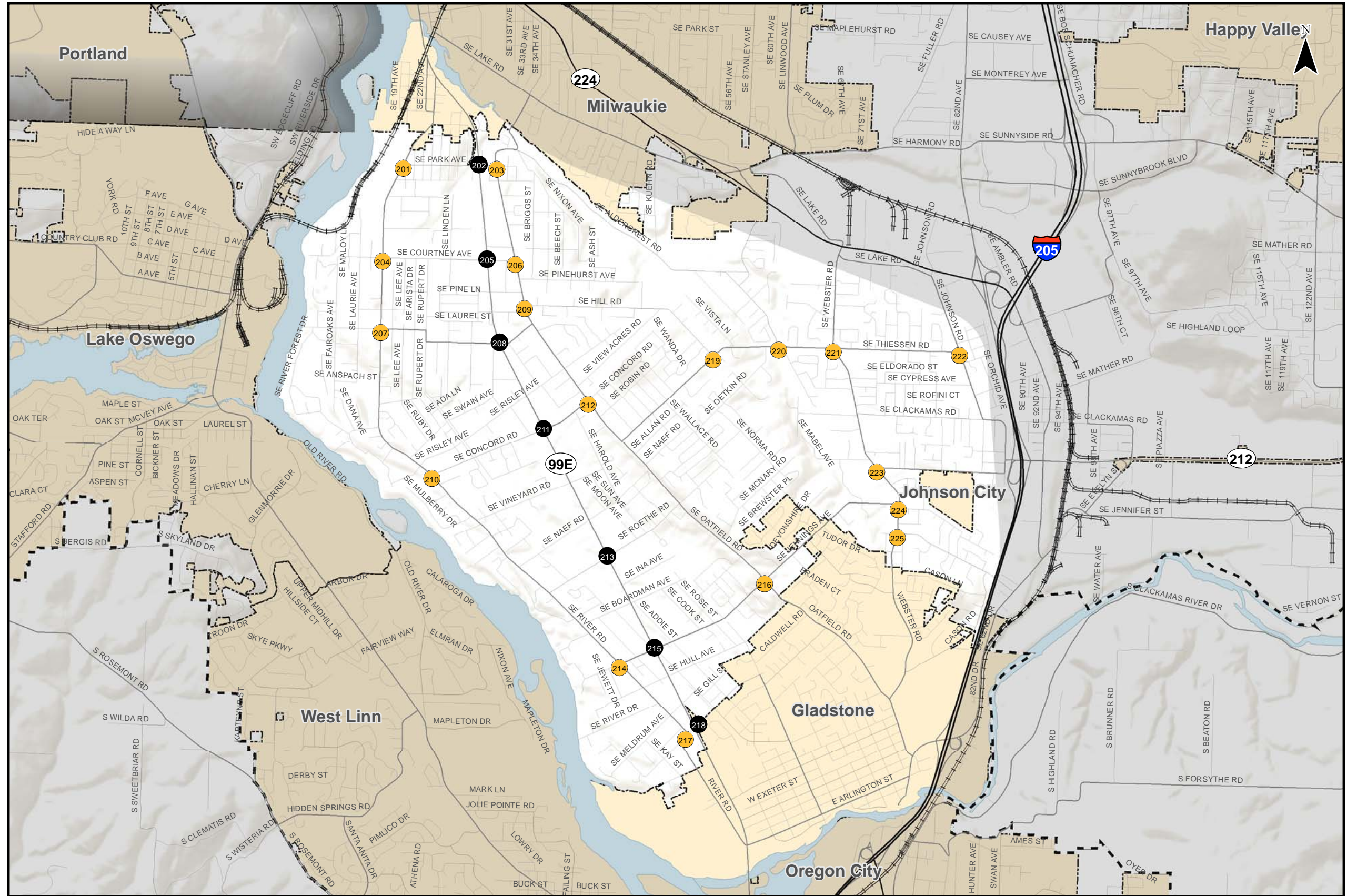
Figure
M 12

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\12 At-Grade Railroad Crossing Locations.mxd



Study Intersection Jurisdiction

- ODOT
- Clackamas County
- Incorporated Areas
- County Boundary
- UGB

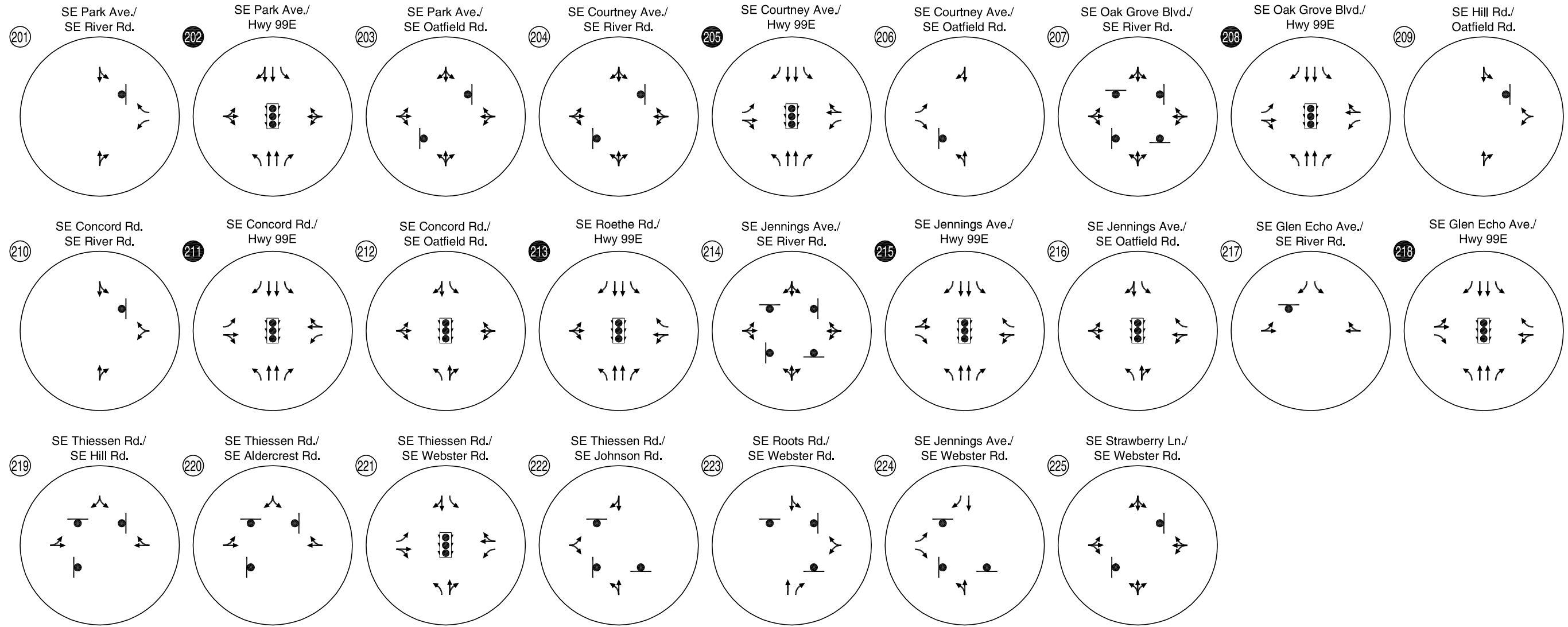


Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

**Transportation System Plan Study Intersections
Greater McLoughlin Area**

Figure
M 13

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\13 Transportation System Plan Study Intersections.mxd



Existing Lane Configuration and Traffic Control Devices Greater McLoughlin Area



**Figure
M 14**

Traffic Operations Analysis Results for Study Intersections

Existing traffic operations at the study intersections were assessed based on seasonally adjusted year 2012 turning movement counts, which reflect weekday p.m. peak hour traffic conditions. The operations at each intersection were compared to the respective performance standards. The process used to evaluate the traffic operations is more extensively described in *Section 3 Assumptions and Methods* of this report. The results are shown in Table M 1 and Figure M 15, with intersections that are operating below performance standards noted.

Table M 1 Existing Intersection Operations at Study Intersections in the Greater McLoughlin Area

ID	Intersection	Jurisdiction	Performance Standard	Meets Standard?
201	SE Park Ave/SE River Rd	County	v/c = 0.99	Yes
202	SE Park Ave/OR 99E	ODOT	v/c = 1.1	Yes
203	SE Oatfield Rd/SE Park Ave	County	v/c = 0.99	Yes
204	SE Courtney Ave/SE River Rd	County	v/c = 0.99	Yes
205	SE Courtney Ave/OR 99E	ODOT	v/c = 1.1	Yes
206	SE Courtney Ave/SE Oatfield Rd	County	v/c = 0.99	Yes
207	SE Oak Grove Blvd/SE Courtney Ave	County	v/c = 0.99	Yes
208	SE Oak Grove Blvd/OR 99E	ODOT	v/c = 1.1	Yes
209	SE Hill Rd/SE Oatfield Rd	County	v/c = 0.99	Yes
210	SE Concord Rd/SE River Rd	County	v/c = 0.99	Yes
211	SE Concord Rd/OR 99E	ODOT	v/c = 1.1	Yes
212	SE Oatfield Rd/SE Concord Rd	County	v/c = 0.99	Yes
213	SE Roethe Rd/OR 99E	ODOT	v/c = 1.1	Yes
214	SE Jennings Ave/SE River Rd	County	v/c = 0.99	Yes
215	SE Jennings Ave/OR 99E	ODOT	v/c = 1.1	Yes
216	SE Jennings Ave/SE Oatfield Rd	County	v/c = 0.99	Yes
217	SE Glen Echo Ave/SE River Rd	County	v/c = 0.99	Yes
218	SE Glen Echo Ave/OR 99E	ODOT	v/c = 1.1	Yes
219	SE Thiessen Rd/SE Hill Rd	County	v/c = 0.99	Yes
220	SE Thiessen Rd/SE Aldercrest Rd	County	v/c = 0.99	Yes
221	SE Thiessen Rd/SE Webster Rd	County	v/c = 0.99	Yes
222	SE Thiessen Rd/SE Johnson Rd	County	v/c = 0.99	Yes
223	SE Roots Rd/SE Webster Rd	County	v/c = 0.99	Yes
224	SE Jennings Ave/SE Webster Rd	County	v/c = 0.99	Yes
225	SE Strawberry Lane/SE Webster Rd	County	v/c = 0.99	Yes

As shown, all intersections operate within the volume-to-capacity ratio standards. *Appendix 8* contains detailed traffic operations analysis results.

Roadway Segment Operations Analysis

The roadway segment operations analysis consists of considering the roadway segment volumes and approximate level of congestion based on a comparison of the volume to the segment capacity. *Section 3 Assumptions and Methods* provides additional details on the scope and approach to the analysis below.



H:\profile\11732 - Clackamas County TSP\dwgs\figs\11732Analysis\Intersections_ExCond_Satflow.dwg May 28, 2012 - 1:10pm - klausen Layout Tab: B_Ops

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
STD = OPERATIONAL STANDARD

Existing Intersection Operations PM Peak Hour Greater McLoughlin Area



**Figure
M 15**

Roadway Segment Volumes

The roadway segment volumes provide a sense of the demand for travel on the roadways within the Greater McLoughlin area. Figure M 16 illustrates the roadway link volumes from the weekday evening peak hour. The roadway segment volumes are from Metro’s travel demand model; therefore, the roadway segment links approximate the actual roadway geometry. The roadway segment links in the model do not reflect roadway curvature. Also, the roadway segment link volumes from the model are provided for roadways of generally a major collector designation or higher, so traffic volumes on local roads are not reflected.

As shown in Figure M 16, under the existing roadway system demand for travel is highest along OR 99E, Otfield Road, Webster Road, SE Thiessen Road, and SE River Road.

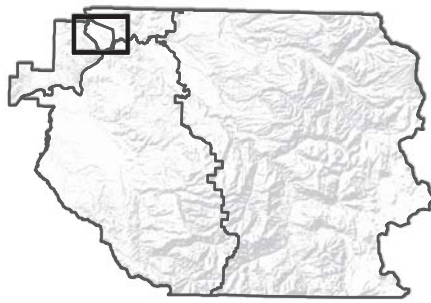
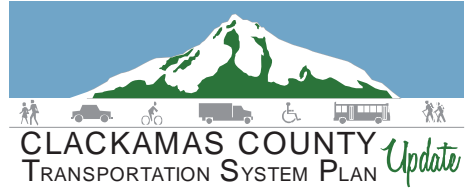
Approximate Level of Congestion

The level of congestion experienced on roadway segments was estimated using the roadway segment volumes from the Metro base model and the roadway segment capacity. The volume was compared to the capacity to calculate a volume-to-capacity ratio that is used to estimate level of congestion. Table M 2 summarizes the level of congestion that corresponds to different volume-to-capacity ratios.

Table M 2 Volume-to-Capacity Ranges for Roadway Segment Congestion Estimates

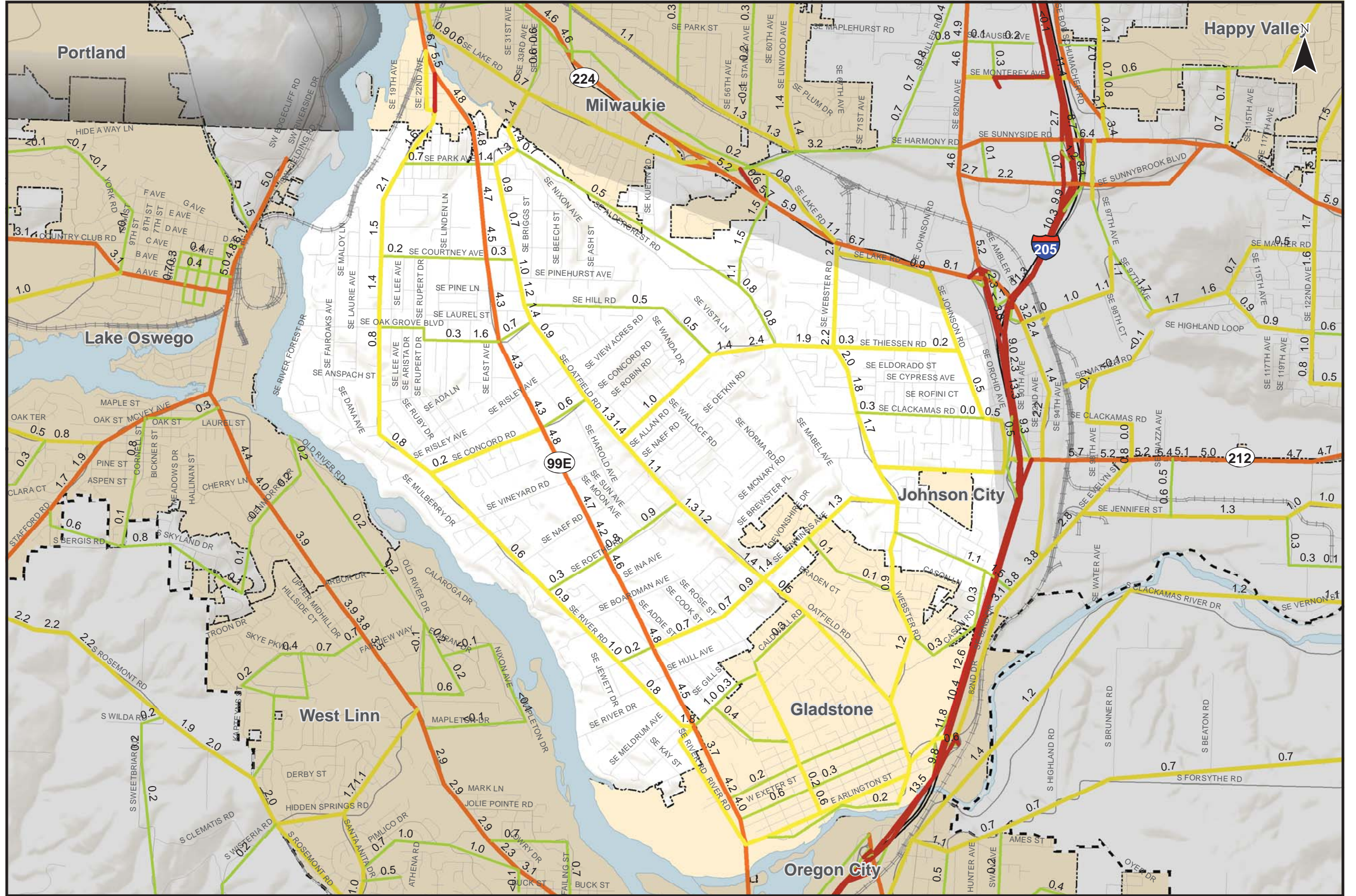
Congestion Level	Volume to Capacity Range
Very Congested	1.1 or greater
Congested	1.0 to 1.1
Some Congestion	0.9 to 1.0
Nearing Congestion	0.8 to 0.90
Less Congested	0.0 to 0.80

Figure M 17 illustrates the relative congestion during the weekday evening peak hours based on the estimated roadway segment volumes and capacity. It is possible for the study intersection analysis results to indicate intersections experiencing relatively high amounts of delay on roadway segments shown as experiencing relatively minimal congestion. The roadway segment analysis considers only the capacity of the lanes on the segment and the volumes on the segment. It is an idealized assessment of volume to capacity (e.g., if all vehicles were traveling in the same direction along a roadway, how many vehicles could the roadway carry). In actuality, motorists experience congestion on roadway segments due to intersection operations. The purpose of the roadway segment analysis is to help identify if the delay being experienced (or anticipated to be experienced in the future) is primarily related to the intersection or the roadway segment.



2010 Base Volumes

- Freeway
- Principal / Major Arterial
- Minor Arterial
- Lower Order Facility
- ##** PM Weekday Traffic Volume in Thousands
- Incorporated Areas
- County Boundary
- UGB

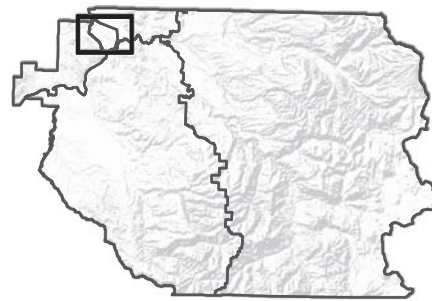
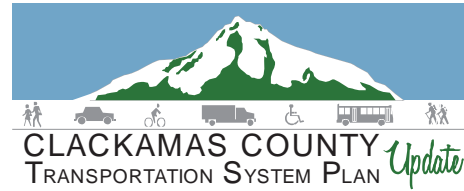


Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Cambridge Systematics, Clackamas County,
Metro Data Resource Center

**Evening Weekday Peak Hour Link Volumes 2010 Base Year
Greater McLoughlin Area**

Figure
M 16

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\16 Evening Weekday Peak Hour Link Volumes 2010 Base Year.mxd



Very Congested >1.10

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Congested 1.0 - 1.1

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Some Congestion 0.9 - 1.0

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Nearing Congestion 0.8 - 0.9

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

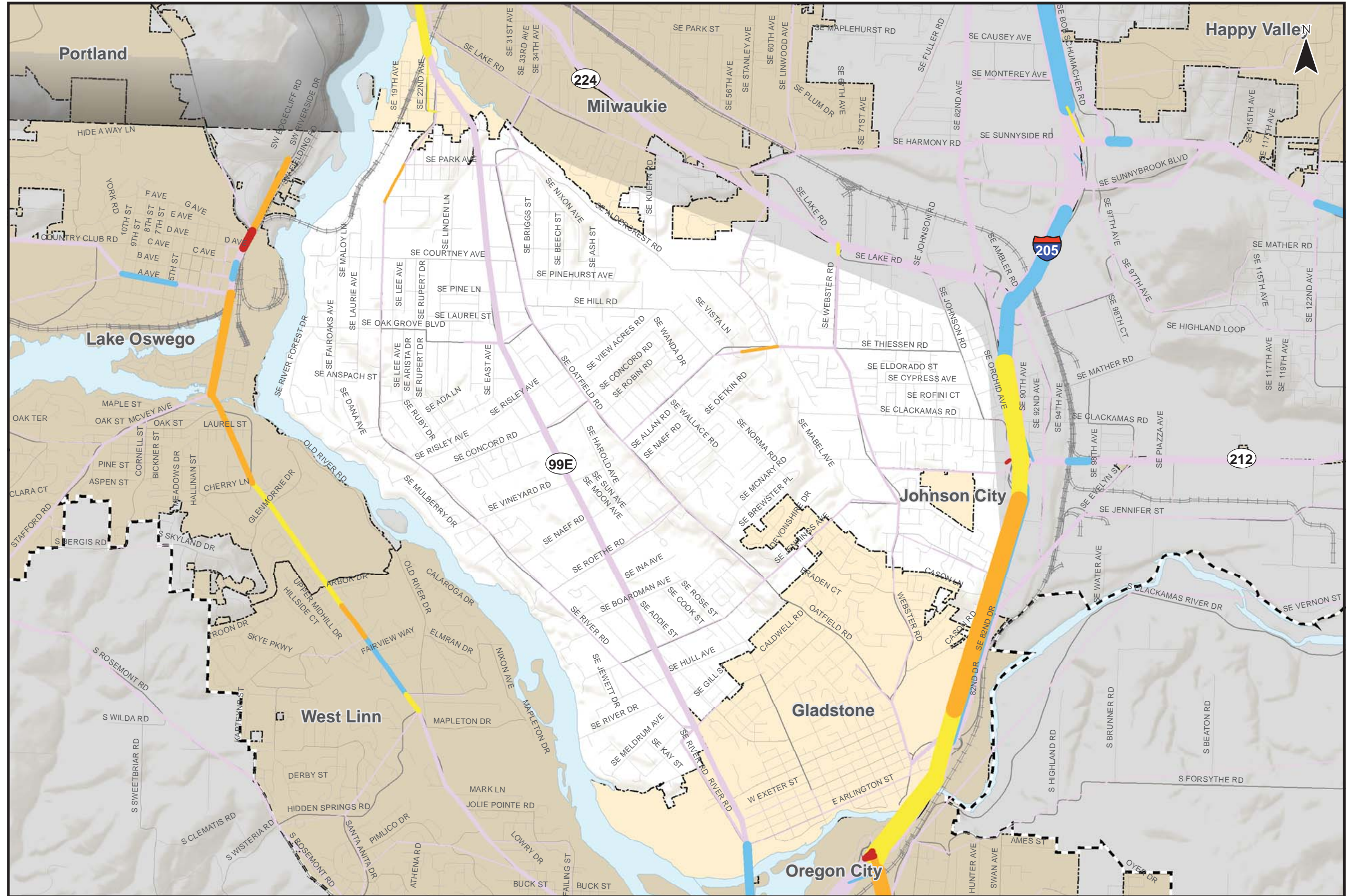
Less Congested <0.8

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

- Incorporated Areas
- County Boundary
- UGB

0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Cambridge Systematics, Clackamas County,
Metro Data Resource Center



**Evening Weekday Peak Hour Roadway Segment Congestion 2010 Base Year
Greater McLoughlin Area**

Figure
M 17

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\17 Evening Weekday Peak Hour Roadway Segment Congestion 2010 Base Year.mxd

As can be seen in Figure M 17, under the 2010 Base Year the roadway segments are less congested during the weekday evening peak hour. Relatively short segments of SE River Road and SE Thiessen Road are estimated to experience congestion during the weekend evening peak hour. The segment of OR 99E starting at the bridge at the southern end of the study area and running south is nearing congestion. A similar analysis was conducted for two future scenarios; the results of that analysis are discussed further below in the section presenting Future Conditions for the Greater McLoughlin Area. Table M 3 Olists the roadway segments that have volume-to-capacity ratios over 0.8 and describes the level of congestion as nearing congestion, some congestion, congested, or very congested.

Table M 3 2010 Base Year Roadway Segment Congestion in Greater McLoughlin Area

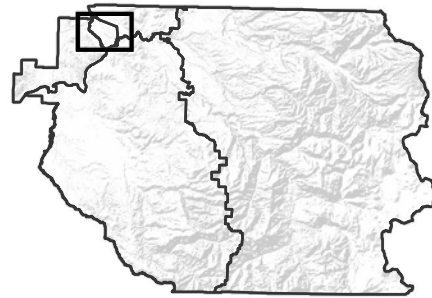
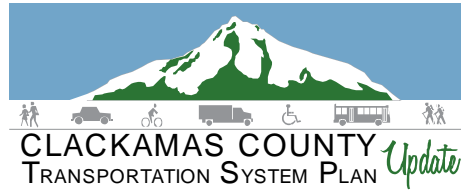
Roadway	Segment	Level of Congestion
SE River Rd	SE Silver Springs Rd to SE Park Ave	Congested
SE Thiessen Rd	SE Vista Ln to SE Aldercrest Rd	Congested
OR 99E	E Arlington St and South	Nearing Congestion

Pedestrian and Bicycle System

Figure M 18 illustrates the location of sidewalks, multi-use paths, and crosswalk signals. Figure M 19 illustrates the location of bike lanes, multi-use paths and shoulder bikeways on roadways. The information is based on inventory data obtained from the County, TriMet, and ODOT.

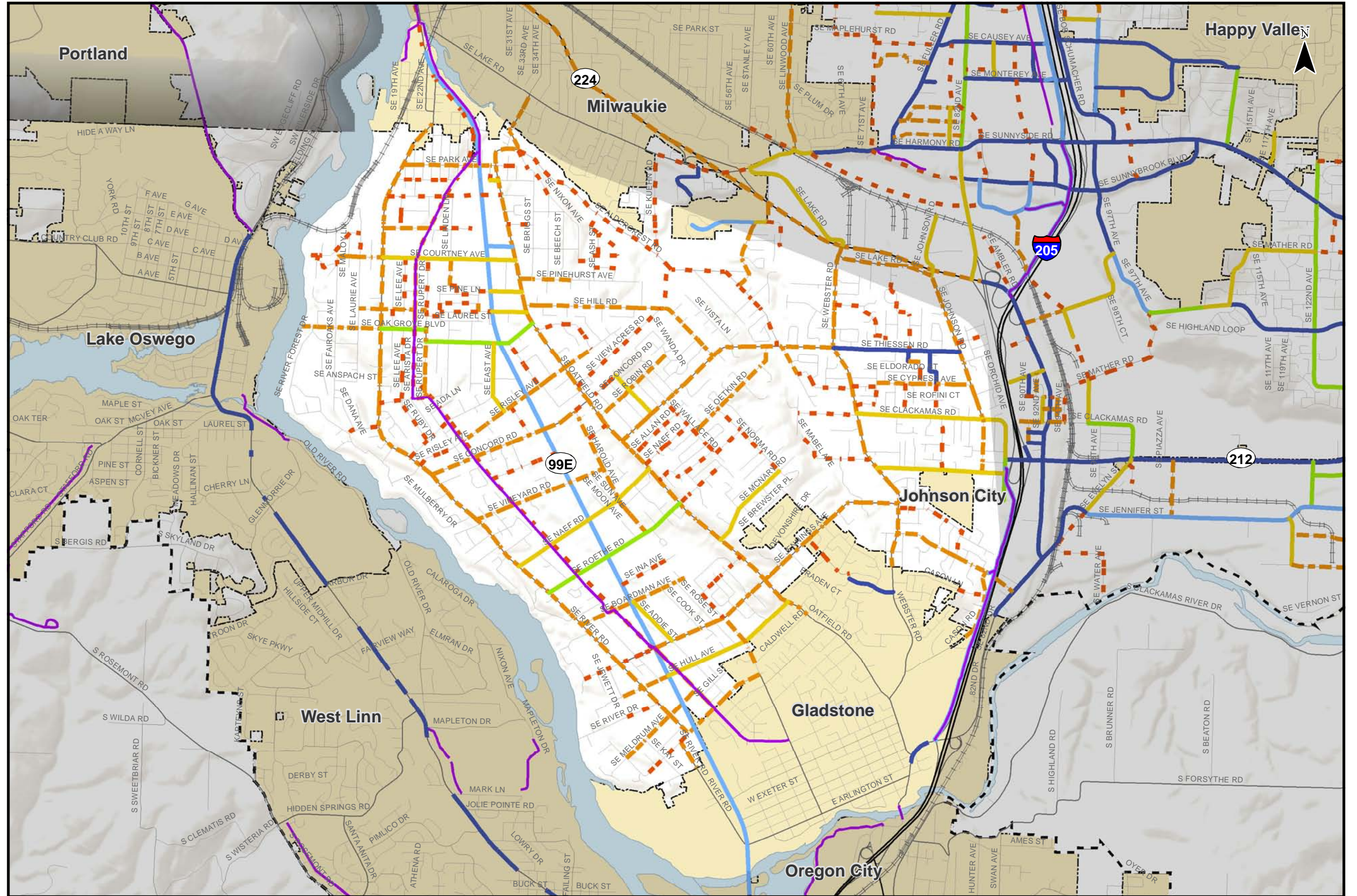
As shown in Figure M 18, nearly all roadways have significant gaps, including OR 99E which is categorized as only 76-99% complete. There are sidewalks in Gladstone not shown (*note that the data shown within cities is not complete and primarily includes state and county facilities only*). According to both Metro and County standards, sidewalks should be provided on all Major Arterials, Minor Arterials, Connectors, Collectors, and Local Streets in urban areas.

While the county’s standards require sidewalk on all streets in the urban area (except freeways and expressways), the Essential Pedestrian Network in the County’s Comprehensive Plan (see *Appendix 5*) provides guidance on which local roadways are critical parts of the pedestrian network. It also includes all collectors and arterials in the area. Existing gaps in the pedestrian network include all roadways identified on the Essential Pedestrian Network that do not have an existing sidewalk facility.



Pedestrian Network

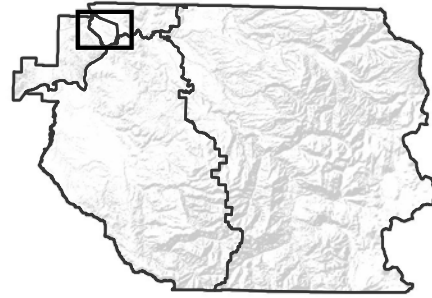
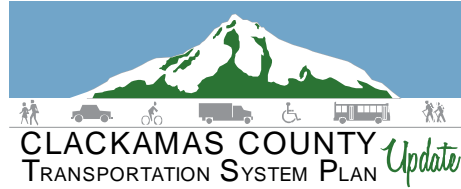
- Sidewalks
- 76% to 99% Complete
- 51% to 75% Complete
- 26% to 50% Complete
- - - 1% to 25% Complete
- - - No Sidewalks
- Multi-Use Path
- ◆ Ped Crossing Flasher
- Incorporated Areas
- County Boundary
- UGB



Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Int
Data Source:
Clackamas County, Metro Data Resouce Center

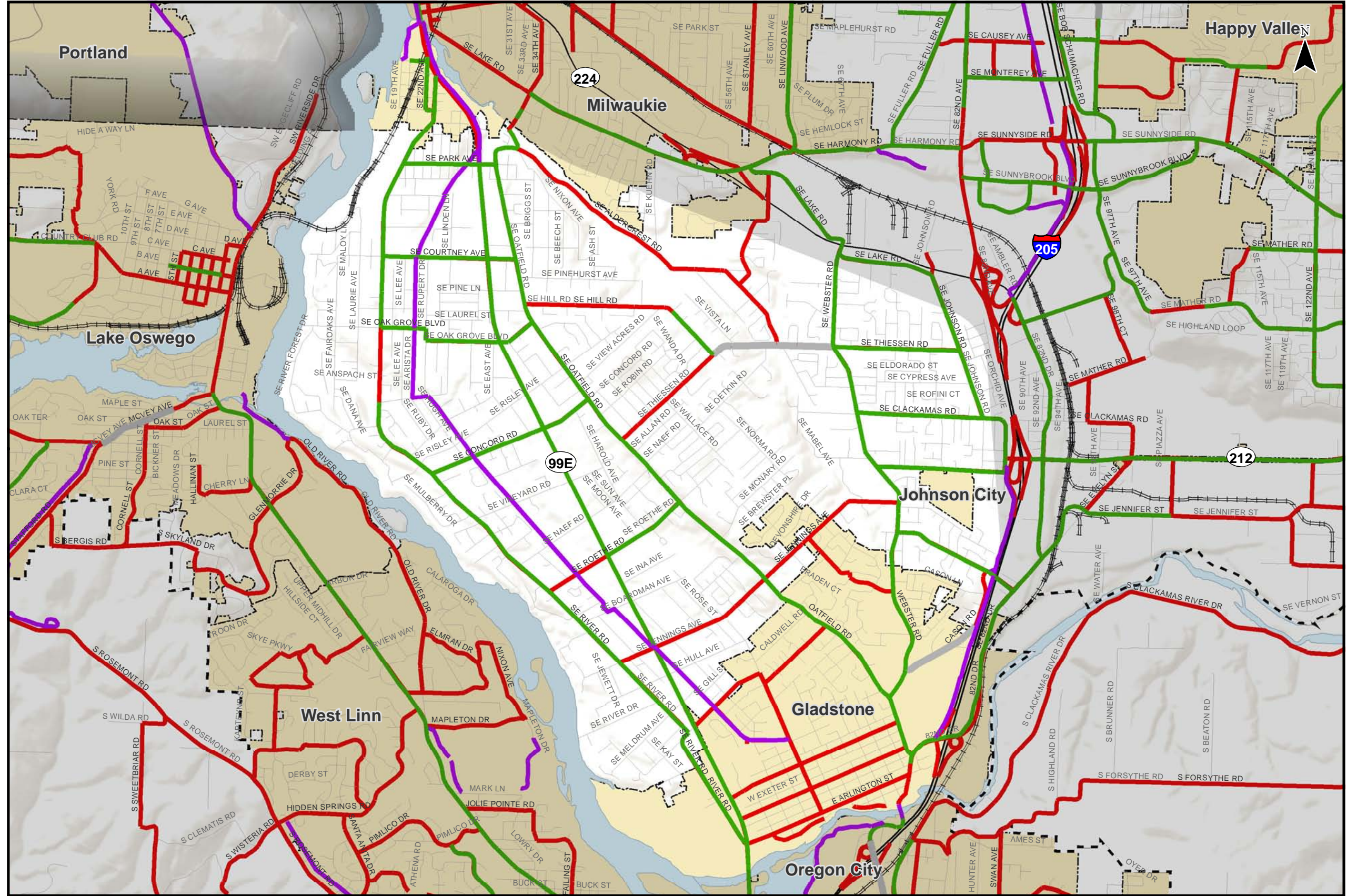
**Essential Pedestrian Network
Greater McLoughlin Area**

Figure
M 18



Bike Facilities

- Bike Lane
- Multi-Use Path
- Shoulders (At Least 4ft Wide)
- Gap in Bikeway Network
- Incorporated Areas
- County Boundary
- UGB



Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Int
Data Source:
Clackamas County, Metro Data Resouce Center

**Existing Bikeway Network
Greater McLoughlin Area**

Figure
M 19

The County’s Pedestrian Master Plan identifies priorities for filling in the pedestrian network gaps. Table M 4 below identifies the priority pedestrian projects from the Pedestrian Master Plan in the Greater McLoughlin Area.

Table M 4 Pedestrian Master Plan Projects in the Greater McLoughlin Area

Pedestrian Master Plan Project Number	Street Name	Section Description
7	ARISTA - TROLLEY TRAIL	On Street Portions: Courtney Ave to Creighton - Jennings to Boardman
9	CONCORD	Harold to Oatfield Rd
11	COURTNEY	River Rd to McLoughlin
14	GREENVIEW	Thiessen Rd to Clackamas Rd
15	HAROLD	Concord Road to Roethe Road
16	HILL	View Acres to Oatfield Rd
17	HILL	Thiessen Rd to View Acres Rd.
22	JENNINGS	99E to Webster
23	JOHNSON	Roots Rd to Lake
25	LAKE	Johnson Rd / Webster
29	NAEF	Oatfield Rd to River Rd
30	OATFIELD	Milwaukie to Gladstone
31	PARK	River Rd to Oatfield Rd
32	RISLEY	Arista to Concord Road
33	RIVER	99E Gladstone to 99E Milwaukie
34	ROETHE	River Road to 99E
35	ROOTS	Webster to McKinley Rd.
36	RUSK	OR 224 to Aldercrest
39	THIESSEN	Webster Rd to Aldercrest Rd
40	THIESSEN	Oatfield to Hill
42	WEBSTER	OR 224 South to Gladstone
52	CONCORD	Oatfield to La Bonita
54	JENNINGS	River Rd to 99E
55	MAPLE	Laurie Ave to Rupert Dr.
102	MCLOUGHLIN	Milwaukie to Gladstone

As shown in Figure M 19, a significant portion of the area has bicycle lanes. The Trolley Trail, the multi-use path that runs from Milwaukie to Gladstone, was built on the former right-of-way used by the Portland Traction Company. Construction began in 2011 and the trail opened in June 2012. Bike lanes are provided on most of the north-south corridors (providing good alternative routes to OR 99E) and many east-west corridors.

Bicycle facilities should be provided on all roadways designated as Collectors or higher (i.e. Major Arterials, Minor Arterials, Connectors, and Collectors). The County’s Comprehensive Plan identifies all collector and arterial roadways in the Greater McLoughlin Area, as well as some local roadways, as part of the Existing Bikeway Network (see Appendix 5 for the County’s essential pedestrian and planned bicycle network maps).

Existing gaps in the network include all roadways identified on the Existing Bikeway Network (all collectors and arterials and several local roadways) that do not have an existing bicycle facility.

The County’s Bicycle Master Plan identifies priorities for filling in the bicycle network gaps. These projects will be reviewed using the TSP Vision and Goals evaluation criteria. Table M 5 below identifies the priority bicycle projects from the Bicycle Master Plan.

Table M 5 Bike Master Plan Projects in the Greater McLoughlin Area

Bike Master Plan Project Number	Street Name	Section Description	Project Elements
B15	ALDERCREST	Thiessen to Oatfield	Bike lanes, Reconstruction and Widening
B16	ARISTA TROLLEY TRAIL	On Street Portions	Bike lanes / Sidewalks
B24	GLEN ECHO	Portland Ave to 99E	Bike lanes
B25	HILL	View Acres to Oatfield Rd	Bike lanes
B29	JENNINGS	Oatfield to Webster	Bike lanes, Reconstruction and Widening
B30	JENNINGS	River Rd to Oatfield	Bike lanes
B42	RUSK	OR 224 South to Aldercrest	Bike lanes
B45	THIESSEN	Aldercrest Rd to Oatfield Rd	Bike lanes

B= Urban Bike Facility, SB = State Bike Facility

Public Transportation System

The public transportation system in the Greater McLoughlin area consists of fixed-route and dial-a-ride services as well as regional transit centers and park/rides. Frequent morning and evening peak hour service provides residents with the ability to use public transit for daily commuting, while less frequent mid-day, Saturday, and Sunday service provides residents with the ability to use public transit to access areas located throughout Clackamas County and the region.

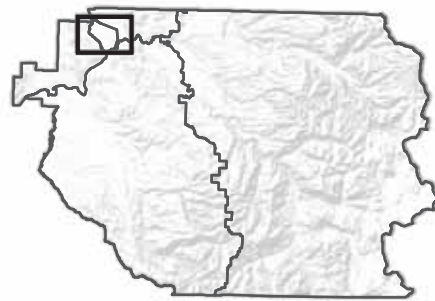
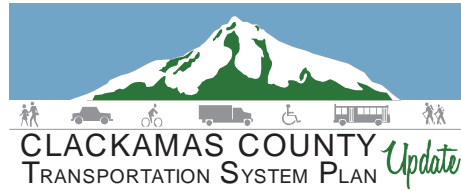
Providers in the Greater McLoughlin Area

TriMet is the only transit agency that currently provides service in this area. Figure M 20 displays the fixed-route services provided by TriMet. These services are discussed in greater detail below.

Fixed Route Service

TriMet operates six fixed-route bus lines in the Greater McLoughlin area, including Lines 30, 32, 33, 34, 79, and 99. Lines 30, 32, 33, and 99 are described in previous sections; however, they are repeated here for easy reference.

- Line 30 provides weekday service between the Clackamas Town Center and the Estacada City Center from 6:00 a.m. to 8:25 p.m. on 30 minute headways during the morning and evening peak periods and 60 minute headways during non-peak periods. During peak time periods, line 30 travels through Milwaukie as Line 31 to provide service to the Portland City Center. *Line 30 connects to Sandy Area Metro’s Sandy Estacada Line in Estacada.*



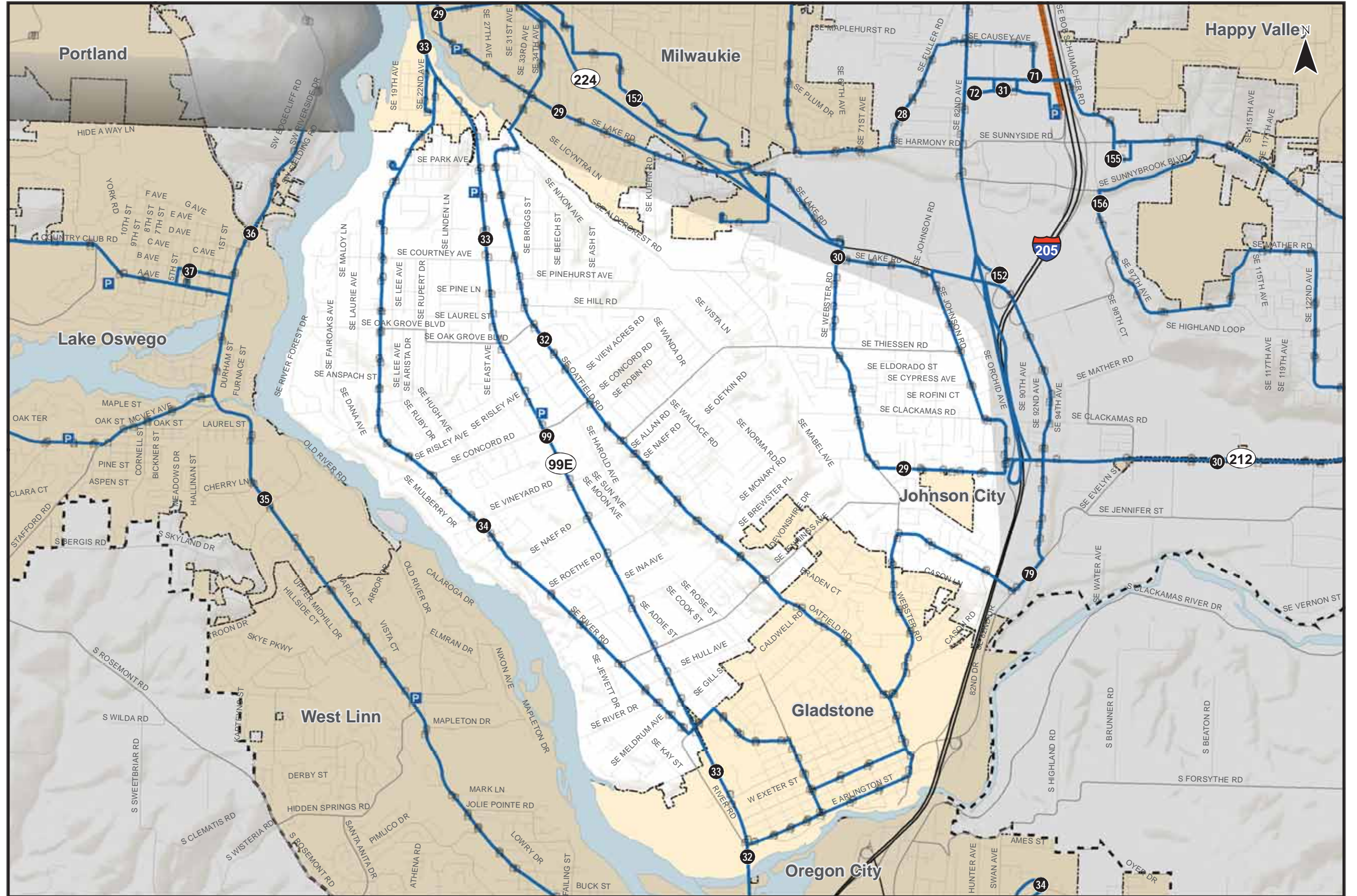
- Bus Stops
- Route Number
- Park & Ride

Transit Providers

- Tri-Met
- SAM
- SCTD
- CAT
- MXT
- SMART

Tri-Met Rails

- MAX
- WES
- Incorporated Areas
- County Boundary
- UGB



0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center

**Transit Service
Greater McLoughlin Area**

Figure
M 20

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\20 Transit Service.mxd

- Lines 32, 33, and 99 provide service between the Portland City Center and Clackamas Community College (CCC) via the Milwaukie City Center and the Oregon City Transit Center. The primary difference between the lines is:
 - Line 32 provides weekday service along SE Oatfield Road as well as Division Street and Molalla Avenue in Oregon City from 6:58 a.m. to 7:21 p.m. on approximately 30 minute headways during the morning and evening peak periods and 60 minute headways during non-peak periods;
 - line 33 provides weekday service along SE McLoughlin Boulevard as well as Linn Avenue and Beaver Creek Road in Oregon City from 5:20 a.m. to 1:48 a.m. on approximately 15-30 minute headways throughout the day; and
 - line 99 provides weekday service along SE McLoughlin Boulevard as well as Division Street and Molalla Avenue in Oregon City; however, Line 99 operates as an express route from CCC to the Portland City Center during the weekday morning peak period from 5:29 a.m. to 8:46 a.m. on approximately 15-30 minute headways and from the Portland City Center to CCC during the evening peak period from 2:56 p.m. to 6:52 p.m. on approximately 15-30 minute headways.
- Line 34 provides weekday service between the Milwaukie City Center and the Oregon City Transit Center via River Road from 5:33 a.m. to 7:41 p.m. on approximately 70-minute headways.
- Line 79 provides weekday service between the Clackamas Town Center and the Oregon City Transit Center from 5:22 a.m. to 10:28 p.m. on approximately 30-40 minute headways.
- *TriMet Lines 32, 33, 34, 79, and 99 connect with Canby Area Transit's Orange Line at the Oregon City Transit Center. Lines 32, 33, and 99 also connect to South Clackamas Transit District's Molalla to Clackamas Community College bus line at CCC.*

Dial-A-Ride Service

TriMet's LIFT Paratransit Program provides dial-a-ride service to residents who are unable to use regular fixed-route services due to disabilities or disabling health conditions. The service is offered within three-fourths of a mile beyond the outermost portions of TriMet's bus and light-rail lines. Service is not offered outside TriMet's service district. This service is available 4:30 a.m. to 2:30 a.m. seven days a week. *Effective September 2012 the LIFT service area and hours of service will match fixed route availability.*

Park/Rides

There are two park/rides located in the Greater McLoughlin area. The Joe's Park/Ride is located along McLoughlin Boulevard in the former GI Joe's parking lot. It provides a total of 50 parking spaces and is served by TriMet Lines 33 and 99. It is available seven days a week, 24 hours a day. The Milwaukie Elks Lodge Park/Ride is also located along McLoughlin Boulevard in the Milwaukie Elks Lodge parking lot. It provides a total of 20 parking spaces and is served by TriMet Lines 33 and 99. It is available Monday through Friday, 24 hours a day.

Transit level-of-Service

The transit level-of-service analysis provided below is based on the methodology described in *TCRP Report 100: Transit Capacity and Quality of Service Manual*. Refer to the Methodology/Approach section for additional information about the level-of-service measures included in the analysis.

Service Frequency

Service frequencies within the area differ by service provider and by route. Table M 6 summarizes the transit level-of-service analysis results for service frequency. As shown, a majority of existing services currently operate at LOS D or below throughout the day.

Table M 6 Service Frequency Level-of-Service Analysis – Greater McLoughlin Area

Provider	Routes	Service Frequency	LOS
TriMet	Line 30	30-60-minutes ¹	D-F
TriMet	Line 32	30-60 minutes ¹	D-E
TriMet	Line 33	15-30 minutes ¹	C-D
TriMet	Line 34	70 minutes ²	F
TriMet	Line 79	30-40 minutes ¹	D-E
TriMet	Line 99	15-30 minutes ²	C-D

1. Service is less frequent on Saturday or Sunday.
2. No service is provided in Saturday or Sunday.

Hours of Service

The total number of hours that transit service is provided differs by service provider and by route. Table M 7 summarizes the transit level-of-service analysis results for hours of service. As shown, a majority of existing services currently operate between LOS A and LOS E throughout the day.

Table M 7 Hours of Service Level-of-Service Analysis – Greater McLoughlin Area

Provider	Routes	Hours of Service	LOS
TriMet	Line 30	14-hours ¹	C
TriMet	Line 32	12 hours ¹	D
TriMet	Line 33	20 hours ¹	A
TriMet	Line 34	12 hours ²	D
TriMet	Line 79	17 hours ¹	B
TriMet	Line 99	4 hours	E

1. Service is less frequent on Saturday or Sunday.
2. No service is provided on Saturday or Sunday.

Service Coverage

Figure M 21 displays the existing transit level-of-service analysis results for service coverage in the Greater McLoughlin area. Areas defined as transit supportive that have service are shown in blue. Areas defined as transit supportive but lacking service are shown in red. Areas that have transit service, but do not qualify as

a TSA, are shown in orange. A majority of the areas shown in red would require additional transit routes or the development of new pathway connections (increasing the area that is within ¼ mile walking distance) to existing transit routes to be served.

The percentage of TSAs served and the corresponding level of service has been identified using the Transit Level of Service (TLOS) methodology. As shown in Table M 8, the percent of transit supportive population areas served is 73 percent and the percent of transit supportive employment areas served is 72 percent. The corresponding LOS is C.

Table M 8 Service Coverage Analysis – Greater McLoughlin Area

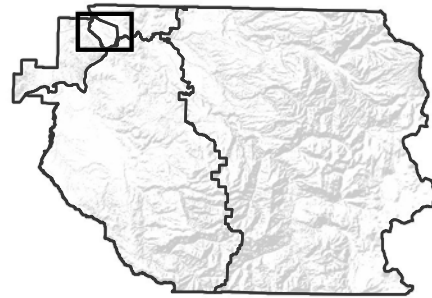
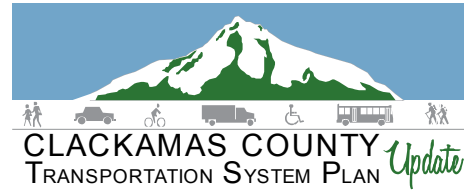
Area Type	Population	Employment
Transit Supportive Areas (TSA) ¹	20,904	4,691
Transit Supportive Areas Served ²	15,286	3,386
Percent TSA Served by Transit	73%	72%
Level of Service	LOS C	LOS C
Transit Supportive Areas without service	5,618	1,305
Total Transit Area Served ³	29,889	5,848
Additional Areas Served by Transit	14,603	2,462

1. Area shown in blue and red in Figure M 21.
2. Area shown in blue in Figure M 21.
3. Area shown in blue and orange in Figure M 21.

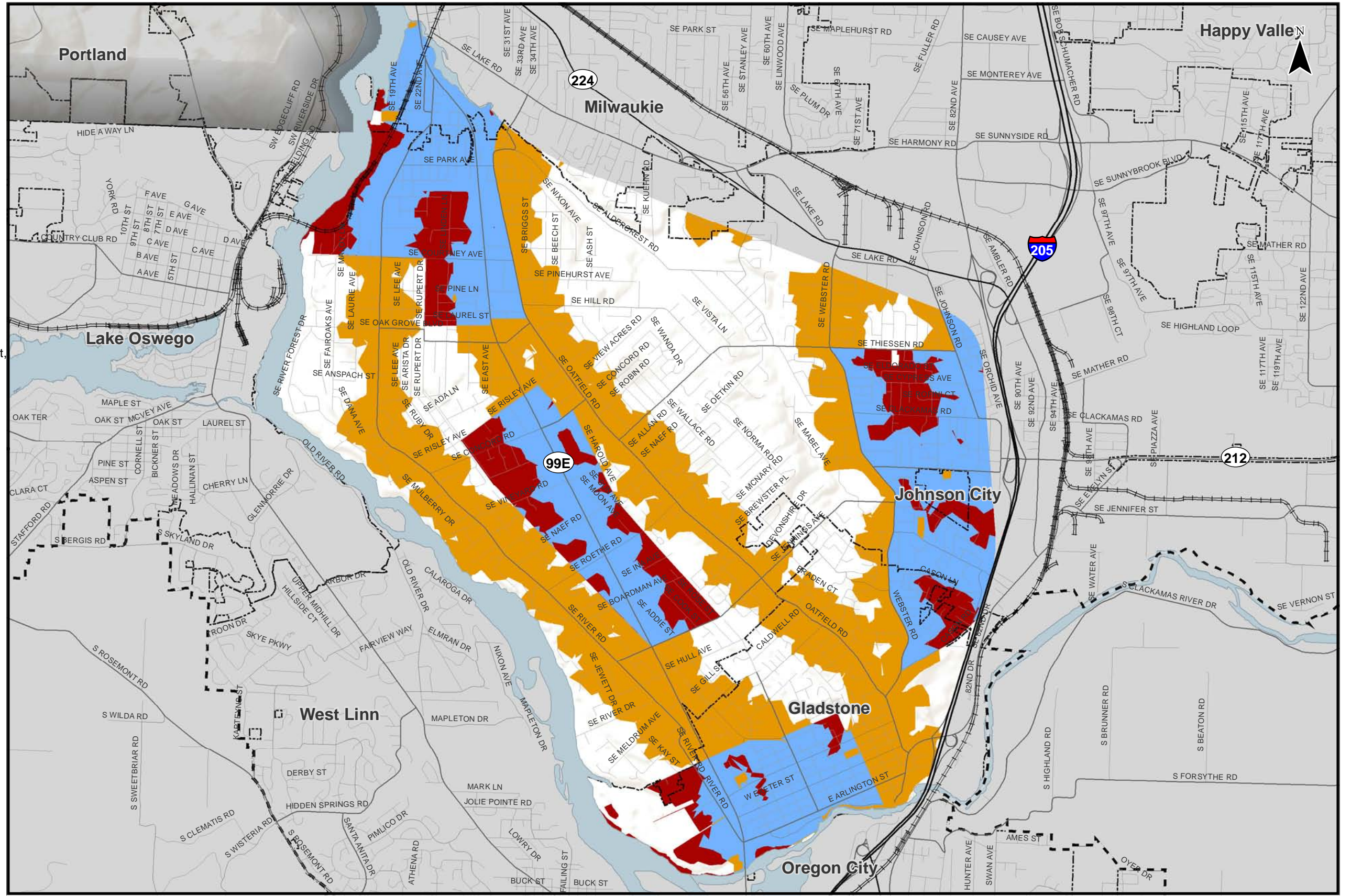
As shown above, 5,618 people and 1,305 jobs are located within TSAs that do not have transit service. These areas currently have a population and/or employment density that can support transit service and therefore should be included in future efforts to improve service routes and stop locations. Also shown above, 29,889 people and 5,848 jobs in the Greater McLoughlin area are currently served by transit. Of the total area served, 14,603 people and 2,462 jobs are located within areas that have transit service, but currently do not have the population and/or job density necessary to economically support transit service. Many of these areas, however, are shown in Figure M 9 as containing a large portion of the transportation disadvantaged population in the Greater McLoughlin area and therefore the service provided in these areas is an important consideration.

Future Transit Service Coverage

The future transit level-of-service analysis assumes that existing service frequencies, service hours, and service coverage is the same in the future. The only difference is the population and employment growth assumptions included in the regional traffic model and the resulting transit supportive areas. Figure M 22 displays the transit level-of-service analysis results for service coverage. As shown, the number of transit supportive areas is expected to increase significantly throughout most of the area. While many of these areas are expected to be served by existing transit services, the remaining areas will require additional service routes or connections to existing routes in order to be served.



- Areas with Density to Support Transit and Served by Transit
- Areas with Density to Support Transit, but Not Served by Transit
- Areas without Sufficient Density to Support Transit
- Incorporated Areas
- County Boundary
- UGB

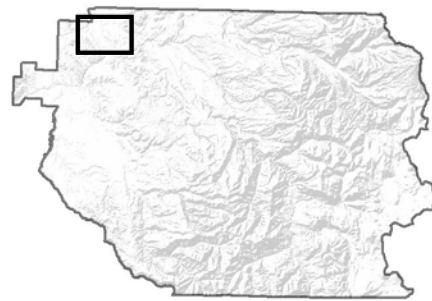
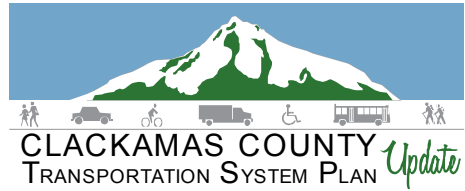


Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center

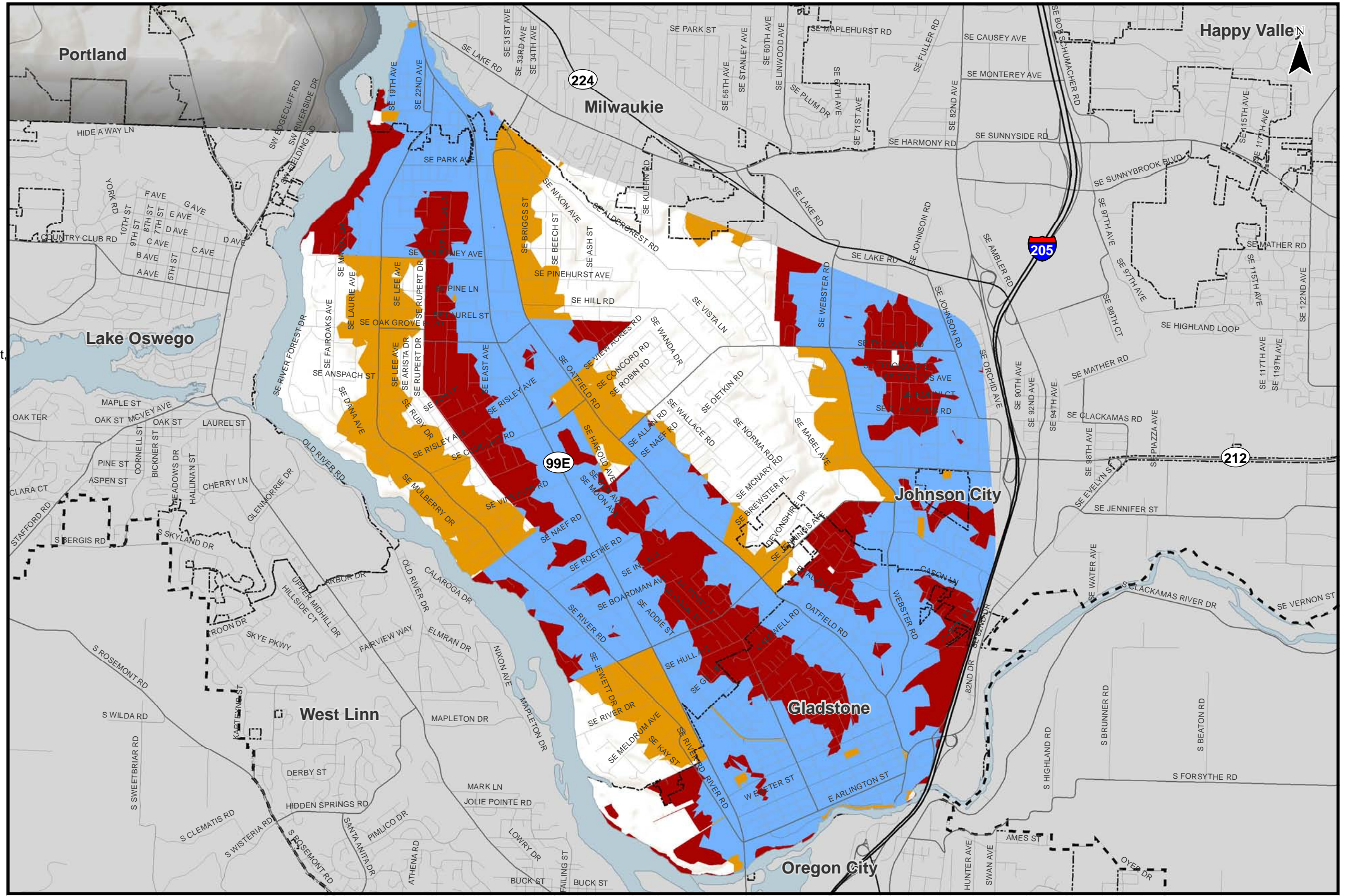
**Existing Transit Supportive Areas
Greater McLoughlin Area**

Figure
M 21

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\21 Existing Transit Supportive Areas.mxd



- Areas with Density to Support Transit and Served by Transit
- Areas with Density to Support Transit, but Not Served by Transit
- Areas without Sufficient Density to Support Transit
- Incorporated Areas
- County Boundary
- UGB



0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center

Future Transit Supportive Areas Greater McLoughlin Area

Figure
M 22

H:\profile11732 - Clackamas County TSP\gis11x17 Maps\22 Future Transit Supportive Areas.mxd

CRASH ANALYSIS

The existing conditions crash analysis considered:

- 1) Locations within the County identified as safety priorities by the Oregon Department of Transportation;
- 2) Primary crash types contributing to the majority of serious injury and fatal crashes in the County; and
- 3) Specific safety focus intersections County staff has identified.

See *Section 3 Assumptions and Methods* for a description of the crash analysis methodology.

Figure M 23 below illustrates the reported crashes in the Greater McLoughlin Area from 2007 through 2010. The following sub-sections take a closer look at the reported crash data to identify the historic trends and patterns that have contributed to the majority of fatal and serious injury crashes in the area.

Statewide Safety Priority Locations

ODOT identifies top safety priority locations annually using a Statewide Priority Index System (SPIS). The locations in the top 5% and 10% are those that have historically experienced a higher number and/or higher severity of crashes. These locations are referred to as SPIS locations or SPIS sites. Clackamas County applies the same methodology as ODOT to County roadways to identify the top 20 to 25 locations on which to focus safety reviews and improvements.

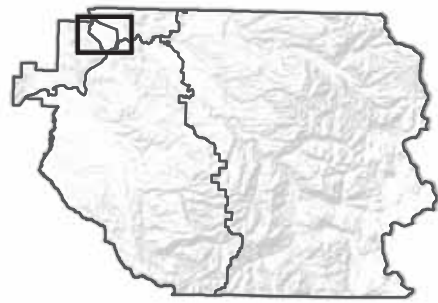
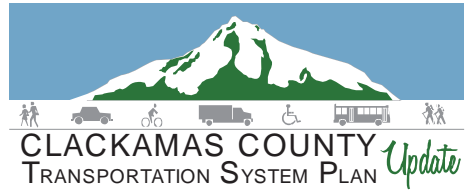
Figure M 24 identifies the several SPIS locations within the Greater McLoughlin Area. The top 5% and 10% sites identified by ODOT are located along OR 99E. Forthcoming TSP update reports will explore potential projects, studies, programs and/or policies to reduce crashes at this location.

Primary Crash Types Contributing to Serious Injury and Fatal Crashes

The following sub-sections and figures display the locations of the crash types that historically have led to the majority of serious injury and fatal crashes in the County. As discussed in *Section 3 Methodology & Approach*, the crash types that have historically led to the majority of serious injury and fatal crashes are:

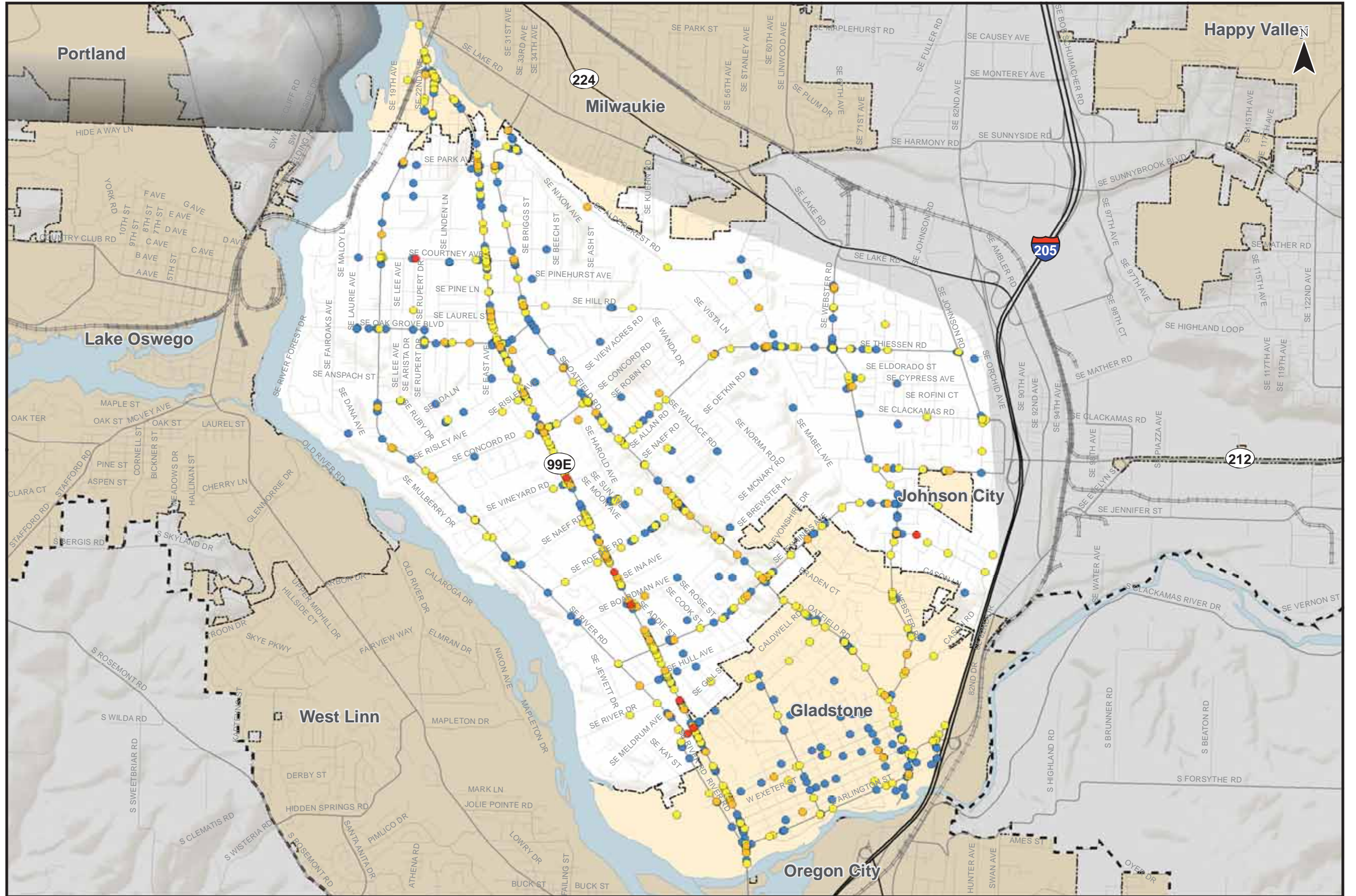
- Roadway Departure Crashes;
- Crashes Involving Young Drivers (ages 15 through 25 years old); and
- Crashes Involving Aggressive Driving (Driving Too Fast, Following Too Close).

Roadway departure crashes, crashes involving young drivers and crashes involving aggressive driving are not mutually exclusive categories. This means one crash could involve a young driver who ran off the road; this crash would be mapped as a roadway departure crash and as a crash involving a young driver. In addition to the three crash types above, crashes involving pedestrians and bicyclists are also mapped below. While the overall occurrence of crashes involving pedestrians and bicyclists may not be as high as other crash types, when those crashes do occur they often result in serious injuries or fatalities because pedestrians and bicyclists are more vulnerable than people traveling in motorized vehicles.



**Reported Crashes
2007 Through 2010**

- Fatal Crash
 - Serious Injury Crash
 - Minor Injury Crash
 - Property Damage Only Crash
- Incorporated Areas
 - County Boundary
 - UGB

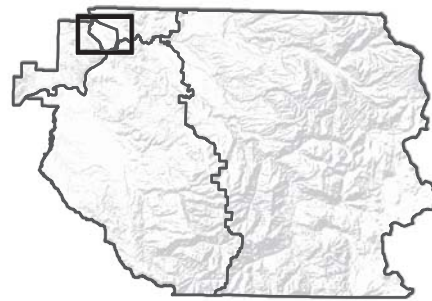
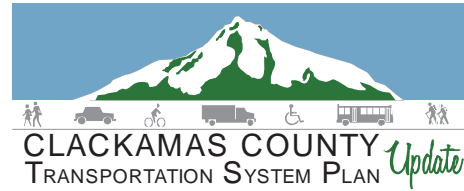


0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center,
Oregon Department of Transportation

**Reported Crashes 2007-2010
Greater McLoughlin Area**

Figure
M 23



County SPIS Sites

ODOT SPIS Sites

- 5% Site
- 10% Site

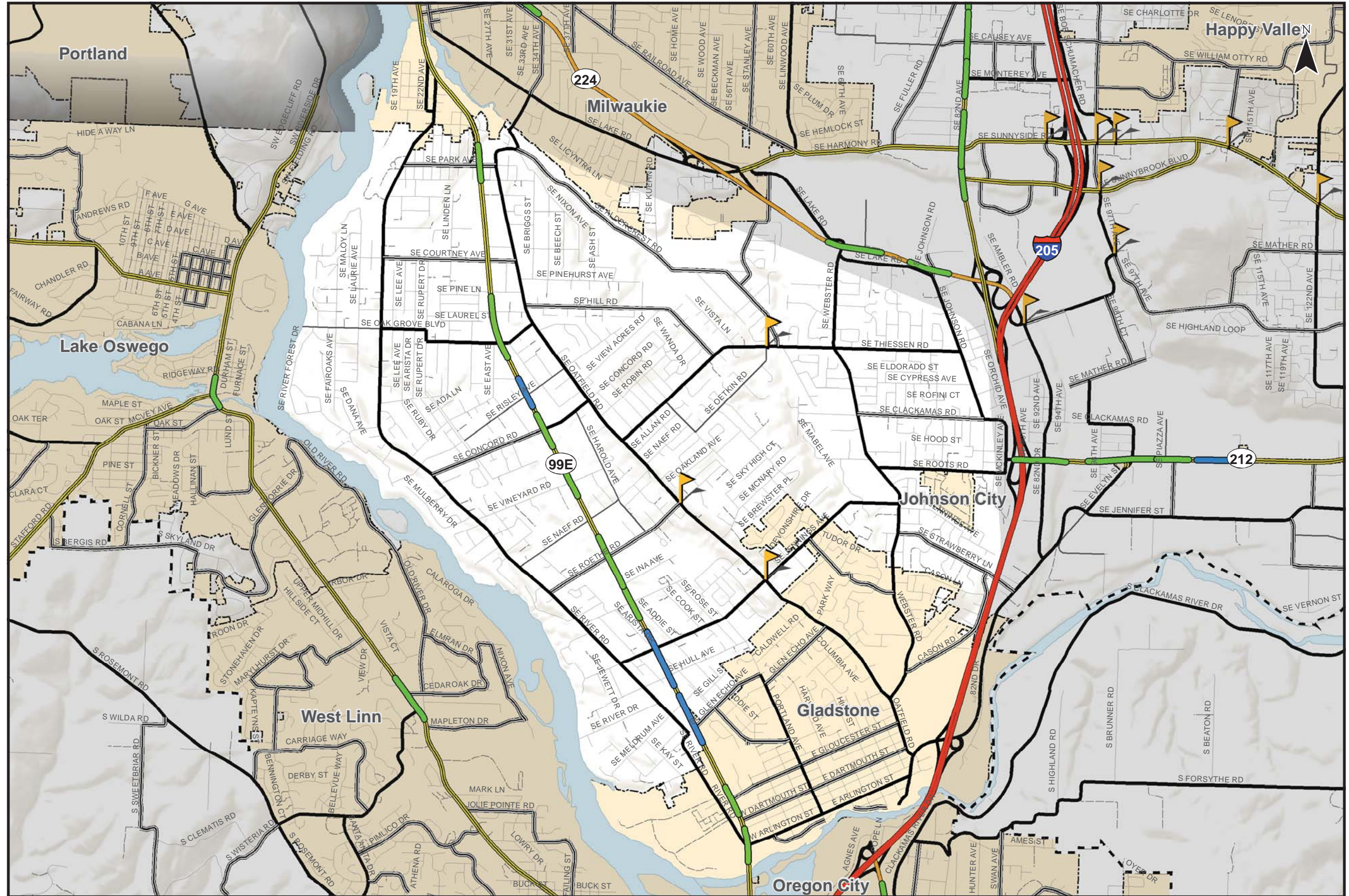
Functional Classifications

- Freeway
- Expressway
- Major Arterial
- Minor Arterial
- Collector
- Connector
- Local
- Forest Service Paved
- Forest Aggregate Road
- General dirt, road or trail
- Other
- Railroad
- Incorporated Areas
- County Boundary
- UGB

On an annual basis, the Oregon Department of Transportation identifies safety priority locations through their Statewide Priority Index System (SPIS). The SPIS process identifies locations for review and potential improvements based on their crash history. SPIS locations listed in the top 5% and top 10% represent locations that have historically experienced a higher number and/or higher severity of crashes than other locations in the state.



Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center



**Statewide Priority Index System Locations
Greater McLoughlin Area**

Figure
M 24

The purpose of this assessment is to identify corridors for the County to study and evaluate in greater detail with regards to safety. Separate from the TSP update activities, the County will review the crash data for these corridors in greater detail, assess the existing physical features of the corridor (e.g., shoulder width, signs, pavement markings) and identify improvements to reduce crashes. Improvements would range from lower cost signing or pavement marking treatments to road reconstruction. Potential improvements include updating and/or installing new signs, new or enhanced pavement markings (e.g., STOP AHEAD pavement markings), moving roadside fixed objects, and adjusting roadside vegetation. Further study of the candidate road safety audit corridors and improvements to them will be addressed programmatically. This enables the County to assess each corridor in more detail on a case by case basis, identify cost-effective solutions and determine if other corridors within the County would also benefit from similar improvements.

From the analysis presented below, the following corridors (listed in no particular order) in the Greater McLoughlin Area emerged as candidate road safety audit corridors:

1. OR 99E from SE Park Avenue to the bridge across the Clackamas River
2. SE Jennings Avenue from Webster Road to OR 99E
3. Oatfield Road from SE Jennings Avenue to SE Lake Road

A few of the corridors identified above extend into incorporated areas; collaboration with partner agencies may be needed to study those corridors. 0 illustrates the location of these corridors.

Roadway Departure Crashes, Crashes Involving Young Drivers, and Crashes Involving Aggressive Driving

Roadway departure crashes, crashes involving young drivers and crashes involving aggressive driving were mapped in two ways. First, each crash type was mapped and assessed separately to identify corridors where each crash type has occurred. Second, the serious injury and fatal crashes for each of those crash types were mapped together to consider where the crash types overlap and focus attention on serious injury and fatal crashes. The results of both mapping exercises informed the candidate road safety audit corridors listed above.

Roadway departure crashes are more common in rural areas compared to urban areas such as the Greater McLoughlin Area. Therefore, the candidate road safety audit corridors above are based more on the frequency and location of crashes involving aggressive driving, younger drivers, pedestrians and bicyclists. The frequency and location of roadway departure crashes are still presented below, but do not play as large of a role in identifying candidate corridors compared to rural areas in the County.

Figure M 26 illustrates the roadway departure crashes. There are a few clusters of roadway departure crashes in the Greater McLoughlin Area located along the northern end of SE Oatfield Road from SE Park Avenue to SE Lake Road. There are also clusters located along SE Jennings Avenue approaching Webster Road. Both of these areas are included in the candidate road safety audit corridors above.

Figure M 27 illustrates the crashes involving young drivers defined as drivers age 15 through 25 years old. The location of these crashes reinforces the candidate road safety audit corridors listed above. The area that is most noticeable is along OR 99E.

Figure M 28 illustrates crashes involving aggressive driving, including vehicles traveling too fast for conditions, exceeding the posted speed, and following too closely. The locations of crashes involving aggressive driving reinforce the candidate road safety audit corridors noted above, particularly OR 99E and SE Oatfield Road.

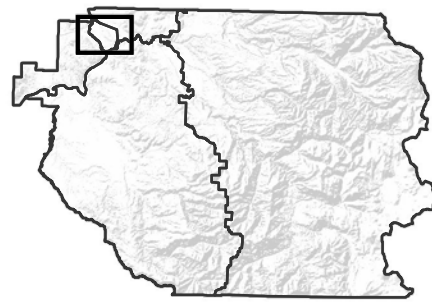
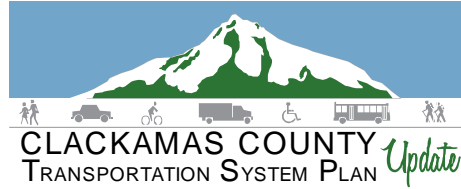
Figure M 29 illustrates serious injury and fatal crashes that were roadway departure crashes, involved young drivers, and/or involved aggressive driving. The purpose of these figures is to help focus on the corridors where serious injury and fatal crashes have occurred. The previous figures reinforced the corridor selection based on the overall frequency of crashes. These figures help confirm that the candidate road safety audit corridors are incorporating areas with a history of serious injury or fatal crashes.

Crashes Involving Pedestrians or Bicyclists

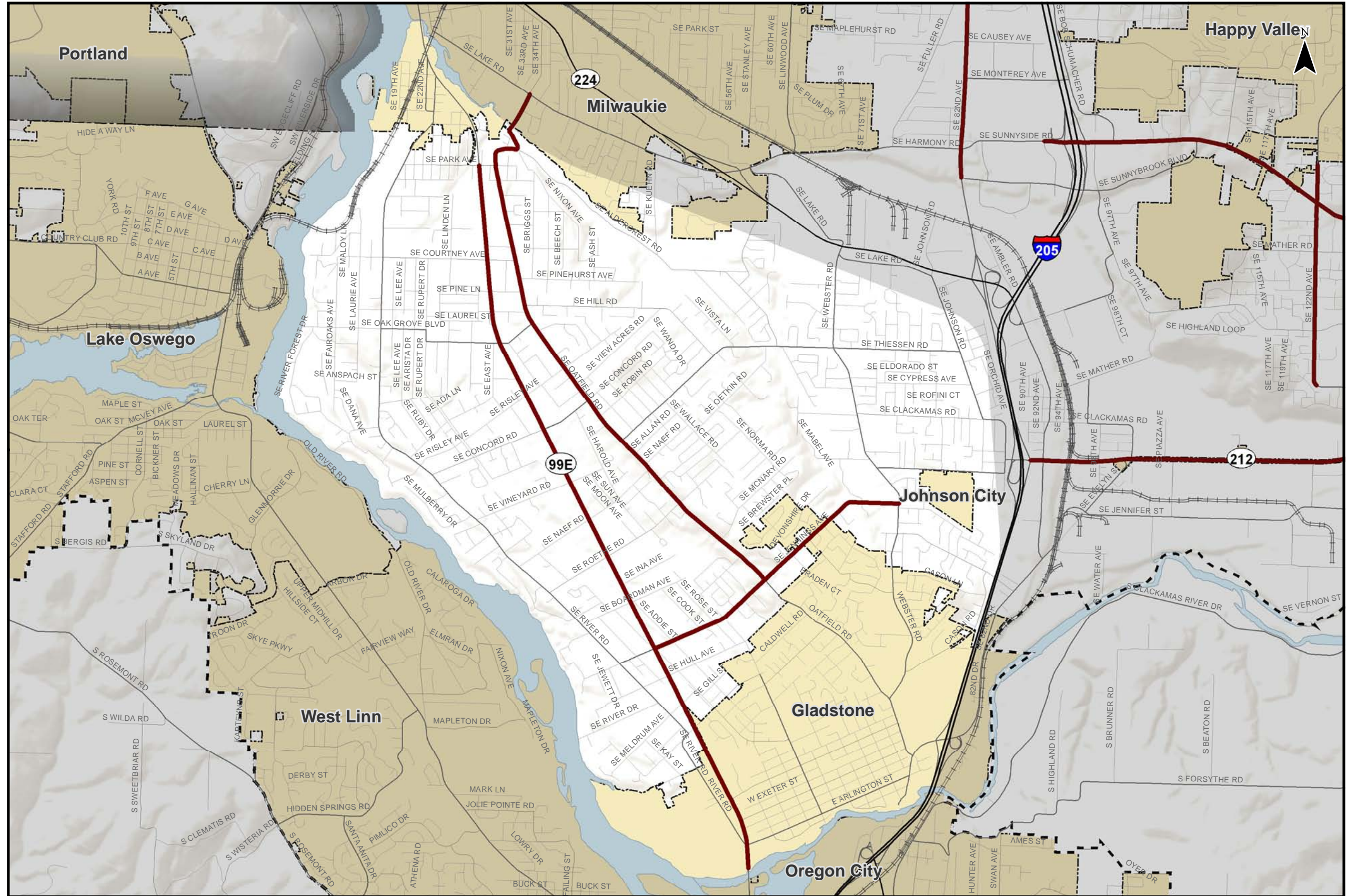
In urban or suburban areas, crashes involving pedestrians and bicyclists tend to be a higher proportion of total reported crashes compared to rural areas because of the comparatively higher volumes of pedestrians and bicyclists using the roadway. These two crash types are considered here to confirm the candidate road safety audit corridors incorporate areas where pedestrian and bicycle crashes have occurred.

Figure M 30 and Figure M 31 illustrate crashes involving pedestrians and bicyclists.

The pedestrian and bicycle crashes within the Greater McLoughlin Area from 2007 through 2010 have predominately occurred along OR 99E. This is consistent with what is expected given that the number of potential destinations along OR 99E likely increases pedestrian and bicycle activity. Furthermore, since OR 99E carries a relatively large amount of vehicular traffic, there is a higher potential for conflicts between vehicles and pedestrians or bicyclists. Although there are bicycle lanes and sidewalks on the full extent of OR 99E in the Greater McLoughlin Area, opportunities to cross OR 99E are generally limited to locations where there are traffic signals. The spacing of the traffic signals can create an undesirable amount of out of direction travel for pedestrians and may contribute to more frequent mid-block crossings.



- Candidate Road Safety Audit Corridors
- Incorporated Areas
- County Boundary
- UGB

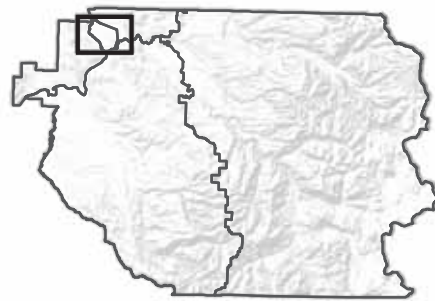
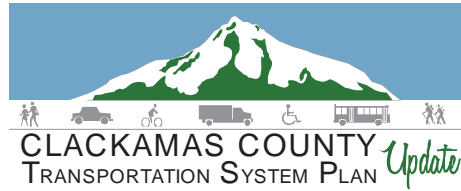


0 1 Miles

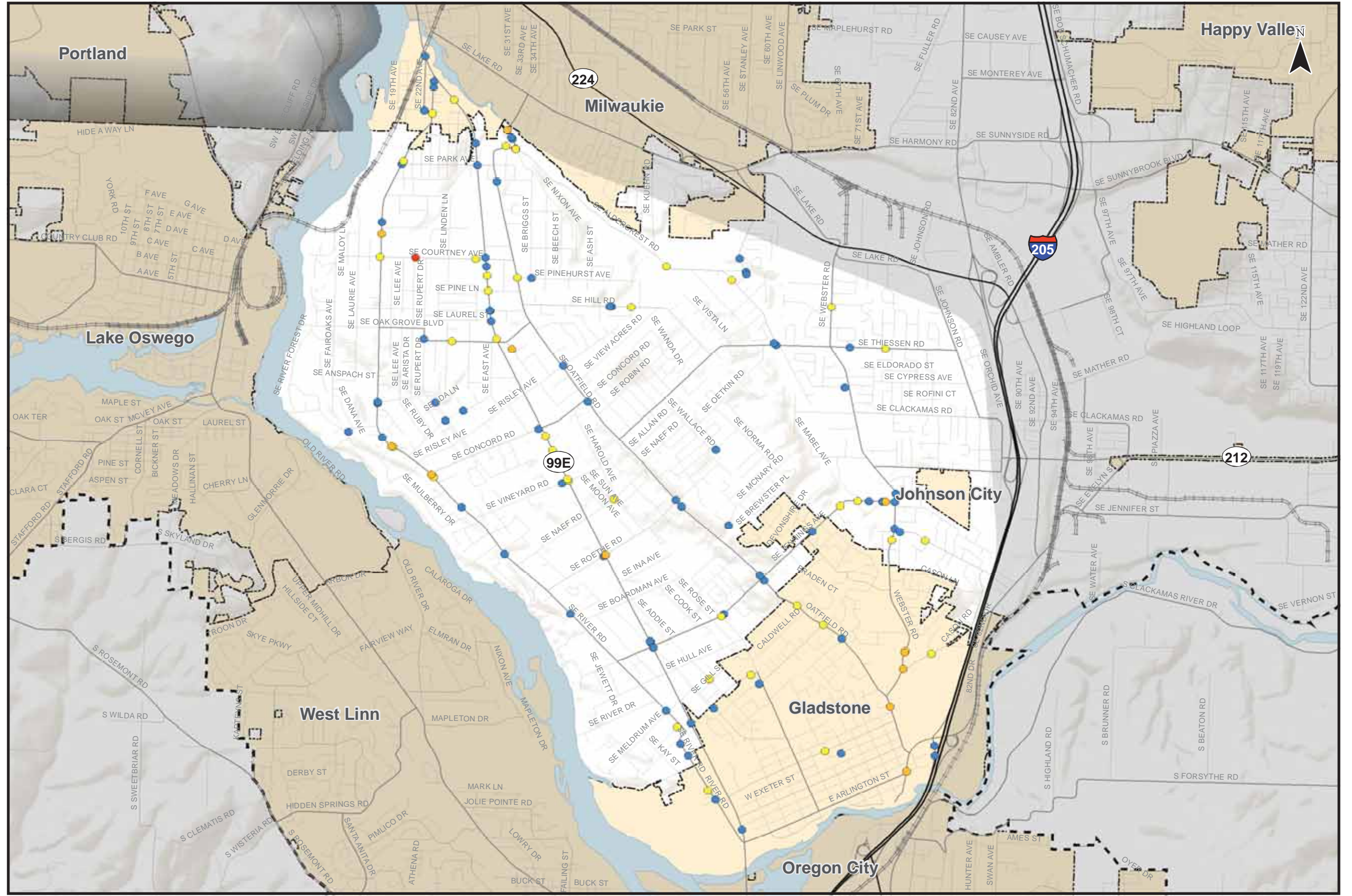
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center

Candidate Road Safety Audit Corridors Greater McLoughlin Area

Figure
M 25



- Roadway Departure Crashes**
- Fatal Crash
 - Serious Injury Crash
 - Minor Injury Crash
 - Property Damage Only Crash
- ▭ Incorporated Areas
 - ▭ County Boundary
 - ▭ UGB



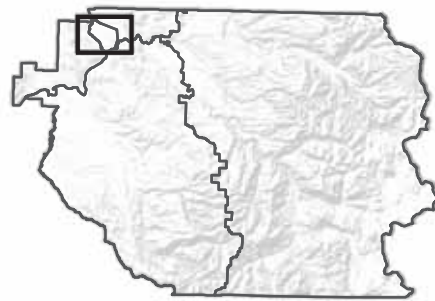
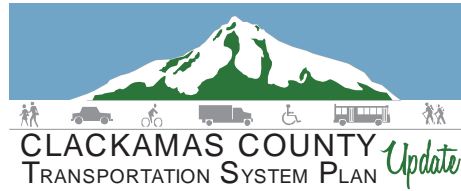
0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center,
Oregon Department of Transportation

**Roadway Departure Crashes 2007-2010
Greater McLoughlin Area**

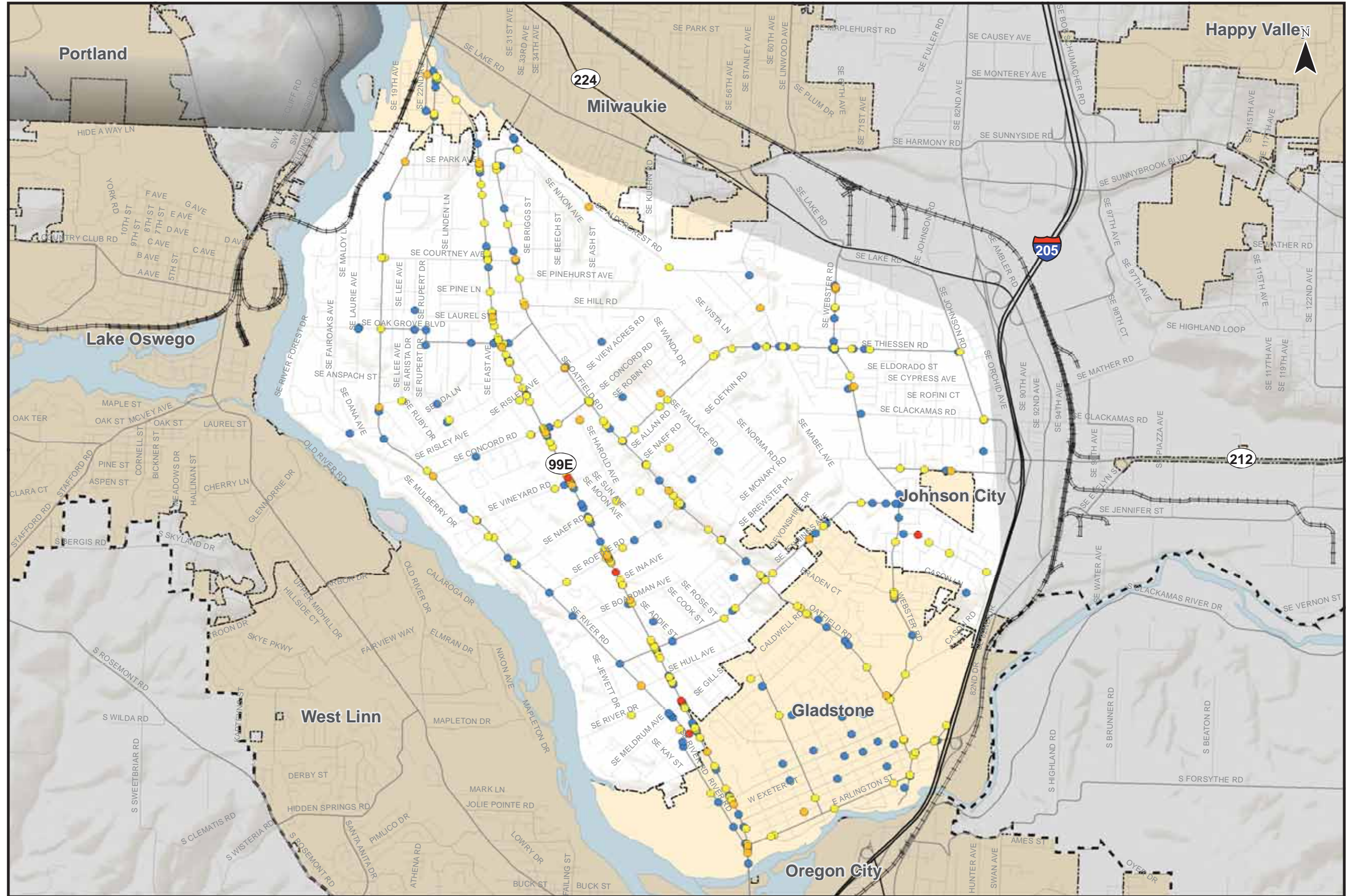
Figure
M 26

H:\profile117132 - Clackamas County TSP\gis11x17 Maps\26 Roadway Departure Crashes 2007-2010.mxd



Crashes Involving Young Drivers (15-25 Years Old)

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- ▭ Incorporated Areas
- ▭ County Boundary
- ▭ UGB

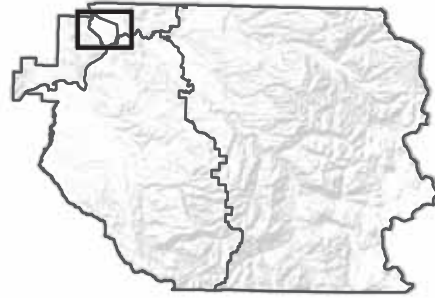
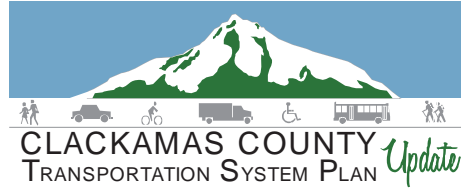


0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center,
Oregon Department of Transportation

**Crashes Involving Young Drivers (15-25 Years Old) 2007-2010
Greater McLoughlin Area**

Figure
M 27



Roadway Departure Crashes

- Fatal Crash
- Serious Injury Crash

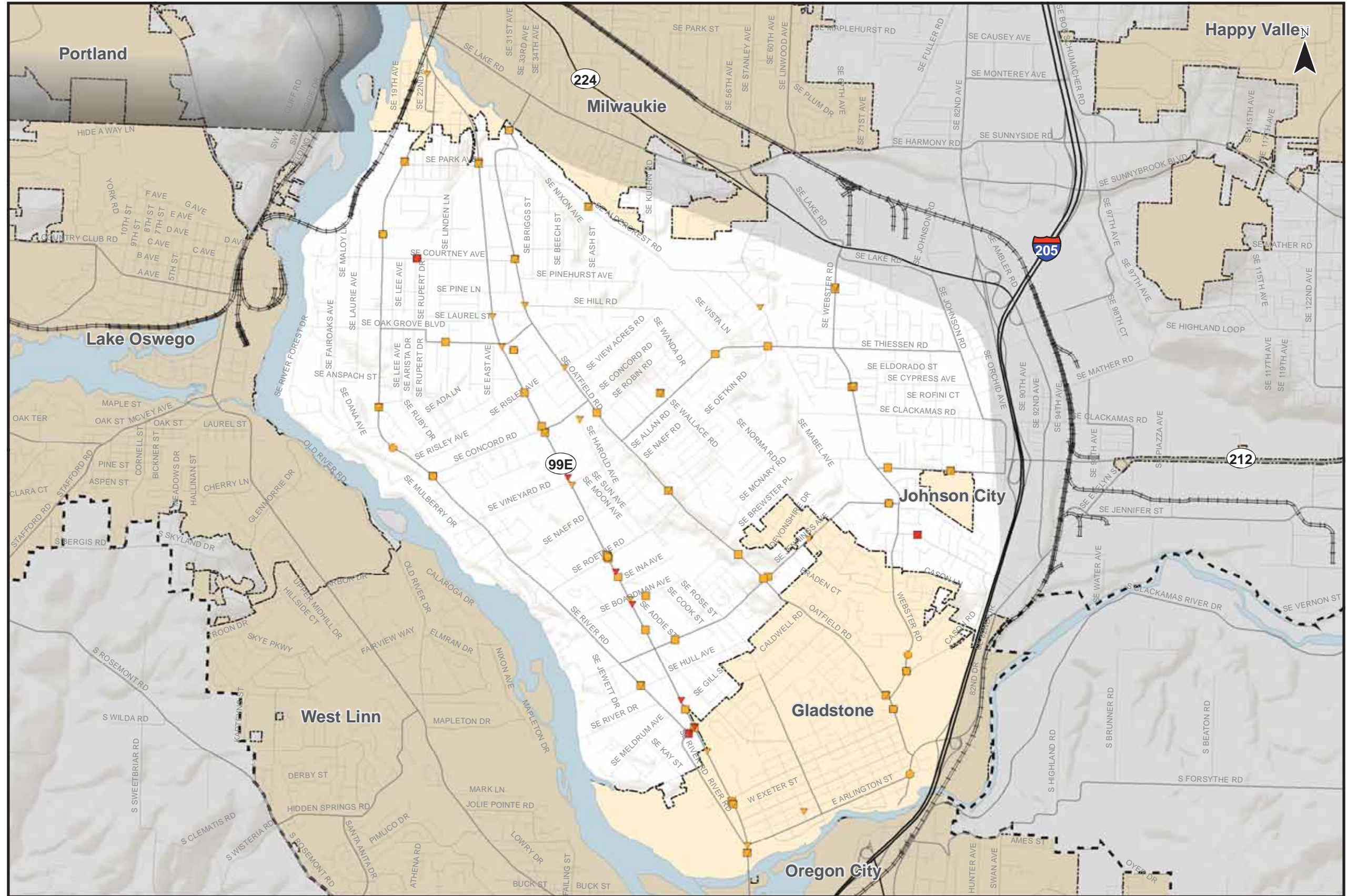
Crashes Involving Young Drivers (15-25 Years Old)

- ▼ Fatal crash
- ▼ Serious Injury Crash

Aggressive Driving Crashes

- Fatal Crash
- Severe Injury Crash

- ▭ Incorporated Areas
- ▭ County Boundary
- ▭ UGB



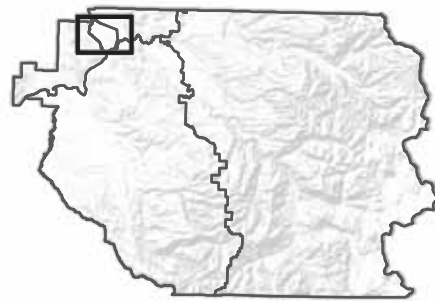
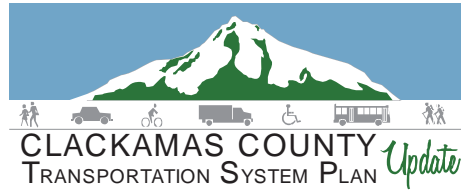
0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center,
Oregon Department of Transportation

**Fatal & Serious Injury, Roadway Departure, Young Driver & Aggressive Driving Crashes
Greater McLoughlin Area**

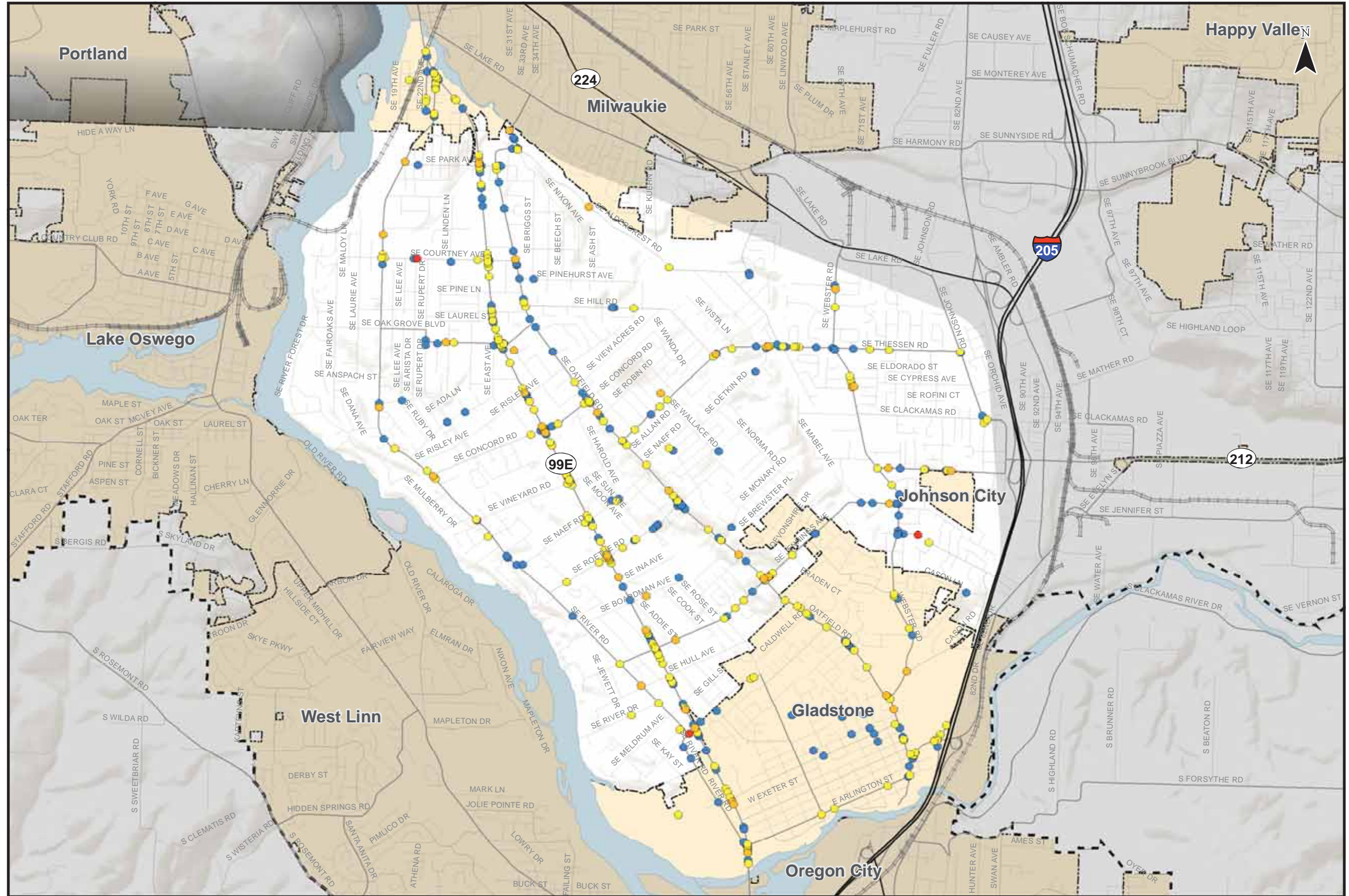
Figure
M 29

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\29 Fatal & Serious Injury, Roadway Departure, Young Driver & Aggressive Driving Crashes.mxd



Crashes Involving Aggressive Driving

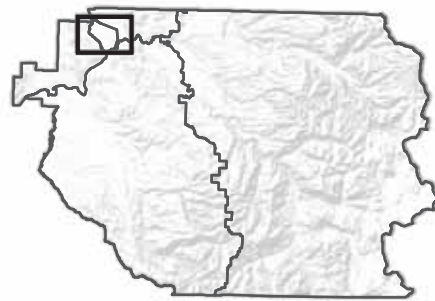
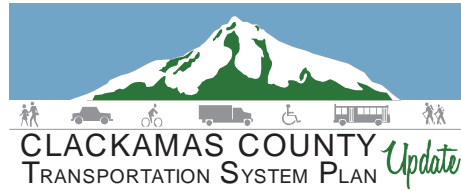
- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center,
Oregon Department of Transportation

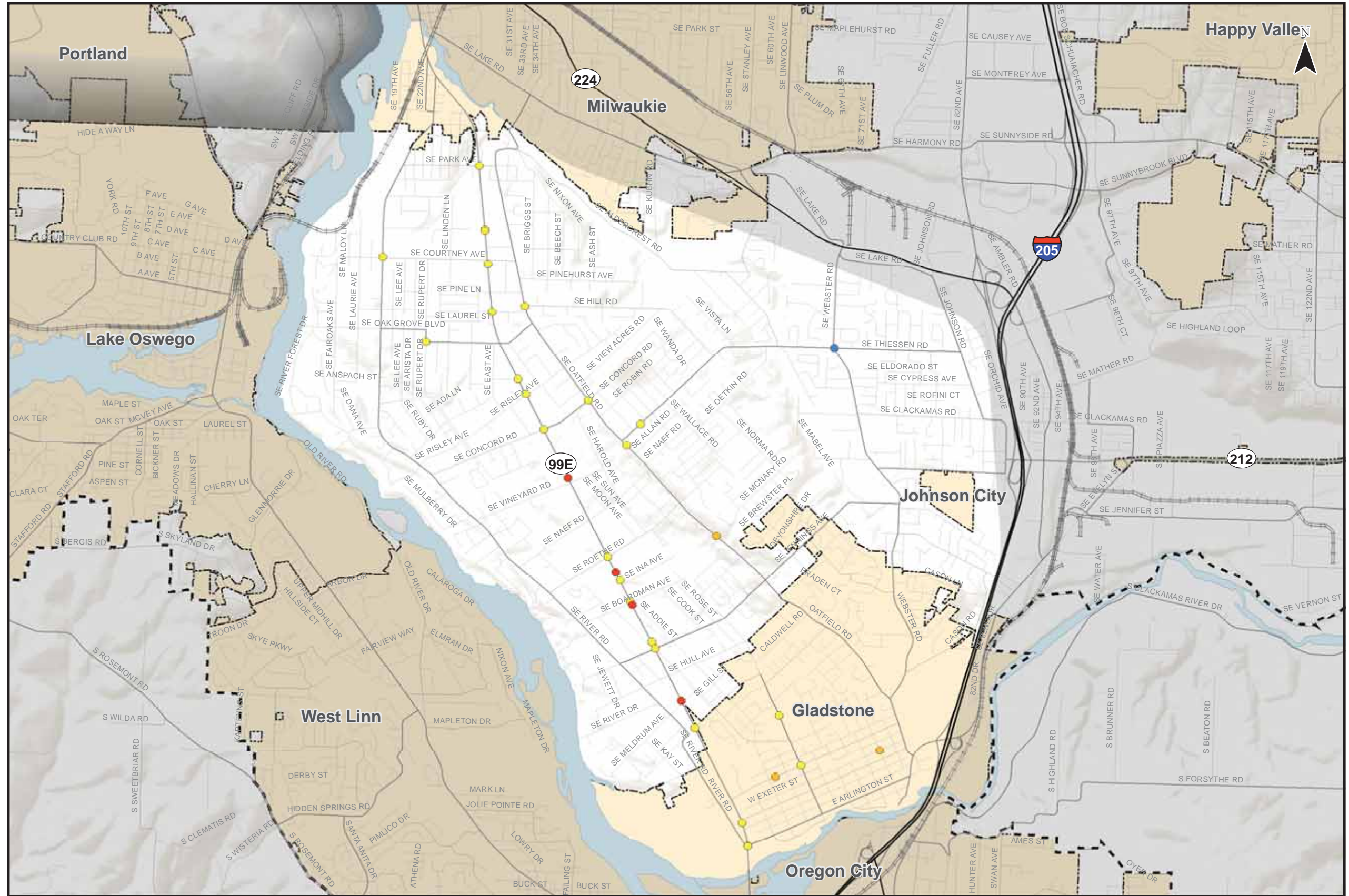
**Crashes Involving Aggressive Driving 2007-2010
Greater McLoughlin Area**

Figure
M 28



Crashes Involving Pedestrians

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB

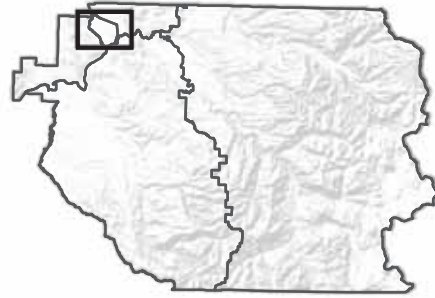
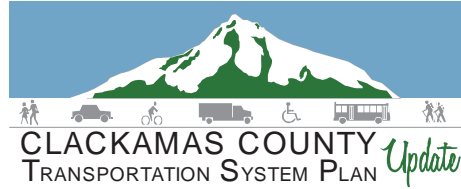


0 1
Miles

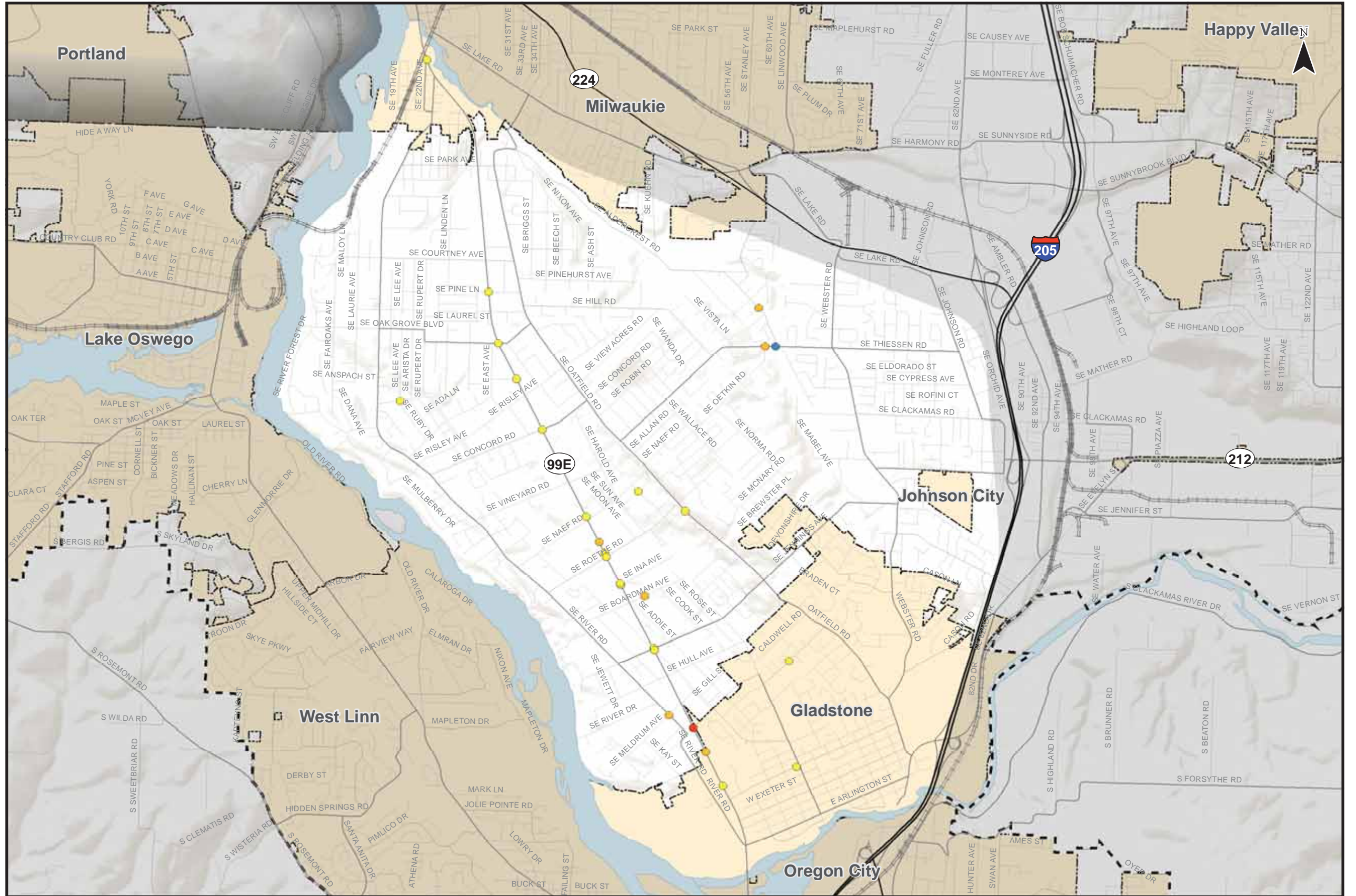
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center,
Oregon Department of Transportation

**Crashes Involving Pedestrians 2007-2010
Greater McLoughlin Area**

Figure
M 30



- Crashes Involving Bicycles**
- Fatal Crash
 - Serious Injury Crash
 - Minor Injury Crash
 - Property Damage Only Crash
- ▭ Incorporated Areas
- ▭ County Boundary
- ▭ UGB



0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center,
Oregon Department of Transportation

Crashes Involving Bicycles 2007-2010
Greater McLoughlin Area

Figure
M 31

H:\profile11732 - Clackamas County TSP\gis11x17 Maps\31 Crashes Involving Bicyclists.mxd

Specific Safety Focus Intersections

County staff identified a number of safety focus intersections. These intersections were flagged for one or more of the following reasons:

- Approaching roads are offset;
- Sight distance is limited at or on approach to the intersection;
- Intersecting roads are skewed (do not intersect at 90-degrees);
- Geometry of approaching roads are challenging for motorists; and/or
- Intersection geometry or lane configuration is unconventional.

The purpose of identifying these types of intersections is to proactively consider potential improvements in advance of the intersections appearing on the County’s priority location list discussed above. The basic characteristics noted above are some geometric features that may make the driving task more difficult and therefore increase the risk of crashes occurring. For example, the American Association of State Highway and Transportation Officials (AASHTO)’s *Highway Safety Manual* notes that skewed stop controlled intersections tend to experience more crashes than intersections with roads crossing at 90-degrees.²

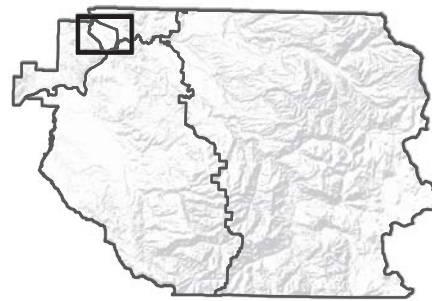
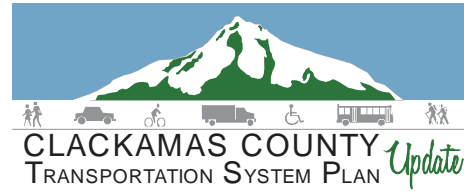
Figure M 32 illustrates the location of these intersections. Table M 9 summarizes the locations.

Table M 9 Safety Focus Intersections in the Greater McLoughlin Area

Major Road	Minor Road	Reason Identified	County Safety Priority Location?	Located on a Candidate Safety Corridor?
Clackamas	Johnson	Intersection Skew	No	No
Hill	View Acres	Intersection Skew and Sight Distance	No	No
Oatfield Rd	View Acres	Sight Distance	No	Yes
Oatfield Rd	Roethe Rd	County Safety Priority Location	Yes	Yes
Oatfield Rd	McNary	Frequency of Rear End Crashes	No	No
Oatfield Rd	Jennings	County Safety Priority Location	Yes	Yes
River Rd	Naef Rd	Sight Distance	No	No
Theissen Rd	Oetkin Rd	County Safety Priority Location	Yes	No

The list of safety focus intersections shown in Table M 9 supplements the County’s Safety Priority Locations and the Candidate road safety audit corridors discussed above. There is some minimal overlap between the safety focus intersections and the previous safety locations presented. Three of the safety focus intersections identified by the County are also part of the County Safety Priority Locations presented and discussed above. The remaining intersections listed are either skewed intersection and/or have limited sight distance. These are candidate intersections for proactive improvements to help reduce the likelihood of crashes. In a forthcoming Transportation System Plan update report, potential projects, programs, studies and/or policies to improve these locations will be discussed.

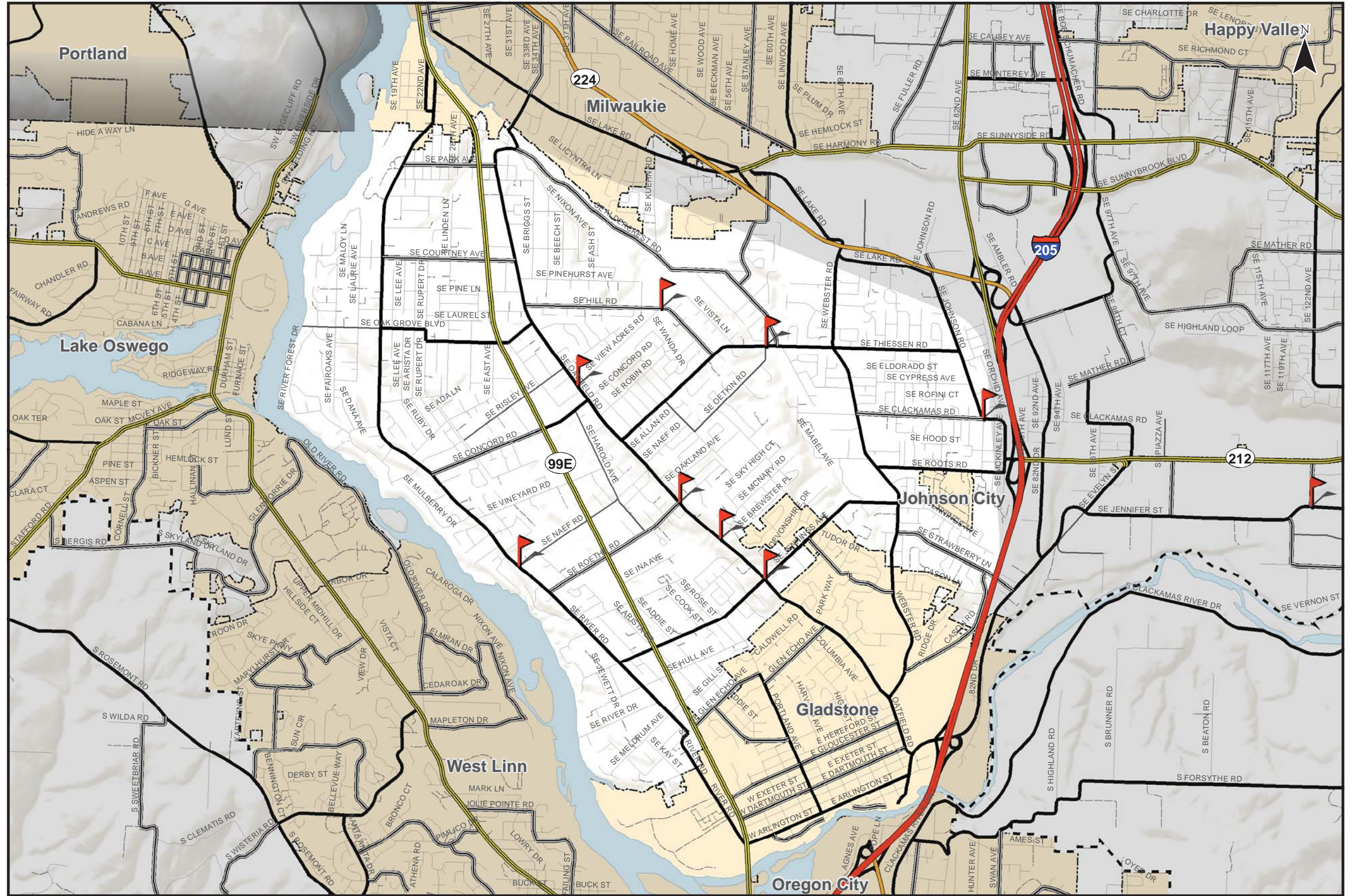
² AASHTO. *1st Edition of the Highway Safety Manual*. 2010. (See Volume 3, Part D, page 14-16).



Safety Focus Intersections

Functional Classifications

- Freeway
- Expressway
- Major Arterial
- Minor Arterial
- Collector
- Connector
- Local
- Forest Service Paved
- Forest Aggregate Road
- General dirt, road or trail
- Other
- Railroad
- Incorporated Areas
- County Boundary
- UGB



0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

**Safety Focus Intersections
Greater McLoughlin Area**

Figure
M 32

FUTURE BASE CONDITIONS – GREATER MCLOUGHLIN AREA

INTRODUCTION

This section summarizes the results of the future traffic conditions and analysis for the Greater McLoughlin Area. It evaluates the study intersections' performance in the year 2035 assuming growth and development occurs and some planned modifications are made to the transportation system. Two future base scenarios were analyzed:

1. **Low Build:** The low build scenario assumes that only planned transportation projects with funding currently allotted are completed.
2. **Full Build:** The full build scenario assumes that all transportation projects identified in the existing TSP planned before the year 2035 are completed.

The projects included in these scenarios will be further evaluated based on criteria and measures corresponding to the County's vision, goals and objectives in the next stage of the TSP Update. Additional new projects to address gaps and deficiencies in the transportation system will also be assessed in the alternatives analysis. The approach and methodology to the Future Base Conditions analysis is further described in *Section 3 Assumptions and Methods*. This section focuses on the results of the analysis in terms of intersection and roadway operations.

2035 LOW BUILD SCENARIO

The low build scenario assumes the completion of transportation projects identified in the existing Clackamas County TSP and Metro Regional Transportation Plan (RTP) with funding currently allotted. The purpose of the low build scenario is to identify intersections and roadways that will not meet standards in 2035 if only the currently funded transportation projects are completed. The analysis will also indicate which projects in the low build scenario help bring the operations on intersections and roadways up to standards.

The forecast traffic volumes, roadway cross-sections, and intersection configurations were adjusted to reflect this scenario, based on the low build capacity projects located in the Greater McLoughlin Area and mapped in Figure M 33. The projects that affect roadway or intersection capacity are listed and described in Table M 10.

Table M 10 Low Build Projects in the Greater McLoughlin Area

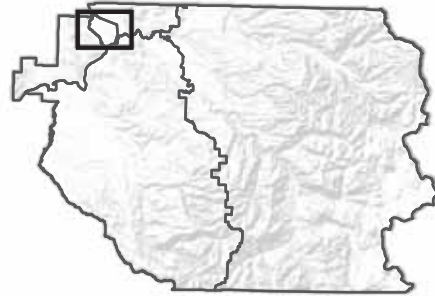
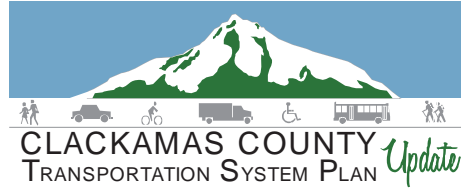
Project	ID	Location	Description
Oatfield Road	U141	Oatfield Road/Park Road intersection	Install traffic signal and turn lanes
Park Ave at OR 99E	U901	Park Ave at OR 99E intersection	Add turn lanes
Park & Ride #1	U902	Park & Ride #1 Station on SE Park Ave west of OR 99E	Create Park and Ride station, signal, turn lanes on EB and WB approaches

Study Intersection Analysis

Any uncompleted low build projects that affect lane configurations or traffic control at study intersections were accounted for and are noted in Figure M 34. The intersections of SE Park Avenue/OR 99E (202) and SE Park Avenue/SE Oatfield Road (203) are both impacted by projects. The operations at the study intersections were analyzed based on the traffic volumes forecast under the low build scenario and are illustrated in Table M 11 and Figure M 35. Signal timings were adjusted as appropriate to account for changes in the forecast traffic volumes. Intersections that do not meet standards are noted.

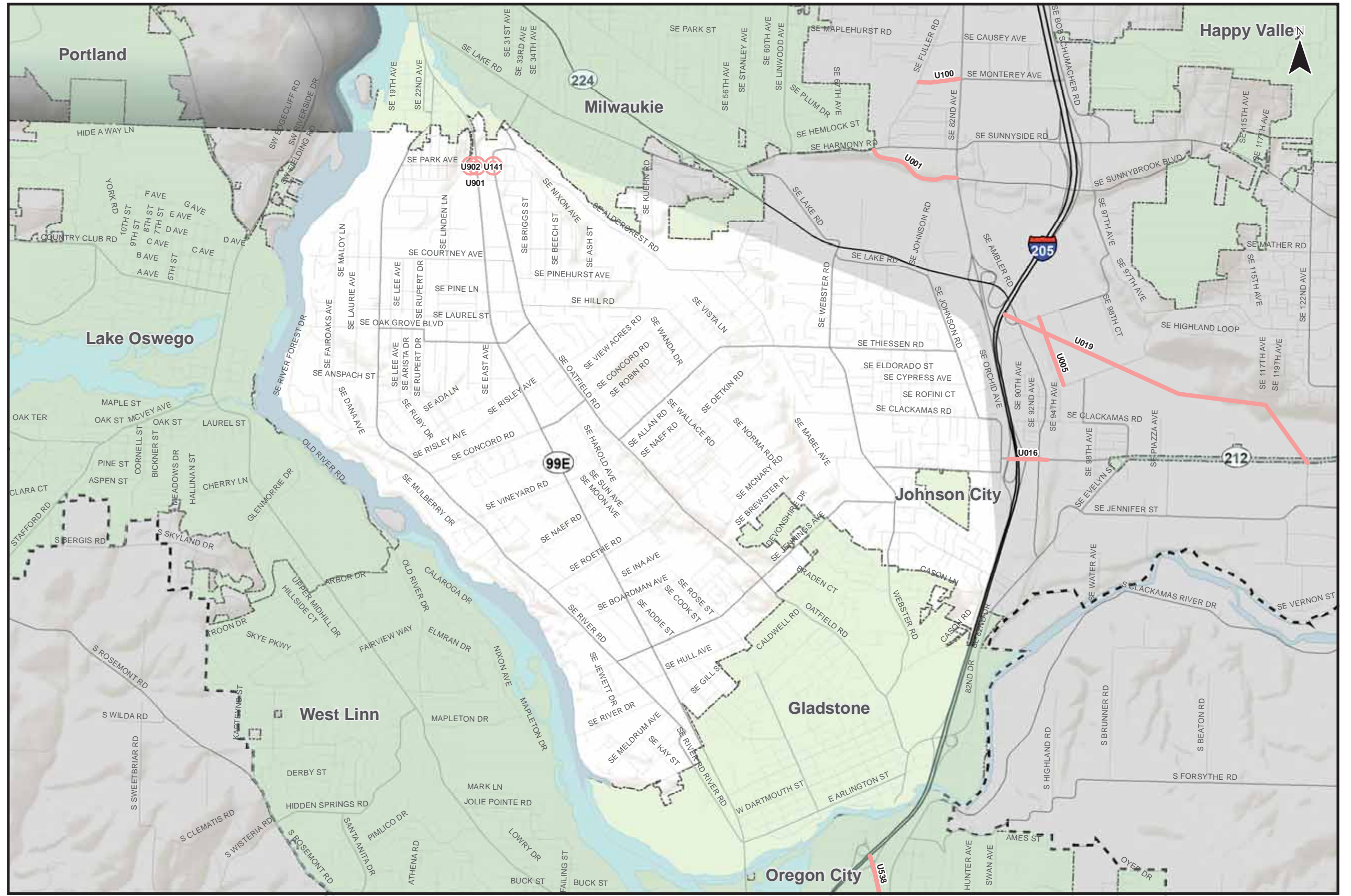
Table M 11 2035 Low Build Intersection Operations at Study Intersections in the Greater McLoughlin Area

ID	Intersection	Jurisdiction	Performance Standard	Meets Standard in Existing Conditions?	Low Build Project?	Meets Standard in 2035 Low Build?
201	SE Park Ave/SE River Rd	County	v/c = 0.99	Yes	No	Yes
202	SE Park Ave/OR 99E	ODOT	v/c = 1.1	Yes	Yes (U901)	Yes
203	SE Oatfield Rd/SE Park Ave	County	v/c = 0.99	Yes	Yes (U141)	Yes
204	SE Courtney Ave/SE River Rd	County	v/c = 0.99	Yes	No	Yes
205	SE Courtney Ave/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes
206	SE Courtney Ave/SE Oatfield Rd	County	v/c = 0.99	Yes	No	Yes
207	SE Oak Grove Blvd/SE Courtney Ave	County	v/c = 0.99	Yes	No	Yes
208	SE Oak Grove Blvd/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes
209	SE Hill Rd/SE Oatfield Rd	County	v/c = 0.99	Yes	No	Yes
210	SE Concord Rd/SE River Rd	County	v/c = 0.99	Yes	No	Yes
211	SE Concord Rd/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes
212	SE Oatfield Rd/SE Concord Rd	County	v/c = 0.99	Yes	No	Yes
213	SE Roethe Rd/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes
214	SE Jennings Ave/SE River Rd	County	v/c = 0.99	Yes	No	Yes
215	SE Jennings Ave/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes
216	SE Jennings Ave/SE Oatfield Rd	County	v/c = 0.99	Yes	No	Yes
217	SE Glen Echo Ave/SE River Rd	County	v/c = 0.99	Yes	No	Yes
218	SE Glen Echo Ave/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes
219	SE Thiessen Rd/SE Hill Rd	County	v/c = 0.99	Yes	No	No (v/c=1.30)
220	SE Thiessen Rd/SE Aldercrest Rd	County	v/c = 0.99	Yes	No	No (v/c=1.17)
221	SE Thiessen Rd/SE Webster Rd	County	v/c = 0.99	Yes	No	Yes
222	SE Thiessen Rd/SE Johnson Rd	County	v/c = 0.99	Yes	No	Yes
223	SE Roots Rd/SE Webster Rd	County	v/c = 0.99	Yes	No	No (v/c=1.21)
224	SE Jennings Ave/SE Webster Rd	County	v/c = 0.99	Yes	No	No (v/c=1.0)
225	SE Strawberry Lane/SE Webster Rd	County	v/c = 0.99	Yes	No	Yes



2035 Low Build Projects

- Intersection Projects
- Roadway Projects
- City
- Incorporated Areas
- County Boundary
- UGB



This figure displays the projects included in the 2035 Low Build Scenario. The 2035 Low Build Scenario assumes the transportation projects in the existing Clackamas County TSP and Metro Regional Transportation Plan (RTP) with funding currently allotted are completed by 2035. The purpose of the 2035 Low Build Scenario is to identify intersections and roadways that will not meet standards in 2035 if only the currently funded transportation projects are implemented.



Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resource Center

**2035 Low Build Projects
Greater McLoughlin Area**

Figure
M 33

H:\profile\11732 - Clackamas County TSP\figs\11x17 Maps\33 2035 Low Build Projects.mxd

As shown, four intersections do not meet standards in the low-build scenario, although all intersections operate acceptably under existing conditions.

- The SE Hill Road (219) and SE Aldercrest Road (220) intersections on SE Thiessen Road operate at volume-to-capacity ratios over 1.0.
- The SE Roots Road (223) and SE Jennings Avenue (224) intersections on SE Webster Road operate at volume-to-capacity ratios greater than the standards.

There are no capacity low build projects at any of these four intersections. *Appendix 8* contains detailed traffic operations analysis results.

Roadway Segment Analysis

The roadway segment operations analysis consists of considering the roadway segment volumes and approximate level of congestion based on a comparison of the volume to the segment capacity. *Section 3 Assumptions and Methods* provides additional details on the scope and approach to the analysis below.

Roadway Segment Volumes

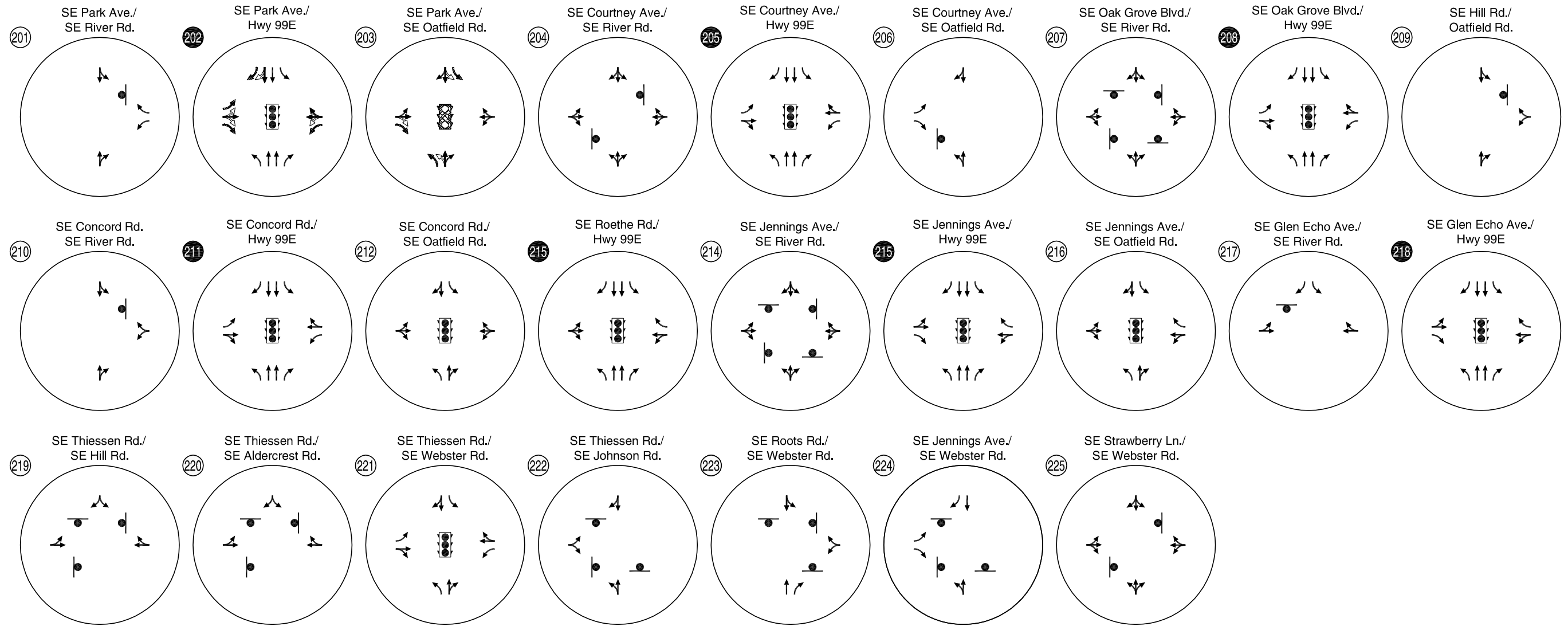
The roadway segment volumes provide a sense of the demand for travel on the roadways. Figure M 36 illustrates the roadway link volumes from the weekday evening peak hour for the 2035 Low Build Scenario.

As is evident from Figure M 36, under the 2035 Low Build Scenario demand for travel continues to be highest along OR 99E, Oatfield Road, Webster Road, SE Thiessen Road, and SE River Road.

Approximate Level of Congestion

The level of roadway segment congestion for the 2035 Low Build Scenario was estimated using the roadway segment volumes from the Metro model and the roadway segment capacity. The volume was compared to the capacity to calculate a volume-to-capacity ratio that is used to estimate level of congestion.

Figure M 37 illustrates the relative congestion during the 2035 Low Build weekday evening peak hour on roadways based on the estimated roadway segment volumes and capacity.



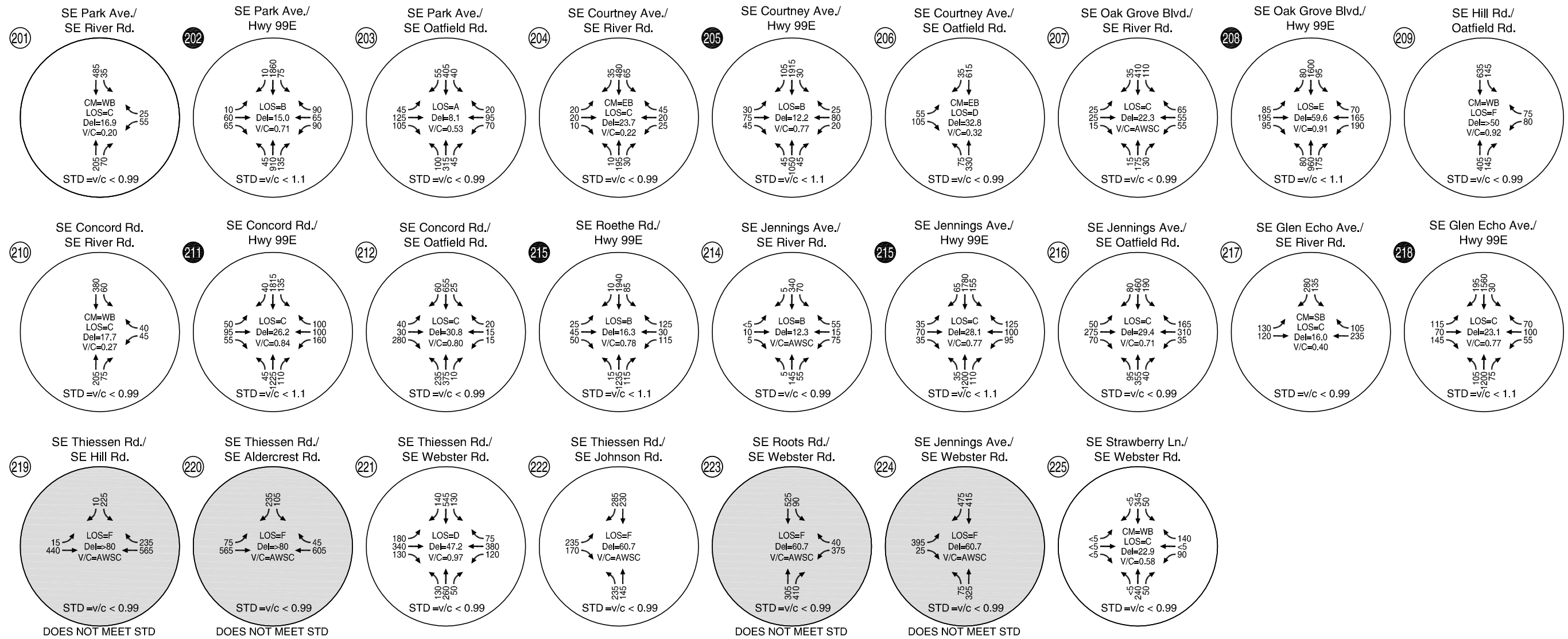
- ## - ODOT STUDY INTERSECTION
- ## - COUNTY STUDY INTERSECTION
- - STOP SIGN
- 🚦 - TRAFFIC SIGNAL
- 🔄 - ROUNDABOUT

- - LANE REMOVED
- - LANE ADDED

Low Build Lane Configuration and Traffic Control Devices Greater McLoughlin Area



**Figure
M 34**

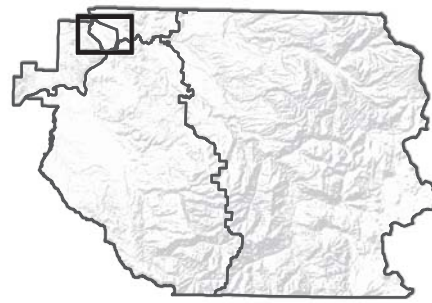
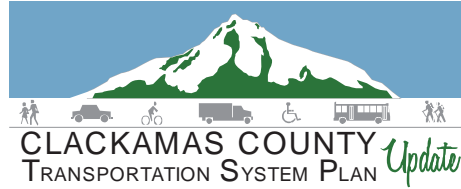


CM = CRITICAL MOVEMENT (UNSIGNALIZED)
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
 STD = OPERATIONAL STANDARD
 AWSC = ALL-WAY STOP CONTROL

Low Build Intersection Operations PM Peak Hour Greater McLoughlin Area

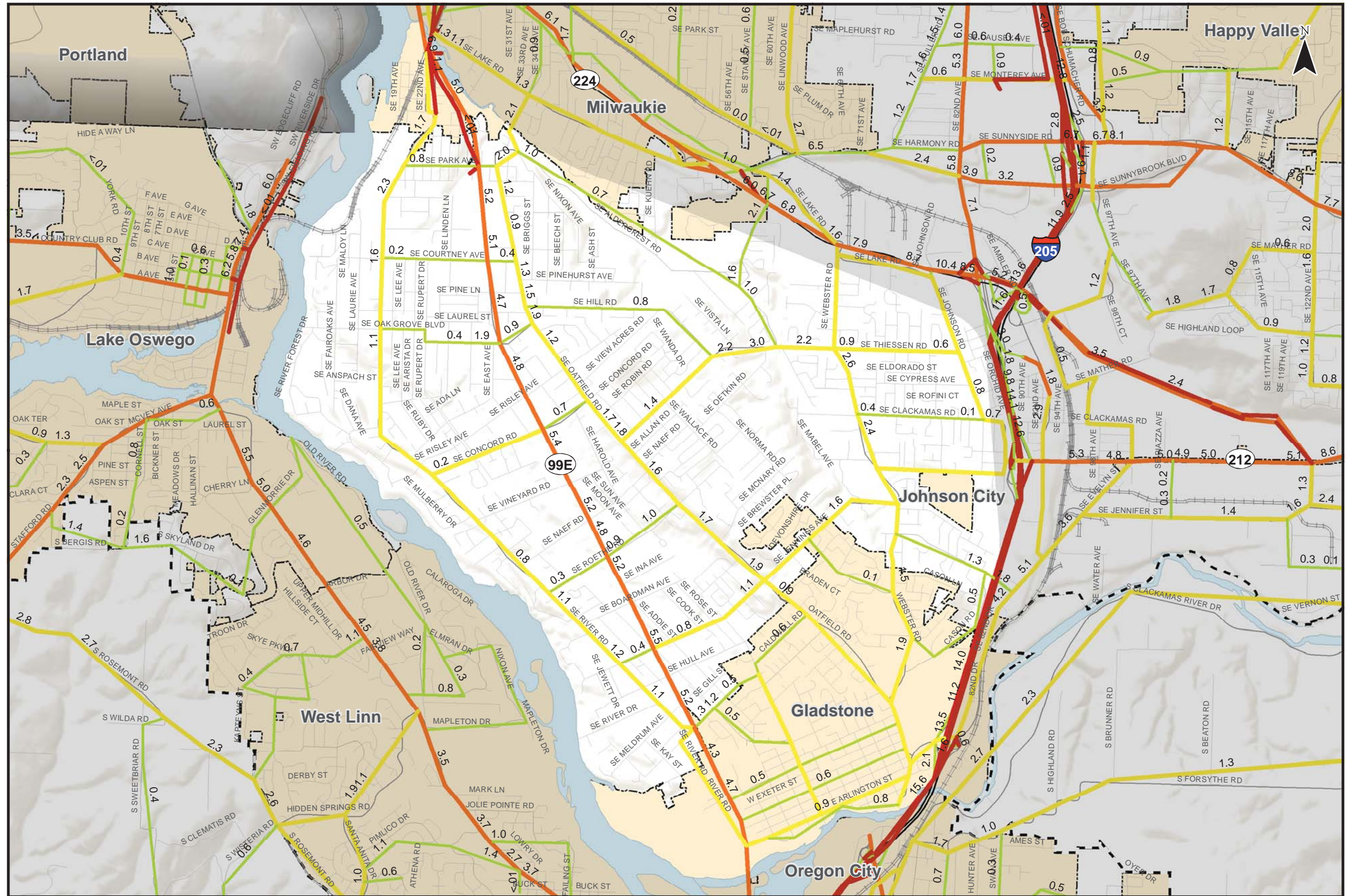


Figure
 M 35



2035 Low Build Volumes

- Freeway
- Principal / Major Arterial
- Minor Arterial
- Other
- ##** PM Weekday Traffic Volume in Thousands
- Incorporated Areas
- County Boundary
- UGB

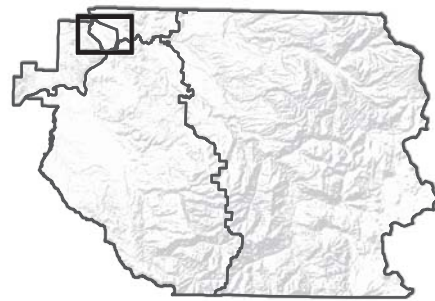
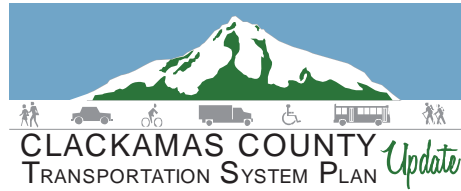


0 1 Miles

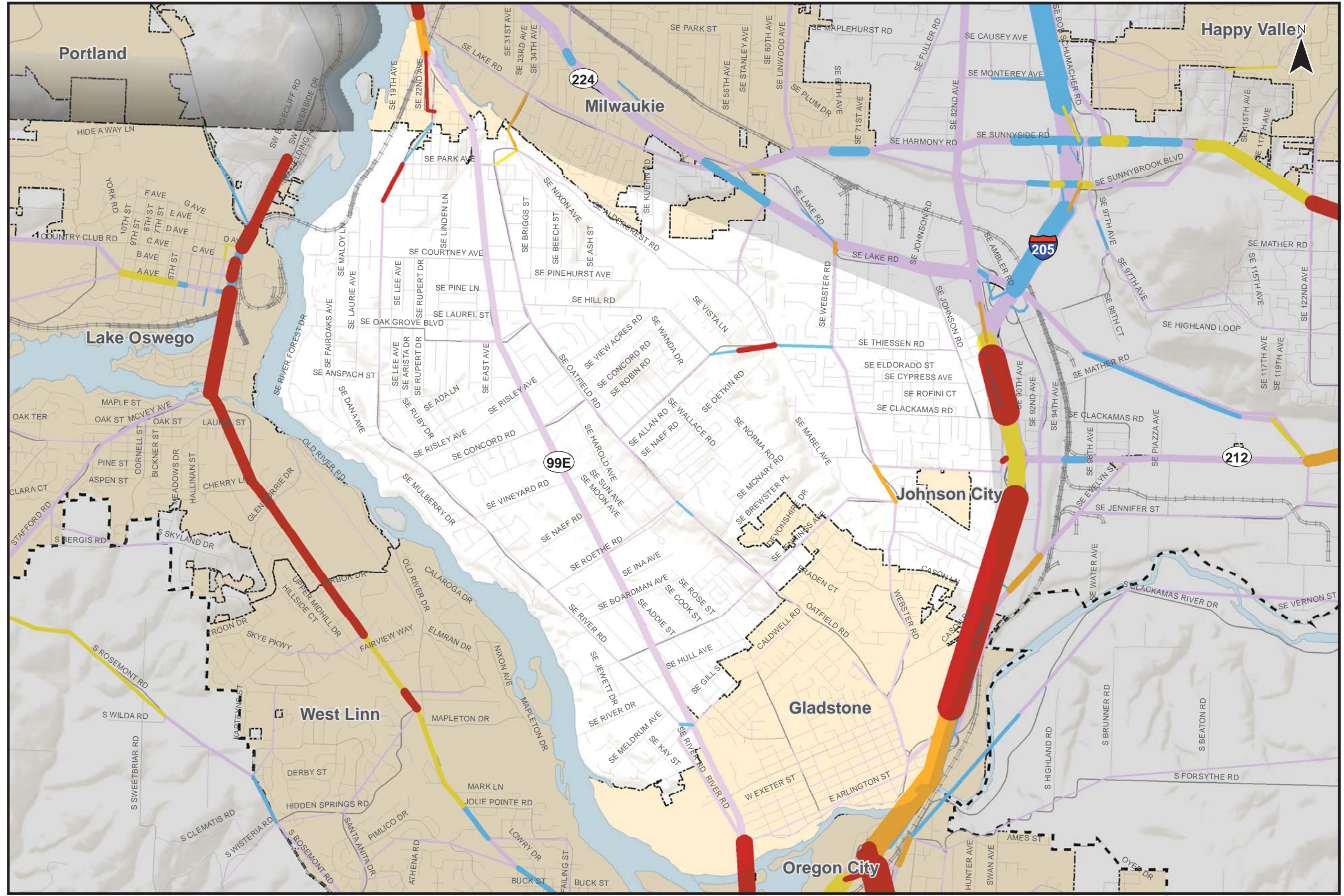
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Cambridge Systematics, Clackamas County,
Metro Data Resource Center

**Evening Weekday Peak Hour Link Volumes 2035 Low Build Scenario
Greater McLoughlin Area**

Figure
M 36



- Very Congested >1.10**
- 1,000 Vehicles
 - 5,000 Vehicles
 - 10,000 Vehicles
- Congested 1.0 - 1.1**
- 1,000 Vehicles
 - 5,000 Vehicles
 - 10,000 Vehicles
- Some Congestion 0.9 - 1.0**
- 1,000 Vehicles
 - 5,000 Vehicles
 - 10,000 Vehicles
- Nearing Congestion 0.8 - 0.9**
- 1,000 Vehicles
 - 5,000 Vehicles
 - 10,000 Vehicles
- Less Congested <0.8**
- 100 Vehicles
 - 1,000 Vehicles
 - 10,000 Vehicles
- Incorporated Areas
 - County Boundary
 - UGB



**Evening Weekday Peak Hour Roadway Segment Congestion 2035 Low Build Scenario
Greater McLoughlin Area**

Figure
M 37

0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Cambridge Systematics, Clackamas County,
Metro Data Resource Center

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\37 Evening Weekday Peak Hour Roadway Segment Congestion 2035 Low Build Scenario.mxd

As can be seen in Figure M 37, under the 2035 Low Build Scenario northern portions of SE River Road begin to experience increased congestion relative to existing conditions. Similarly, congestion is estimated to increase along portions of Thiessen Road west of Webster Road. A relatively short segment along Webster Road south of SE Roots Road is expected to experience some congestion. The largest increase in congestion is estimated to take place at the bridge at the southern end of OR 99E in the study area. In existing conditions this segment was shown as nearing congestion and under the 2035 Low Build Scenario it is shown as very congested. Table M 12 lists the roadway segments that have volume-to-capacity ratios over 0.8 and describes the level of congestion as nearing congestion, some congestion, congested, or very congested.

Table M 12 2035 Low Build Roadway Segment Congestion in Greater McLoughlin Area

Roadway	Segment	Level of Congestion
SE River Rd	SE Torbank Rd to SE Lark St	Nearing Congestion to Very Congested
SE Oatfield Rd	SE Park Ave to SE Lake Road	Some Congestion to Congested
SE Thiessen Rd	SE Hill Rd to SE Webster Rd	Nearing Congestion to Very Congested
SE Webster Rd	SE Jennings Ave to SE Roots Rd	Congested
SE Oatfield Rd	SE Corey Ln to SE Roethe Rd	Nearing Congestion
OR 99E	E Arlington St to South border of subarea	Very Congested

2035 FULL BUILD SCENARIO

The full build scenario includes all of the existing planned projects in the County’s current TSP and the Metro RTP. The purpose of analyzing the full build scenario is to determine how transportation projects that are currently planned will improve future traffic operations. This will help identify which projects are necessary to address roadway and intersection operations that are below standard and which projects are located on facilities that are forecast to perform above standards. In addition, the full build analysis will identify intersections and roadways that do not meet standards even with planned transportation projects.

The forecast traffic volumes, roadway cross-sections, and intersection configurations were adjusted based on projects in the full build scenario that affect roadway or intersection capacity, such as the addition of turn lanes or roadway widening. The capacity full build projects are mapped in Figure M 38 and listed and described in Table M 13. There are several planned intersection and roadway projects, most involving reconstructing and widening rural roadways to three lanes to meet standards.

Table M 13 Full Build Projects in the Greater McLoughlin Area

Project	ID	Location	Description
Oatfield Road*	U141	Oatfield Road/Park Road intersection	Install traffic signal and turn lanes
Park Ave at OR 99E*	U901	Park Ave at OR 99E	Add turn lanes
Park & Ride #1*	U902	Park & Ride #1 Station on SE Park Ave west of OR 99E	Create Park and Ride station, signal, turn lanes on EB and WB approaches
Webster Road	U004	Webster/Jennings and Roots intersection	Construct traffic signals, turn lanes
River Road	U137	Milwaukie to Gladstone	Reconstruct and widen (urban) (3 lanes)
River Road	U139	River Road/Concord Road intersection	Install traffic signal and left-turn lanes
Concord Road	U140	River Road to Oatfield Road	Reconstruct and widen (urban) (3 lanes)

Project	ID	Location	Description
Oatfield Road	U143	Oatfield Road/Hill Road intersection	Install left-turn lanes, install signal if warranted
Oatfield Road	U144	Oatfield Road/Concord Road intersection	Widen, add turn lanes
Oatfield Road	U145	Oatfield Road/McNary Road intersection	Add turn lanes
Aldercrest Drive	U146	Thiessen Road to Oatfield Road	Reconstruct and widen (urban) (3 lanes)
Thiessen Road	U148	Thiessen Road/Hill Road intersection	Widen, add left-turn lane on Thiessen Road
Jennings Road	U149	Oatfield Road to Webster Road	Reconstruct and widen (3 lanes)
Webster Road	U150	OR 224 to Gladstone City limits	Widen to 3 lanes and conduct OR 224 corridor study
Webster Road	U152	Webster/Strawberry Lane intersection	Install traffic signal, left-turn lanes
Johnson Road/McKinley Road	U154	Lake Road to I-205	Reconstruct and widen (urban) (3 lanes)

* Project also included in Low Build Scenario.

Study Intersection Analysis

The operations at the study intersections that do not meet standards under the low build scenario were analyzed under the full build scenario using traffic volumes projected under the full build scenario. Figure M 39 illustrates the lane configurations and traffic control devices at the study intersections. The intersections that meet standards under the low build analysis were not analyzed under the full build scenario.

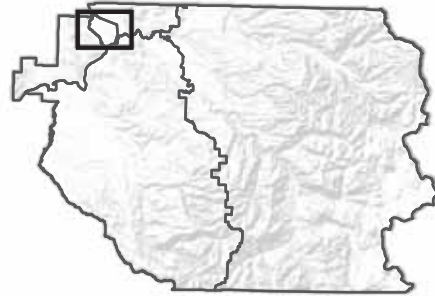
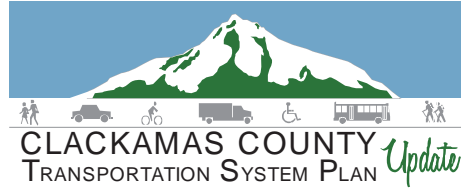
The intersection operation results are shown in Table M 14 and Figure M 40, with intersections that do not meet standards noted. Any full build projects that affect lane configurations at study intersections were accounted for and are noted in the figure and table as well. Signal timings were adjusted as appropriate to account for changes in the forecast traffic volumes. Intersections that do not meet standards are noted.

Table M 14 2035 Full Build Intersection Operations at Study Intersections in Greater McLoughlin Area

ID	Intersection	Jurisdiction	Performance Standard	Meets Standard in 2035 Low Build?	Full Build Project?	Meets Standard in 2035 Full Build?
219	SE Thiessen Rd/SE Hill Rd	County	v/c = 0.99	No	Yes (U148)	No (v/c=1.28)
220	SE Thiessen Rd/SE Aldercrest Rd	County	v/c = 0.99	No	Yes (U146)	No (v/c=1.17)
223	SE Roots Rd/SE Webster Rd	County	v/c = 0.99	No	Yes (U004)	Yes
224	SE Jennings Ave/SE Webster Rd	County	v/c = 0.99	No	Yes(U149)	No (v/c=1.23)

As seen in the table, three of the four intersections that do not meet standards under the low build scenario continue to not meet standards under the full build scenario. Although the intersections of SE Thiessen Road/SE Hill Road (219), SE Thiessen Road/SE Aldercrest (220), and SE Jennings Avenue/SE Webster Road (224) are all impacted by widening projects in the full build scenario, none meet standards in the full build scenario. All three intersections are all-way stop-controlled and operating at volume-to-capacity ratios between 1.17 and 1.28.

The intersection of SE Roots Road/SE Webster Road (223) is signalized in the full build scenario, which improves operations so that the intersections operate within standards. *Appendix 8* contains detailed traffic operations analysis results.

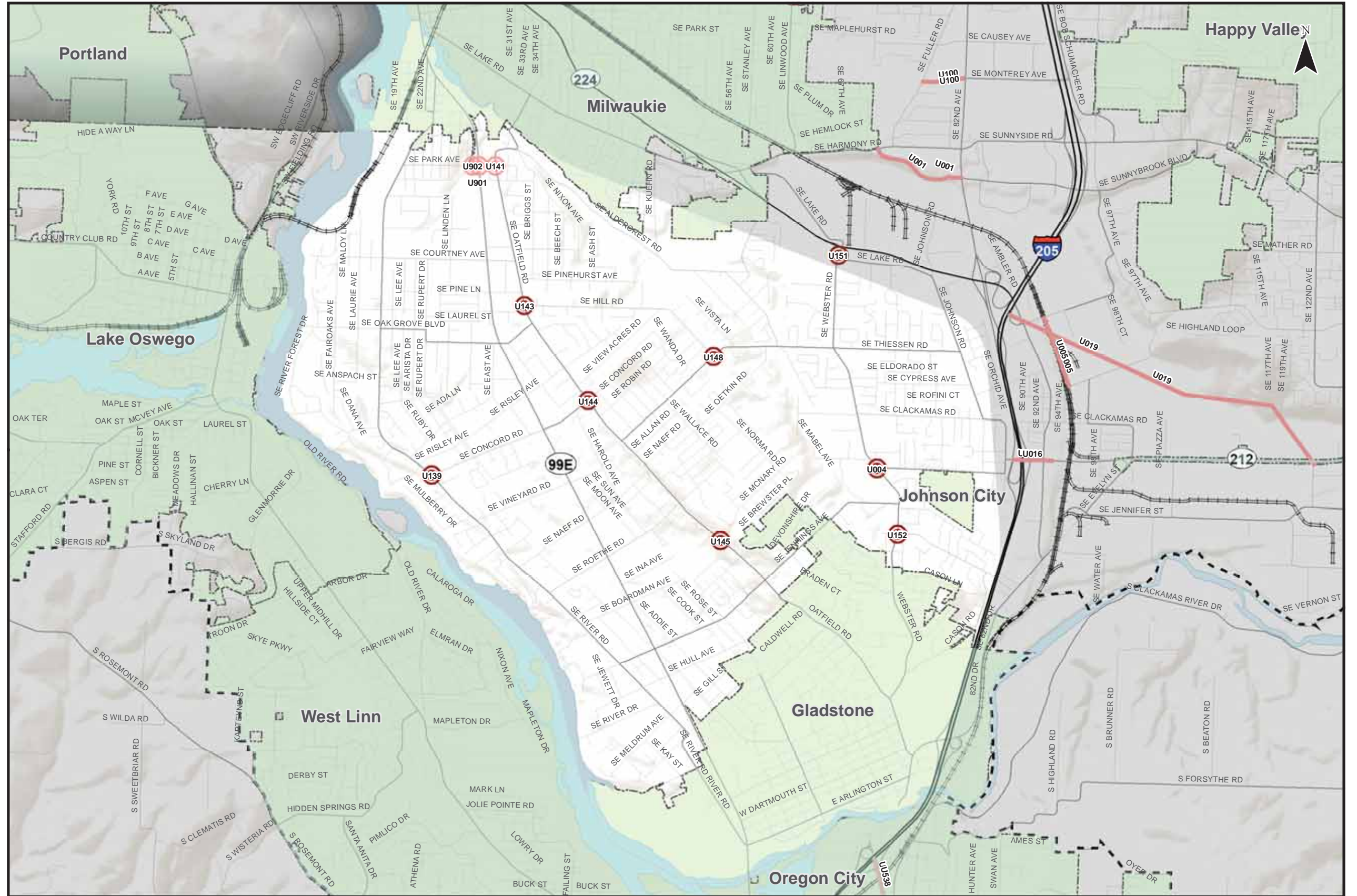


2035 Low Build Projects

- Intersection Projects
- Roadway Projects

2035 Full Build Projects

- Intersection Projects
- Roadway Projects
- City
- Incorporated Areas
- County Boundary
- UGB



This figure displays the projects included in the 2035 Full Build Scenario. The 2035 Full Build Scenario includes the existing planned projects in the County's current TSP and the Metro RTP. The purpose of analyzing the Full Build Scenario is to determine how transportation projects that are currently planned will improve future traffic operations. This will help identify which projects are necessary to address roadway and intersection operations that are below standard and which projects are located on facilities that are forecasted to perform above standards.



Coordinate System:
 NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
 Data Source:
 Clackamas County, Metro Data Resouce Center

**2035 Full Build Projects
 Greater McLoughlin Area**

Figure
M 38



NOTE: THE FULL BUILD ANALYSIS WAS ONLY CONDUCTED ON THE INTERSECTIONS THAT DID NOT MEET STANDARDS IN THE LOW BUILD ANALYSIS

- ## - ODOT STUDY INTERSECTION
- ## - COUNTY STUDY INTERSECTION
- - STOP SIGN
- ⬆️ - TRAFFIC SIGNAL
- ⦿ - ROUNDABOUT
- ⇨ - LANE REMOVED
- ➔ - LANE ADDED

Full Build Lane Configuration and Traffic Control Devices Greater McLoughlin Area



**Figure
M 39**

H:\profile\11732 - Clackamas County TSP\dwg\figs\11732AnalysisIntersections_FullBuild.dwg Jul 05, 2012 - 6:01pm - klausen Layout Tab: B_Config



NOTE: THE FULL BUILD ANALYSIS WAS ONLY CONDUCTED ON THE INTERSECTIONS THAT DID NOT MEET STANDARDS IN THE LOW BUILD ANALYSIS

- CM = CRITICAL MOVEMENT (UNSIGNALIZED)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
- Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- STD = OPERATIONAL STANDARD
- AWSC = ALL-WAY STOP CONTROL

Full Build Intersection Operations PM Peak Hour Greater McLoughlin Area



**Figure
M 40**

H:\profile\11732 - Clackamas County TSP\dwg\figs\11732AnalysisIntersections_FullBuild.dwg Jul 05, 2012 - 6:01pm - klausen Layout Tab: B_Ops

Roadway Segment Analysis

The roadway segment operations analysis consists of considering the roadway segment volumes and approximate level of congestion based on a comparison of the volume to the segment capacity. *Section 3 Assumptions and Methods* provides additional details on the scope and approach to the analysis below.

Roadway Segment Volumes

The roadway segment volumes provide a sense of the demand for travel on the roadways. Figure M 41 illustrates the roadway link volumes from the weekday evening peak hour for the 2035 Full Build Scenario.

As is evident from Figure M 41, under the 2035 Full Build Scenario demand for travel continues to be highest along OR 99E, Oatfield Road, Webster Road, SE Thiessen Road, and SE River Road.

Approximate Level of Congestion

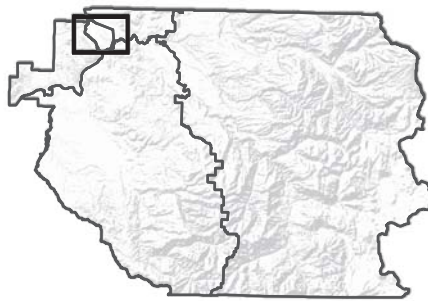
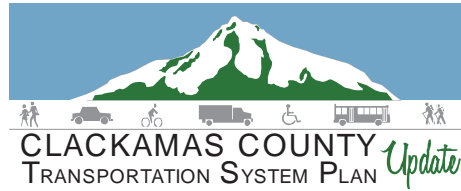
The level of congestion experienced on roadway segments was estimated using the roadway segment volumes from the Metro model and the roadway segment capacity. The volume was compared to the capacity to calculate a volume-to-capacity ratio that is used to estimate level of congestion.

Figure M 42 illustrates the relative congestion during the 2035 Full Build weekday evening peak hour on roadways based on the estimated roadway segment volumes and capacity.

As can be seen in Figure M 42, under the 2035 Full Build Scenario many of the same segments estimated to experience congestion in the 2035 Low Build Scenario continue to experience some level of congestion in the 2035 Full Build Scenario. The primary difference is a lower degree of congestion on portions of SE River Road and at the southern end of OR 99E within the study area. Table M 15 lists the roadway segments that have volume-to-capacity ratios over 0.8 and describes the level of congestion as nearing congestion, some congestion, congested, or very congested.

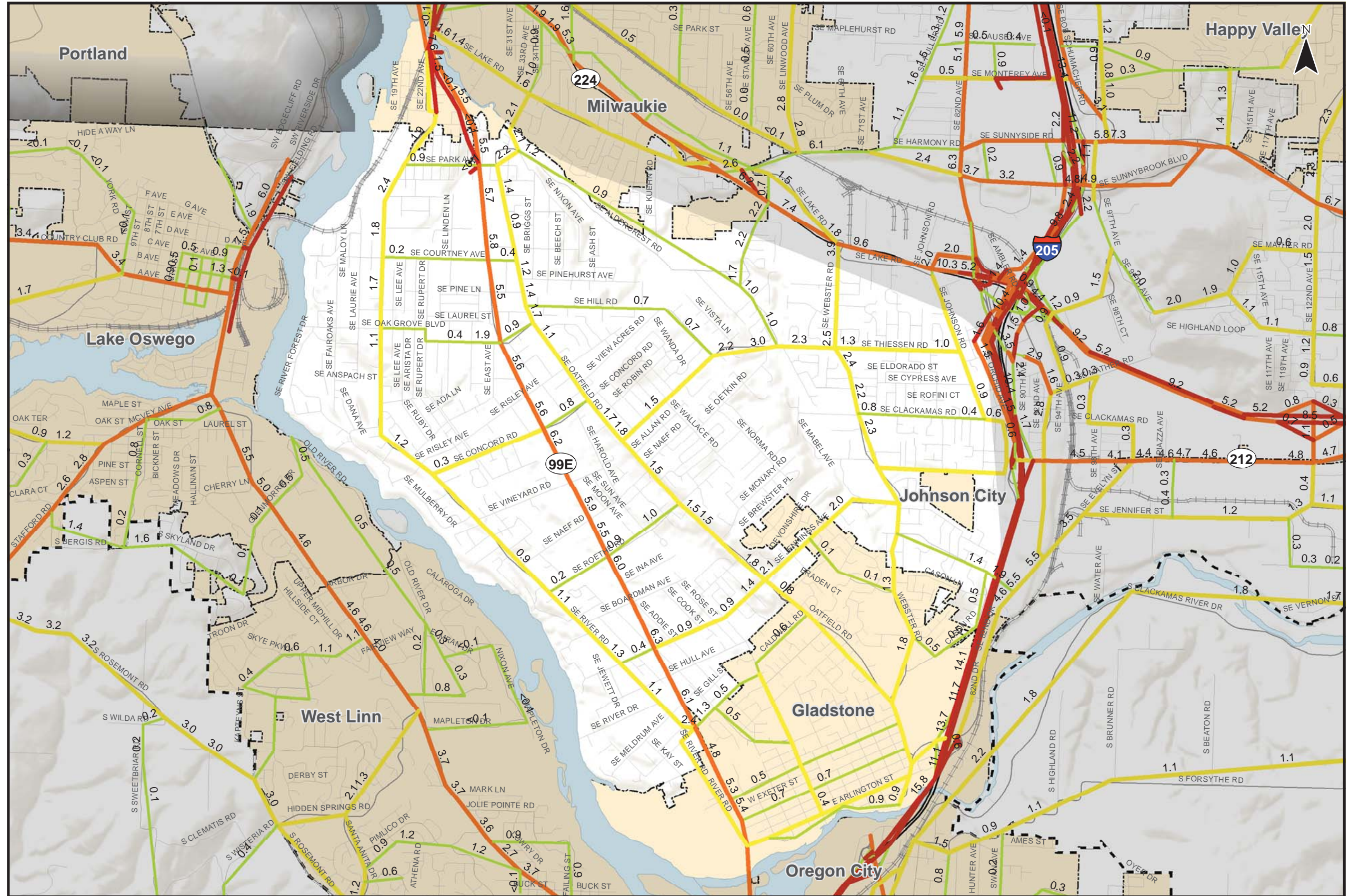
Table M 15 2035 Full Build Roadway Segment Congestion in Greater McLoughlin Area

Roadway	Segment	Level of Congestion
SE River Rd	SE Silver Springs Rd to SE Park Ave	Nearing Congestion
SE Oatfield Rd	SE Park Ave to SE Lake Road	Nearing Congestion to Some Congestion
SE Thiessen Rd	SE Hill Rd to SE Webster Rd	Nearing Congestion to Very Congested
SE Webster Rd	SE Jennings Ave to SE Roots Rd SE Wilshire St to SE Lake Rd	Congested to Very Congested
OR 99E	E Arlington St to South	Some Congestion



2035 Full Build Volumes

- Freeway
- Principal / Major Arterial
- Minor Arterial
- Other
- ##** PM Weekday Traffic Volume in Thousands
- Incorporated Areas
- County Boundary
- UGB

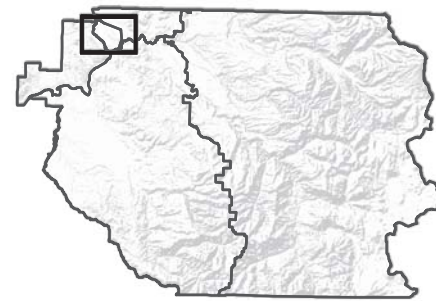
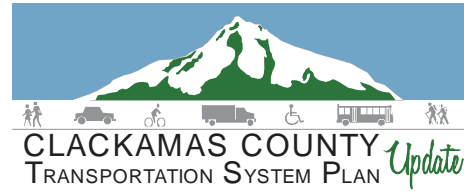


0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Cambridge Systematics, Clackamas County,
Metro Data Resource Center

**Evening Weekday Peak Hour Roadway Segment Volumes 2035 Full Build
Greater McLoughlin Area**

Figure
M 41



Very Congested >1.10

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Congested 1.0 - 1.1

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Some Congestion 0.9 - 1.0

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Nearing Congestion 0.8 - 0.9

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

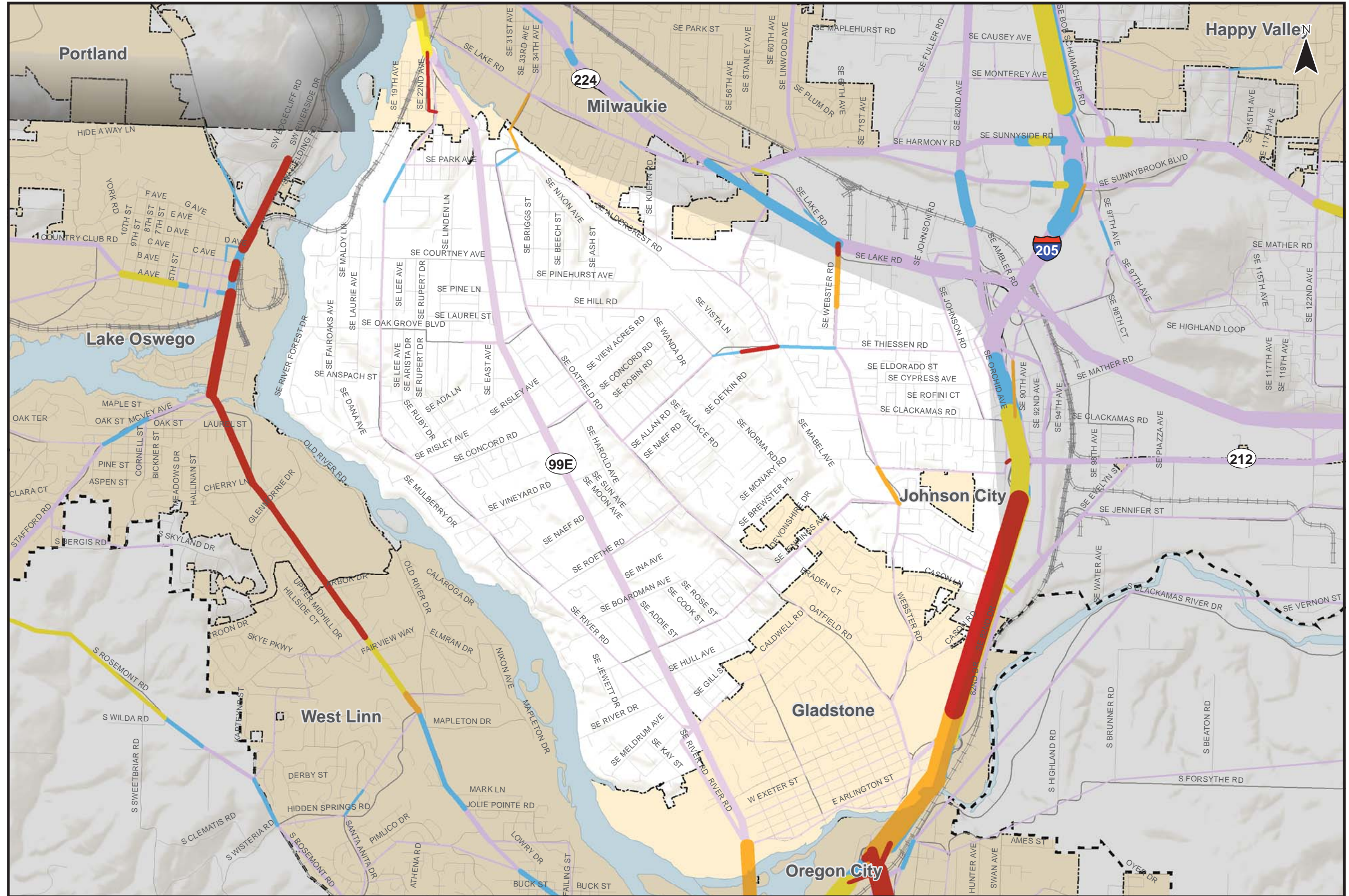
Less Congested <0.8

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

- Incorporated Areas
- County Boundary
- UGB

0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Cambridge Systematics, Clackamas County,
Metro Data Resource Center



**Evening Weekday Peak Hour Roadway Segment Congestion 2035 Full Build
Greater McLoughlin Area**

Figure
M 42

H:\profile11732 - Clackamas County TSP\gis11x17 Maps42 Evening Weekday Peak Hour Roadway Segment Congestion 2035 Full Build Scenario.mxd

COMPARISON OF EXISTING, 2035 LOW BUILD, AND 2035 FULL BUILD ANALYSIS RESULTS

Traffic volumes are forecast to increase noticeably in the Greater McLoughlin Area. The increase in traffic volumes is more significant on Oregon 99E than on county facilities. There are very few transportation projects planned and financed under the low build scenario. The full build scenario includes several roadway and intersection projects, mainly reconstructing and widening roadways, signaling intersections, and adding turn lanes.

Intersection Operations Analysis

Table M 16 compares the intersection operation results for the existing, 2035 low build, and 2035 full build scenarios. The table also notes intersections that are impacted by low build and full build projects. As seen in the table, the intersections of SE Thiessen Road/SE Hill Road (219), Thiessen Road/SE Aldercrest Road (220), and SE Jennings Avenue/SE Webster Road (223) do not meet standards under any of the scenarios, although full build projects are planned at all three locations.

Table M 16 Comparison of Traffic Operations Analysis Results at Study Intersections in the Greater McLoughlin Area

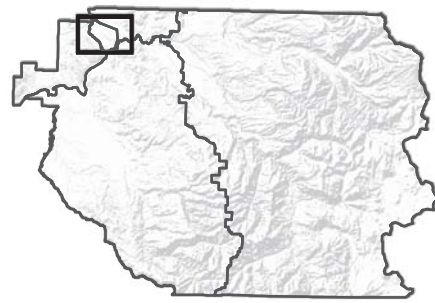
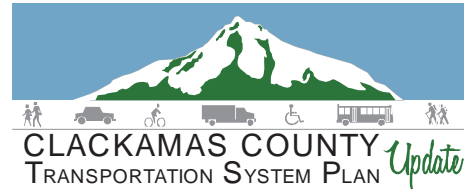
ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?	Full Build Project?	Meets Standard in 2035 Full Build?
201	SE Park Ave/SE River Rd	County	v/c = 0.99	Yes	No	Yes	-	-
202	SE Park Ave/OR 99E	ODOT	v/c = 1.1	Yes	Yes	Yes	-	-
203	SE Oatfield Rd/SE Park Ave	County	v/c = 0.99	Yes	Yes	Yes	-	-
204	SE Courtney Ave/SE River Rd	County	v/c = 0.99	Yes	No	Yes	-	-
205	SE Courtney Ave/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes	-	-
206	SE Courtney Ave/SE Oatfield Rd	County	v/c = 0.99	Yes	No	Yes	-	-
207	SE Oak Grove Blvd/SE Courtney Ave	County	v/c = 0.99	Yes	No	Yes	-	-
208	SE Oak Grove Blvd/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes	-	-
209	SE Hill Rd/SE Oatfield Rd	County	v/c = 0.99	Yes	No	Yes	-	-
210	SE Concord Rd/SE River Rd	County	v/c = 0.99	Yes	No	Yes	-	-
211	SE Concord Rd/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes	-	-
212	SE Oatfield Rd/SE Concord Rd	County	v/c = 0.99	Yes	No	Yes	-	-
213	SE Roethe Rd/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes	-	-
214	SE Jennings Ave/SE River Rd	County	v/c = 0.99	Yes	No	Yes	-	-
215	SE Jennings Ave/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes	-	-
216	SE Jennings Ave/SE Oatfield Rd	County	v/c = 0.99	Yes	No	Yes	-	-
217	SE Glen Echo Ave/SE River Rd	County	v/c = 0.99	Yes	No	Yes	-	-
218	SE Glen Echo Ave/OR 99E	ODOT	v/c = 1.1	Yes	No	Yes	-	-
219	SE Thiessen Rd/SE Hill Rd	County	v/c = 0.99	Yes	No	No	Yes	No
220	SE Thiessen Rd/SE Aldercrest Rd	County	v/c = 0.99	Yes	No	No	Yes	No
221	SE Thiessen Rd/SE Webster Rd	County	v/c = 0.99	Yes	No	Yes	-	-
222	SE Thiessen Rd/SE Johnson Rd	County	v/c = 0.99	Yes	No	Yes	-	-
223	SE Roots Rd/SE Webster Rd	County	v/c = 0.99	Yes	No	No	Yes	Yes

ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?	Full Build Project?	Meets Standard in 2035 Full Build?
224	SE Jennings Ave/SE Webster Rd	County	v/c = 0.99	Yes	No	No	Yes	No
225	SE Strawberry Lane/SE Webster Rd	County	v/c = 0.99	Yes	No	Yes	-	-

Roadway Segment Operations Comparison

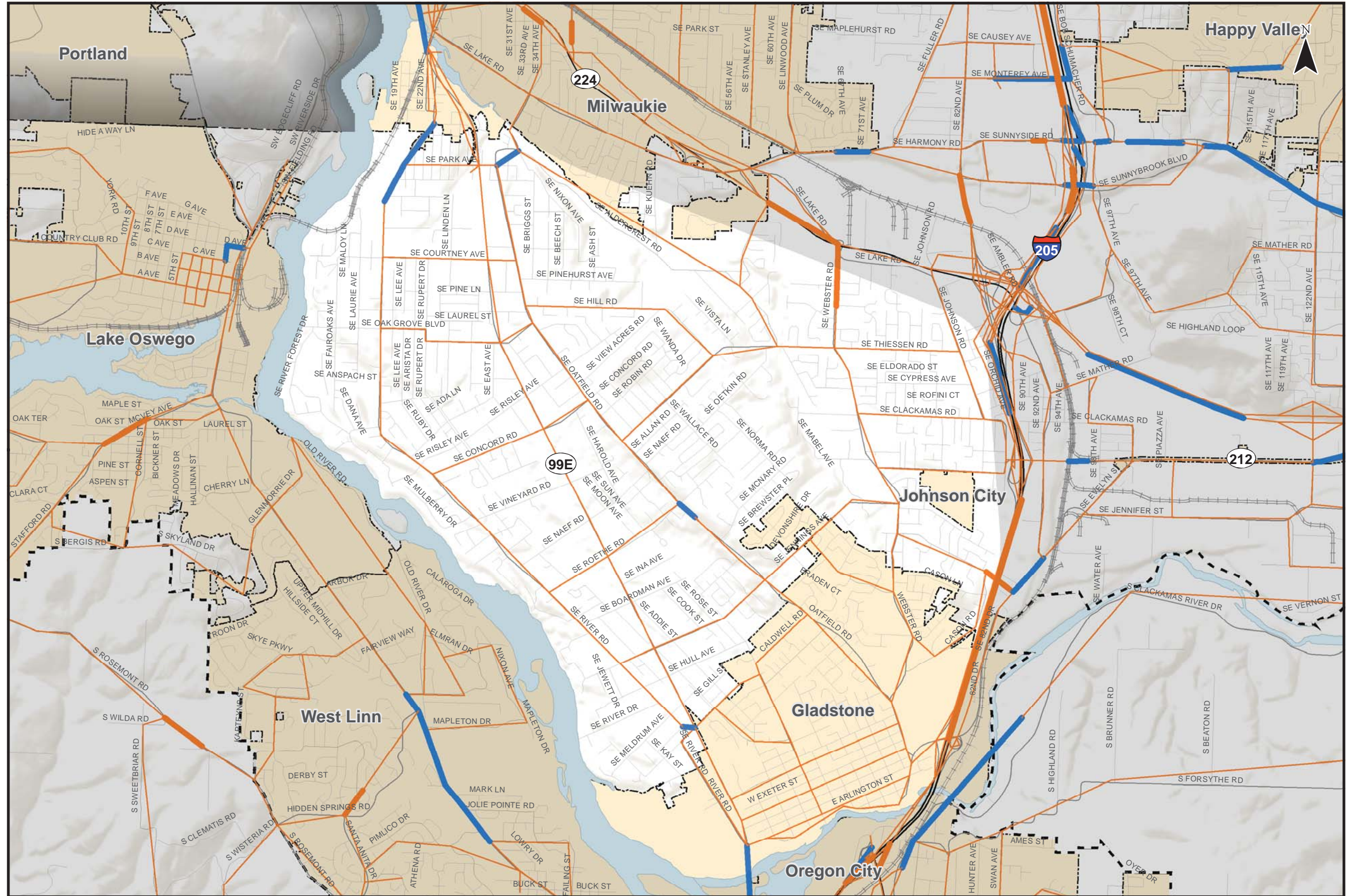
Figure M 43 compares the approximate change in congestion between the 2035 Low Build Scenario and 2035 Full Build Scenario.

As shown in Figure M 43, implementing the full build projects decreases congestion (relative to the low build scenario) on relatively short portions of SE River Road and Oatfield Road. Congestion is also estimated to increase on a relatively short segment of Webster Road. Overall, the level of congestion on the vast majority of roadways does not change between the 2035 Low Build and 2035 Full Build scenarios. The roadway capacity projects included in the Low Build and Full Build scenarios will be further evaluated based on criteria and measures corresponding to the County’s vision, goals and objectives in the next stage of the TSP Update. Additional new projects to address roadway deficiencies will also be assessed in the alternatives analysis.



Change in Congestion
Low to Full Build

- Congestion Increases
- Minimal Change
- Congestion Decreases
- Incorporated Areas
- County Boundary
- UGB



Evening Weekday Peak Hour Roadway Segment Congestion Comparison of 2035 Low Build vs. 2035 Full Build Greater McLoughlin Area

Figure
M 43

0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Cambridge Systematics, Clackamas County,
Metro Data Resource Center

H:\profile11732 - Clackamas County TSP\gis11x17 Maps\M3 Evening Weekday Peak Hour Roadway Segment Congestion Comparison of 2035 Low Build vs. mxd