Appendix B Existing and Future Conditions Memo

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TECHNICAL MEMORANDUM #2

Multnomah County Comprehensive Plan Update

Existing and Future Transportation Conditions

Date: June 9, 2015 Project #: 17944

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From: Susan Wright, PE, and Jenny Miner

cc: Matt Hastie, Angelo Planning Group

Multnomah County is currently updating their Comprehensive Plan, including the transportation element for rural areas. Today, the Comprehensive Plan is supported by separate Transportation System Plans (TSPs) for the Rural Westside, and West of Sandy River areas (taking into account the West Hills, Sauvie Island, and West of Sandy River Area Plans) and, the transportation components of the East of Sandy River Area Plan and the Columbia River Gorge Scenic Area Management Plan. The updated Multnomah County TSP will incorporate relevant elements from all of these plans into one document.

This memorandum provides an inventory and assessment of existing and future conditions of the transportation system in the unincorporated rural areas of Multnomah County. This information can provide a baseline for the TSP update, and was assembled using Geographic Information System (GIS) files, data provided by Multnomah County, inventory conducted using Google Earth aerial images, field observations, and studies provided or produced by Multnomah County and the Oregon Department of Transportation (ODOT).

The information contained in this memorandum is organized into a series of sections, listed below.

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The majority of the inventory and analysis results are presented in figures and tabular form with supplemental text provided, as needed, to further explain the illustrated information. The identified transportation needs contained herein are based on the County and ODOT's adopted performance measures. Based on information summarized in this memorandum, a series of policies, projects, programs, pilot projects and refinement studies will be identified to support the transportation system over the next twenty years.

EXISTING CONDITIONS

The following section describes the population, demographics, and land uses within the rural areas (herein referred to as the "study area"), and provides an overview of the existing inventory and conditions (if applicable) for all transportation modes and major elements of the transportation system.

STUDY AREA

The Transportation System Plan (TSP) focuses on the five rural areas of the county, including West Hills, Sauvie Island, West of Sandy River, East of Sandy River, and Columbia River Gorge National Scenic Area. The study area for the TSP is illustrated in Figures 1A and 1B.

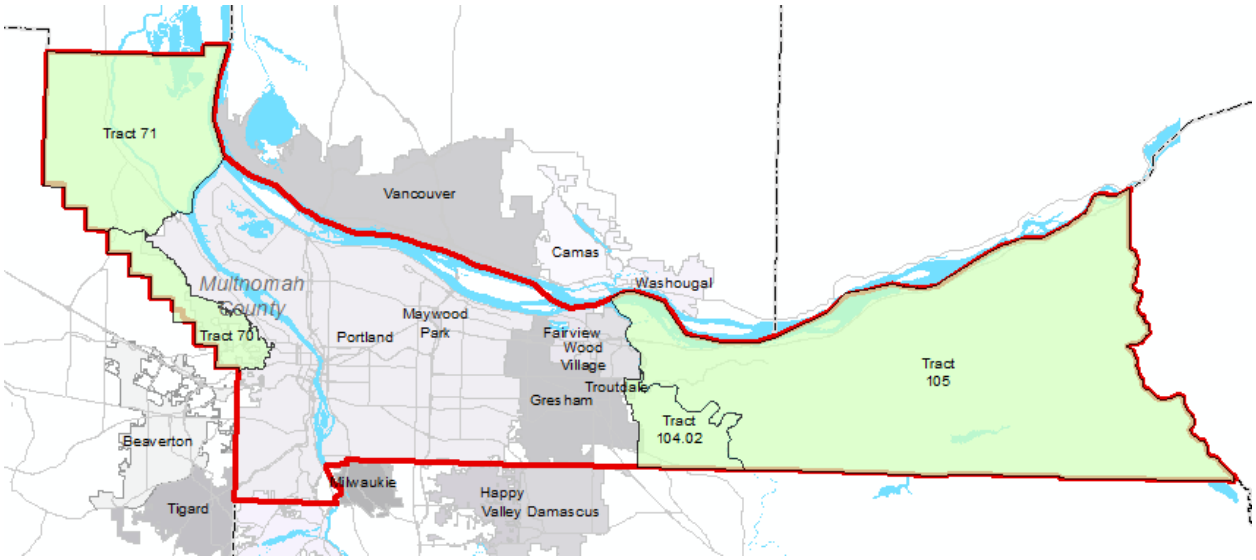
The Sauvie Island and Multnomah Channel (SIMC) TSP is being completed separately and in congruence with this TSP update. The SIMC area will still be included in this evaluation.

POPULATION AND DEMOGRAPHICS

Information about the rural area population and demographics was gathered to support the existing and future conditions analysis, particularly as the project team works with the community to develop future alternative scenarios that capture the County's vision. This data presented is based on the best available information that can be obtained from US Census, given that the Census Block boundaries don't perfectly align with the study areas and some information is not available. Given these

inconsistencies, this memo refers to the study areas as West Multnomah County and Eastern Multnomah County in some sections. West Multnomah County consists of Census Tracts 70 and 71 and the areas of Sauvie Island and West Hills. East Multnomah County consists of Census Tracts 104.02 and 105 and the areas of East of Sandy River and West of Sandy River. Exhibit 1 shows the study area census tracts.

Exhibit 1 Study Area Census Tracts (70, 71, 104.02, and 105)



For further information on land use and population, please see the "Population Demographics, Zoning, and Development" section of the Baseline Report memo prepared for the Comprehensive Plan Update by Angelo Planning Group dated December, 2014.

Population and Growth

Table 1 reports the population of Multnomah County and its sub-areas. Multnomah County's population in 2010 was just over 735,000 whereas the 2000 Census figure was 660,446. The county grew by 11.3%, or about 1.08% per year, from 2000 to 2010. This growth follows a similar trend to that experienced by the overall State of Oregon, which grew by 11.97%, or about 1.14% per year, during the same period.

Table 1 Year 2010 Area Populations

Area	2010 Census
Multnomah County	735,334
East of Sandy River	3,926
West of Sandy River	10,184
West Hills	10,052
Sauvie Island	888

Source: 2010 Census Block Group Data

Table 2 reports the population growth in the rural areas of the County. In comparison to the County as a whole, the rural areas grew at a higher rate from 2000 to 2010. While the growth in the rural areas do not represent a significant change in total population of the County as a whole, the rate of growth is relatively high for a rural area in Oregon, particularly compared to other rural parts of the state.

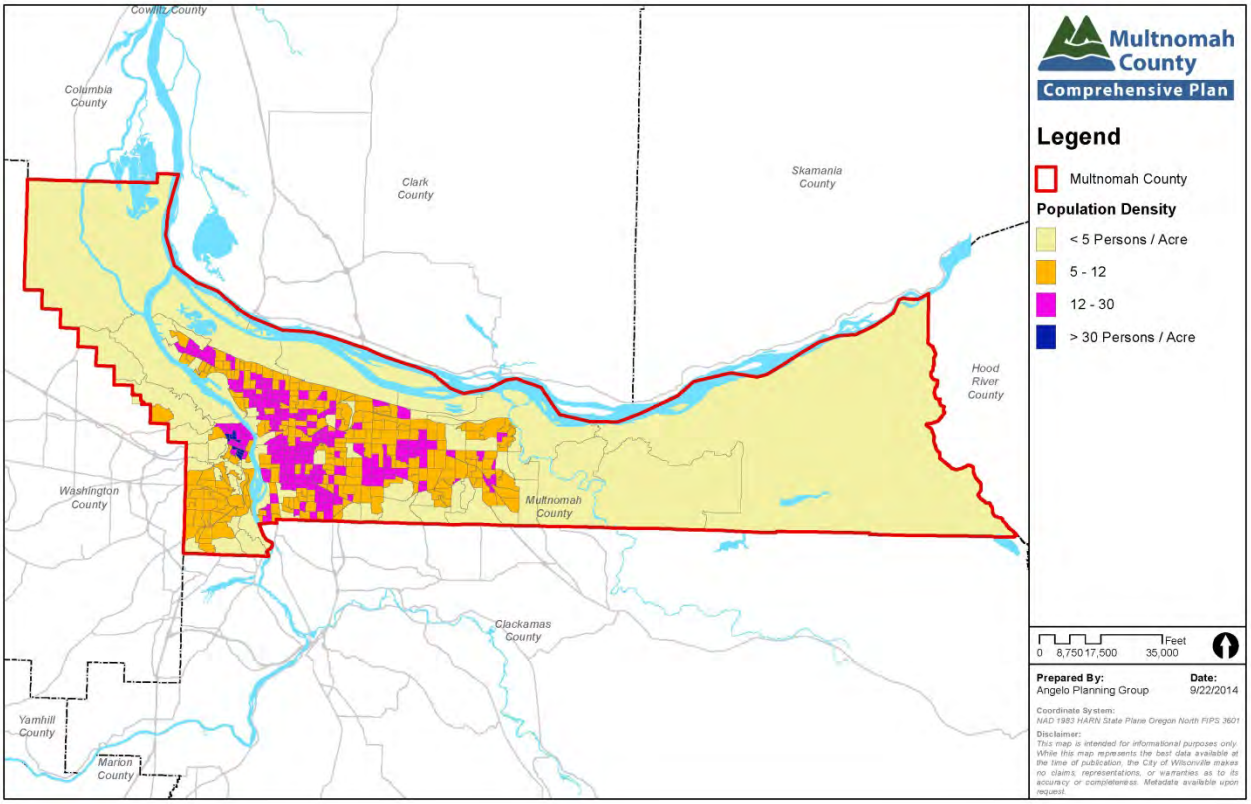
Table 2 Change in Population from 2000 to 2010 Census

Area	2000	2010	% Change	Average Annual Growth	Population Density***
Multnomah County	660,486	735,334	11.3%	1.08%	2.47 People/Acre
West Multnomah County*	7,963	10,940	37%	3.2%	0.25 People/Acre
East Multnomah County**	8,668	10,061	16%	1.5%	0.11 People/Acre
State of Oregon	3,421,399	3,831,074	11.9%	1.14%	--

*Includes Sauvie Island and West Hills subareas
**Includes East of Sandy River and West of Sandy River subareas
***Calculated as 2010 population / total acres within Census Block Groups
Source: 2000 and 2010 Census Tract Level Data

In addition to growth rates, Table 2 also reflects the 2010 estimates of people per acre within the County. This information is graphically represented in Exhibit 2 and Figures 2A and 2B by Census Block group.

Exhibit 2 Population Density Map



Family and Household Data

Table 3 reports the number and type of households by area. A family household is defined by the US Census Bureau as "a group of two or more people related by birth, marriage, or adoption and residing together." Approximately 53% of households meet this definition within Multnomah County. With the exception of Sauvie Island, which has about 57% family households, the rural areas of Multnomah County have higher than a 70% family household rate. The state as a whole has a family household rate of about 63%.

Multnomah County and the State of Oregon have similar median ages within the households with 35.7 and 38.4, respectively. The rural areas report a higher median age, in the range of 40 to 45, with the exception of Sauvie Island that has a median age of 50.

Table 3 Household Demographics

	East of Sandy River	West of Sandy River	West Hills	Sauvie Island	Multnomah County	State of Oregon
Number of Households	1,433 (100%)	3,573 (100%)	3,938 (100%)	410 (100%)	304,540 (100%)	1,518,938 (100%)
Family Households	1,063 (74.2%)	2831 (79.2%)	2,832 (71.9%)	233 (56.8%)	163,539 (53.7%)	963,467 (63.4%)
Nonfamily Households	370 (25.8%)	742 (20.8%)	1,106 (28.1%)	177 (43.2%)	141,001 (46.3%)	555,471 (36.6%)
Mean Household Size	2.65	2.85	2.56	2.14	2.35	2.47
Median Age	44.8	40.1	43.9	50	35.7	38.4

Economic Characteristics

Table 4 describes selected economic characteristics of the study area. The rural areas of the county have a higher median household income than the county as a whole. West County generally has a higher income, lower unemployment rate, and lower poverty rate than East County or Multnomah County as a whole, particularly Tract 70, which approximates the West Hills rural plan area. Due to the small sample size, however, margins of error are fairly high.

Table 4 Economic Characteristics

	West County		East County		Multnomah County
	Tract 70	Tract 71	Tract 104.2	Tract 105	--
Median Household Income	$148,832 (+/- $19,429)	$78,894 (+/-$14,306)	$76,630 (+/-$9,464)	$65,938 (+/-$10,090)	$51,582 (+/-$739)
Unemployed	7.4% (+/-2.8%)	6.1% +/-4.3%)	14.8% (+/-6.5%)	12.1% (+/-6.1%)	10.4% (+/-0.4%)
Individuals below poverty level in past 12 months	4.5% (+/-3.8%)	3.4% (+/-2.8%)	9.7% (+/-2.8%)	13.4% (+/-%7.3%)	17.1% (+/-0.6%)

LAND USE AND ZONING

This section describes the zoning designations, land use, parcel size, and vacancy status in each of the plan subareas. Figures 3A and 3B depict the zoning designations.

As shown, the majority of the rural areas of Multnomah County are zoned for agricultural and forest uses. Rural residential and single family residential make up most of the rest of the lands with little commercial and industrial development in the rural areas.

The East of Sandy River Rural Area is generally characterized by natural and commercial timber forests, much of which is within the Mt. Hood National Forest. The western-most portion of this Rural Area contains the most of the non-forest uses in the area, mainly consisting of agricultural, rural residential and rural service development.

The West of Sandy River Rural Area's predominant land uses in the plan area are nurseries, berry farms, and pastures, consistent with the agricultural zoning. The area is located in two major drainage basins, the Sandy River and the Willamette River via Johnson Creek. The area is open to urban influence to a greater degree than the other plan areas due to a lack of physical barriers, such as the steeper topography of West Hills, and the limited access to Sauvie Island and the East of Sandy River area.

Pleasant Valley and Interlachen are small unincorporated areas located due west of Columbia River Gorge National Scenic Area and West of Sandy River study areas, respectively. The Pleasant Valley subarea is under County zoning but lies within the urban growth boundary and is being planned by Gresham for eventual annexation into the City. The majority of the land in this area is currently zoned for rural residential use.

Interlachen is a small residential community located between Fairview Lake and Blue Lake and is surrounded by the City of Fairview. It is zoned entirely Urban Low Density Residential and largely built out.

The Columbia River Gorge National Scenic Area is zoned primarily for forest uses.

The West Hills Rural Area Plan is zoned for commercial forest use or exclusive farm use; lands zoned for rural residential use represents about a tenth of the total.

The Sauvie Island and Multnomah Channel Rural Area is zoned primarily for agricultural uses. Land Uses on the Island are predominantly farming-related (due to the fine soils on the island protected by the levees of the Sauvie Island Drainage District) as well as the wildlife refuge, various water-related uses on and along Multnomah Channel, ranging from protected wetlands to marinas, and recreational uses (due to proximity to the Portland Metropolitan Area). The rural area encompasses approximately 15,400 acres of land and several thousand additional acres of water. Approximately 11,800 of the 15,400 acres are designated in the Comprehensive Framework Plan as Exclusive Farm Use, with the remainder designated as Multiple Use Agriculture.

Key Destinations and Community Centers

Figures 4A and 4B show the key destinations and community centers in the rural areas that are likely origins and destinations for pedestrian, bicycle, and vehicle trips. As shown, many of the key destinations and community centers in the rural areas are schools. Others which are more likely to be accessed via vehicle include National Parks and public recreational areas. Sauvie Island has public beaches as well as farm lands that attract visitors with corn mazes, pumpkin patches, and fresh produce for sale. East County has a number of key destinations in National Forest, National Scenic Area and State parks including but not limited to recreation areas in the Mount Hood National Forest, Sandy River Delta Park, Multnomah Falls, Mt. Hood National Forest, and the Columbia River Gorge Scenic Area.

STREET SYSTEM AND TRAFFIC ANALYSIS

Primary roadway facilities, their characteristics, and existing operational performance are summarized below for each of the study areas.

Street System Overview

The following sections describe the key attributes of the roadways within the study area.

Roadway Jurisdiction

As shown in Figures 5A and 5B, the majority of the roads in the rural areas are under the County's or local jurisdiction. The state facilities within Multnomah County provide interstate, statewide, and regional connectivity. These facilities include Interstate 84 (I-84), Oregon Highway 30 (US 30), and a small section of Oregon Highway 26 (US 26). Highway 30 provides access to both the west and east sides of the county. I-84 serves the east area of the county.

Pavement Conditions

Figures 6A and B illustrate the pavement condition ratings for each of the roadways in the study area. The roadways are rated are based on a pavement conditions index from 0 and 100, with 100 representing the best possible condition and 0 representing the worst possible condition. The County's goal is to maintain pavement conditions at 70 or above but accepts 50 and above for rural roadways. As shown in the figures, the majority of the roadways in the study area are rated at 50 or above. The areas not meeting the standard of 50 or above are primarily located in the West of Sandy River area as well as the West Hills.

Functional Classification

Functional classification systems are used to establish a hierarchy of roadways based on their primary function (e.g., moving people across regions or providing access to local destinations). These

classification levels are identified by ODOT for state facilities, the County for County facilities, and local agencies for their own classification levels within their community. The classification levels also determine the recommended roadway cross-section for different facilities. The functional classification of roadways that Multnomah County established is based on the following hierarchy:

Minor Arterials represent the lowest order arterial facility in the regional street network. They typically carry less traffic volume then principal and major arterials, but have a high degree of connectivity between communities. Access management may be implemented to preserve traffic capacity. Land uses along the corridor are a mixture of community and regional activities. Minor arterial streets provide major links in the regional road and bikeway networks; provide for truck mobility and transit corridors; and are significant links in the local pedestrian system.[1]

Rural Arterials are the primary means of access into the County's large rural districts, and often connect between counties to accommodate through movements. Rural arterials connect to freeways or highways, and link rural collector and local roads to the urban area and other regions. Rural arterial roads carry greater traffic volumes then rural collector roads, including commuters and other home-based trips, natural resource trips involving trucks, and recreational trips involving autos, bicycles and equestrians.[1]

Major Collectors serve several purposes including linking neighborhoods to the regional system of bicycle and automobile streets, and basic transit services. They typically provide direct access between residential and commercial developments, schools and parks and carry higher volumes of traffic then neighborhood streets. Major collector streets area also utilized to access industrial and employment areas and other locations with large truck and over-sized load volumes.[1]

Neighborhood Collectors provide access primarily to residential land uses and link neighborhoods to higher order roads. They generally have higher traffic volumes than local streets.[1]

Local Urban and Rural provide access to abutting land uses on low traffic volume and low speed facilities. Their primary purpose is to serve local pedestrian, bicycle and automobile trips and limited public transportation use in urban areas; and auto and farm vehicle circulation with local pedestrian, bicycle and equestrian use in rural areas.[1]

Figures 7A and 7B depict the functional classifications of the roadways in the five rural study areas. As shown, the areas are mostly served by collectors and local roadways. Key arterials and state facilities that connect the rural areas to the regional system include I-84, Highway 30, Cornelius Pass Road, Orient Drive, Stark Street, Corbett Hill Road, and Troutdale Road.

[1] Multnomah County Functional Classification (Policy 34). https://multco.us/transportation-planning/multnomah-county-functional-classification-policy-34. Accessed May 2015.

Expectations about speed limits generally correspond with the functional classification of the roadway with higher classification (e.g. arterials) having greater speeds and lower classifications (e.g. locals) having lesser speeds. Figures 8A and 8B show the speed limits on roadways within the study area.

Roadway Cross-Section Standards

Expectations about roadway cross-sections are provided for each of the County's functional classifications. These cross-sections identify the required width for pedestrian facilities, bicycle facilities, landscaping/drainage, and number and width of vehicular travel lanes. The cross-section standards typically inform new roadways or roadway modification projects. Older roadways are typically upgraded to current standards when modified or reconstructed.

The County's current Design and Construction Manual[2] identifies rural roadway design standards. These standards are summarized below in Table 5.

As shown in the table, rural roadways in the County are not currently required to have bike lanes or marked bicycle facilities. The roadway design standards indicate that bicyclists shall be accommodated on the shoulder, when appropriate, based on the facility's traffic volumes. The Design and Construction Manual indicates that shoulders on collectors and arterials should be paved for a minimum of five feet. Rural roadways are also not required to have separate pedestrian facilities. Instead, rural roadway shoulders are typically used by pedestrians, bicycles, oversized vehicles, and for emergency pull-off purposes.

Table 5 Multnomah County Standards for Typical Rural Sections

Classification	Right-of-Way Width (ft)	Paved Width (ft)	Number of Lanes	Shoulder Width (ft)	Travel Lane Width (ft)
Arterial	60-90	20-55	2-4	6-8 (min. 5 ft. paved)	10-14
Collector	50-80	20-24	2	5-8 (5 ft. paved)	10-12
Local	50-60	20-24	2	5-6	10-12

Paved Width refers to the travel way and does not include shoulders

Figures 9A and 9B show the current width of roadways in the study area including both travel way and paved shoulders. As shown, most roads are 28 feet or less with many 23 feet or less. This indicates that many of the rural roadways have narrow or no paved shoulders.

[2] Multnomah County Design and Construction Manual. https://multco.us/file/16499/download.

Rural Intersections

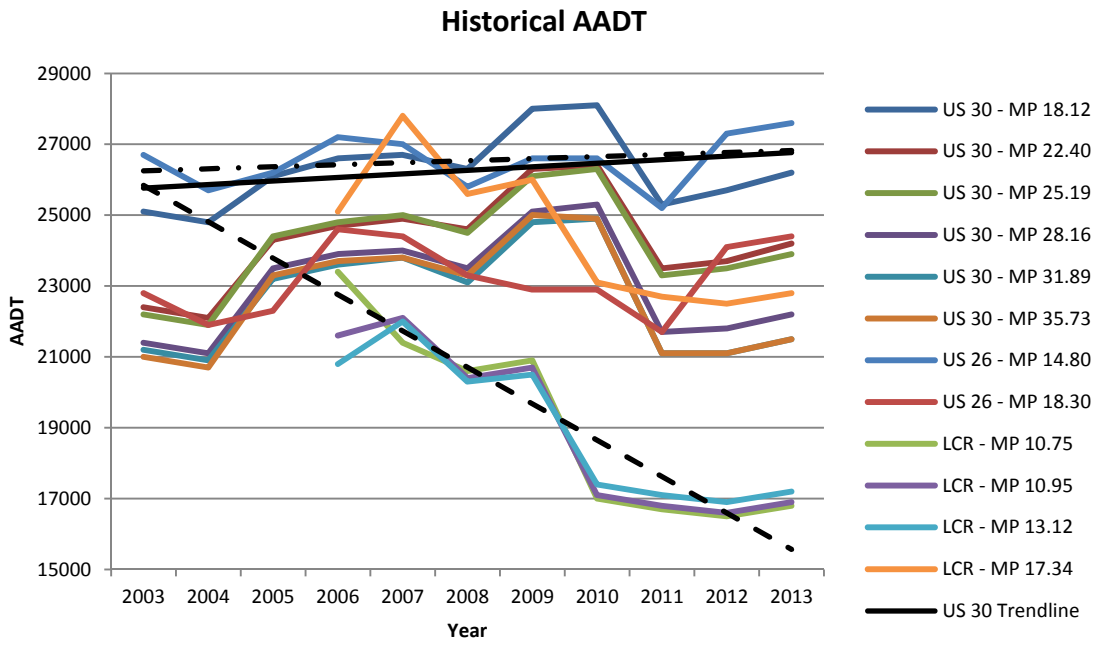
Figures 10A and 10B show the location of the all of the intersections within the study areas. Most of these locations are stop-controlled with the exception of two locations on the Westside. These include: Highway 30 and Sauvie Island Road, and Highway 30 and Cornelius Pass Road. Intersection operations and safety analyses will be conducted at key intersections serving the rural areas as part of the forthcoming Alternatives Analysis Memo.

Traffic Volumes

Average annual daily traffic on roadway segments throughout the study area are shown in Figures 11A and 11B. As shown, the majority of the roadways carry less than 1,000 vehicles per day on average. As expected, the arterial roadways, such as Cornelius Pass Road, SE Foster Road and Troutdale Road carry higher volumes of traffic.

From the Sauvie Island and Multnomah Channel TSP update, average daily traffic volumes on most of the roadways throughout Sauvie Island are less than 3,000 vehicles per day serving residents and daily business operations. The popularity of the beaches, hunting and fishing areas, recreational cycling opportunities, seasonal festivals, and agri-tourism activities lead to significant fluctuations in average daily traffic volumes during the peak seasons, summer and fall. During these times, the Sauvie Island Road can have as many as 17,000 vehicles per day. The peak traffic conditions are a result of both seasonal all-day events (such as access to public beaches and pumpkin patches) as well as limited duration events (such as concerts and farm-to-table dinners).

ODOT records annual average daily traffic (AADT) volumes on all state highways. depicts the historical AADTs, as well as trendlines, for the state facilities in the study area. Table 7 provides a summary of historical AADTs for the state facilities in the study area. As shown in Exhibit 3, traffic volumes generally followed the overall state trends related to decreases during the recession and an increase since 2011. Volumes on the Lower Columbia River (US 30) have gone down since 2006 and is reflected in the trendline. Overall growth between 2003 and 2013 has averaged to less than one percent per year on US 26 and US 30 in East County. Volumes on US 30 (Lower Columbia River Highway) in West County are still at levels lower than recorded in 2007. Appendix 3 provides a table with more details on the historical AADT.



LCR – Lower Columbia River (US 30); No counts were recorded on LCR for 2003, 2004, and 2005

Exhibit 3 Historical AADT on State Highways in Rural Multnomah County

HISTORIC CRASH ANALYSIS

Crash data from the latest five years (January 1, 2009 through December 31, 2013) was obtained from ODOT for all State and County roadways within the study areas.

County Crash Patterns

A total of 1,403 crashes were reported in in the study areas between 2009 and 2013. Of the 1,403 crashes, 401 were reported on I-84. Table 6 summarizes the reported crashes by severity. Half of the reported crashes involved an injury, and 24 crashes involved a fatality. Of the fatal crashes, 14 were reported as a fixed object crash. The second most common crash type reported for fatalities was head-on collisions. One fatality was the result of a collision between a pedestrian and motor vehicle. This crash occurred under dark light and wet road conditions. The report states the pedestrian was in the roadway illegally and wearing non-visible clothing. The majority of the fatal crashes occurred in clear weather, on dry roads, and in the daylight. Excessive speed was reported in 10 of the 24 fatal crashes.

Figures 12A and 12B provide the location of each of the recorded crashes in the study areas. As shown, many of the recorded crashes occurred along I-84 and US 30, as well as key arterials such as Cornelius Pass Road, Skyline Boulevard, Germantown Road, and Corbett Hill Road.

Table 6 Reported Crashes by Severity in Multnomah County Rural Areas (2009 – 2013)

	Crash Severity			Total
	Fatal	Injury	Property Damage Only	
Number of Reported Crashes	24	511	467	1,002
Percentage of Total Crashes	2%	51%	47%	100%

Seasonal Trends

To understand any possible weather and/or seasonal trends, Exhibit 4 shows the number of crashes reported by month over the five year period.

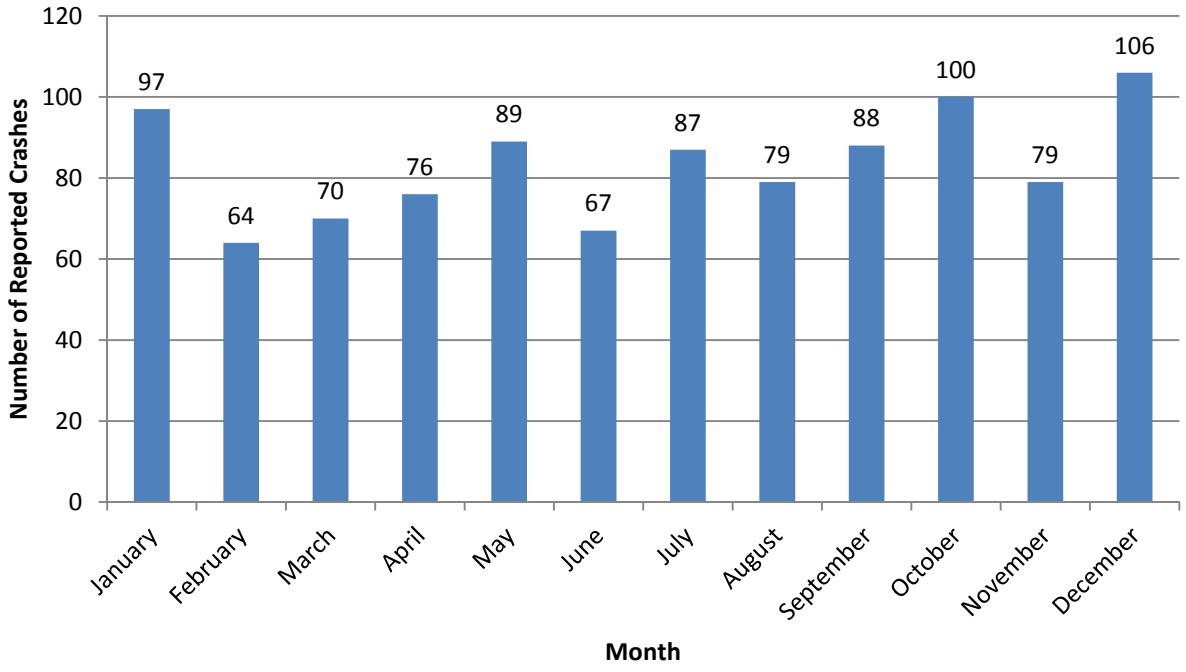


Exhibit 4 Reported Crashes by Month (2009-2013)

As shown in Exhibit 4, the highest crash frequency occurred during late fall winter months, from October through January. Winter months in Multnomah County can include inclement weather conditions producing wet, icy, and/or snowy conditions. Further review of crashes in October, November, December, and January (382 crashes) indicate that 60% (228 crashes) occurred on roadway surfaces that were wet, icy, or snow-covered. Additionally, 55% (210 crashes) occurred in dark, dawn, or dusk lighting conditions.

Crash Type Analysis

Over the study period, 54% of crashes (537 crashes) were single vehicle crashes including fixed object, overturn, and non-collision crashes. Speed was a contributing factor in one-third (327 crashes) of all crashes. Over 40% (409 crashes) occurred on roadway surfaces that were wet, icy, or snow-covered. Forty-two percent (417 crashes) occurred in dark, dawn, or dusk lighting conditions.

Four pedestrian crashes were reported in the study period with one resulting in a fatality. The fatality occurred in dark, rainy conditions. The report states the pedestrian was in the roadway illegally and wearing non-visible clothing. The pedestrian crashes occurred at the following locations:

- US 30 – 2,000 feet south of Watson Road
- Lusted Rd – 3,300 feet from Cottrell Road
- Hurlburt Rd – 260 feet east of Kimbley Rd (west access)
- Haines Road and Thompson Mill Road

Eleven bicycle crashes were reported in the study period all resulting in non-fatal injuries. All but one crash occurred under clear weather conditions, dry road surface, and in the daylight. The majority (seven) of the crashes were attributed to not yielding to the right-of-way. The other causes were following too closely, non-motorist illegally in the roadway, and other improper driving. The bicycle crashes occurred at the following locations:

- Skyline Boulevard and Brooks Road
- Laidlaw Road and Thompson Road – two crashes occurred here
- HCRH and Crown Point Highway – two crashes occurred here
- Foster Road and Richey Road
- Lusted Road 2,000 ft north of Dodge Park Boulevard
- Lusted Road at Sam Barlow High School
- HCRH – 400 feet west of Lucas Road
- Dodge Park Boulevard and Short Road
- HCRH and Evans Road

Intersection and Segment Crash Analysis

In addition to the countywide data, ten locations, four intersections and six segments within the study areas, were analyzed and compared to statewide averages for similar facilities, when possible.

Intersection Crash Rates

Reported crashes at four key intersections are summarized in Table 7. Intersection exposure was measured in terms of total entering vehicles (TEV), derived from the link volumes data. To provide a basis of comparison, ODOT identifies 90th percentile crash rates for similar facilities in the Analysis

Procedures Manual, Exhibit 4-1 (Reference 1). As shown, all of the study intersections reported higher crash rates than ODOT's 90th percentile crash rates for the respective intersection type.

Table 7 Reported Crashes at Study Intersections

Intersection ID and Name	# of Crashes	TEV (in millions)	Crash Rate	90th Percentile Crash Rates	Crash Type						Severity		
					Angle	Rear-End	Turning	Ped/Bike	Fixed-Object	Other	PDO	Injury	Fatality
A - Reeder Road/Sauvie Island Road	6	4.95	1.21	0.475	0	0	2	0	4	0	3	2	1
B - Foster Road/172nd Avenue	25	17.82	1.40	0.475	0	14	8	0	2	1	6	19	0
C - Foster Road/Richey Road	10	17.82	0.56	0.475	1	2	1	0	4	2	5	5	0
D - Orient Drive/282nd Avenue	17	13.78	1.23	0.579	3	6	6	0	2	0	9	8	0

[1]TEV = Total entering vehicles
[2]PDO = Property damage only
[3]Crash Rate = Crashes per million entering vehicles

One fatality occurred at the study intersections above. It was a single-vehicle, fixed-object crash that occurred at the Reeder Road/Sauvie Island Road intersection. It occurred in the rain, with wet road surface, and in the dark. Speeds too fast for conditions was a contributing factor.

Segment Crash Rates

Reported crashes along study roadway segments are summarized in Table 8. Exposure on the segments was measured based on average daily traffic (ADT) volumes from available link volume data. ODOT publishes statewide average roadway segment crash rates for the past five years for urban and rural areas, by functional classification. The statewide average roadway segment crash rates for rural minor collectors are provided in Table 8 for comparison to calculated crash rates for highways in the study areas. As shown, all of the study segments reported higher crash rate than the state average crash rates for the respective functional classification.

Table 8 Reported Crashes at Study Roadway Segments

ID	Segment Name	Segment Boundaries	Segment Length (miles)	Number of Crashes	ADT	Crash Rate (2009 – 2013 average)	State Average	Crash Type		Severity		
								Fixed-Object	Other	PDO	Injury	Fatality
E	Germantown Road	Between Skyline Road and Old Germantown Road	2.0	25	4800	2.85	1.30	14	11	12	11	2
F	Skyline Boulevard	From ½ miles north of Rock Creek Road to ¾ miles south of Rock Creek Road	1.25	8	1340	3.27	1.30	6	2	1	7	0
G	Corbett Hill Road	Between I-84 and Historic Columbia River Highway	1.4	29	2520	6.32	0.71	6	23	12	17	0
H	Lusted Road	¼ of a mile east starting 1/3 of a mile east of Cottrell Road	0.25	7	650	5.90	1.30	4	3	3	3	1
I	Hurlburt Road	From Springdale School to Kimbley Road (East)	1.5	11	1490	4.05	1.30	5	6	4	7	0
J	Stark Street	Between 36th Street and Historic Columbia River Highway	1.3	21	5410	2.13	0.71	12	9	8	11	2

Findings from the study intersection and segment crash analysis indicate the following:

- Corbett Hill Road, which is an arterial connecting to I-84, has the highest crash frequency among the study segments.
- The intersection of Reeder Road and Sauvie Island Road has the highest crash frequency among the study intersection.
- Over 46% of reported crashes along the studied intersections and segments areas occurred on a wet, icy, or snowy roadway.
- Over a third (52 crashes) of the crashes recorded at the study intersections and segments indicated speeding or speed too fast for conditions as a contributing cause.
- Of the six fatal crashes on the study segments, five were fixed object crashes with four of attributing speed too fast for conditions or speeding as a contributing factor. The other fatal crash involved a pedestrian who was in the roadway illegally.

- Four pedestrian and bicycle crashes were reported at the study intersections and segments throughout the five year analysis period, one of which was fatal and described above. Three of the four crashes occurred with clear weather conditions, on dry roadways, in the daylight. The two reported causes were "did not yield right-of-way" and "non-motorist illegally in roadway."
- Among the injury crashes, the majority were single-vehicle crashes. Speed was a contributing factor in approximately half of the reported injury crashes. Over half of the injury crashes occurred with some sort of precipitation on the roadway.

Potential Countermeasures

Given that many of the recorded crashes are single vehicle, low-cost systemic treatments such as shoulder widening and installation of centerline and shoulder rumble strips may be effective in helping to reduce the severity and frequency of crashes on rural roadways in the study area. Treatments addressing speed as well as informing drivers of inclement roadway conditions may also be effective measures. A summary of potential countermeasures is provided below.

Shoulder Widening

Wider paved shoulders could provide drivers more opportunity to recover before departing the roadway and/or to slow their vehicles to a controlled stop, thereby reducing single vehicle crashes.

Shoulder Rumble Strips

Installing shoulder rumble strips on both sides of the roadway has the potential to reduce vehicles inadvertently "running off the road." Although shoulder rumble strips for rural two-lane roads are not currently included in the Highway Safety Manual (HSM) (Reference 2), NCHRP Report 641 *Guidance for the Design and Application of Shoulder and Centerline Rumble Strips* evaluated their effectiveness in a rural two-lane road setting (Reference 3). NCHRP Report 641 indicates shoulder rumble strips on rural two-lane roads can reduce run off the road crashes by 15 percent. The report also indicates shoulder rumble strips on rural two-lane roads can reduce fatal and injury run off the road crashes by 29 percent.

NCHRP Report 641 indicates shoulder rumble strips are more effective when placed close to the edgeline than when they are placed further from the edgeline. The report also stated shoulder rumble strips appear to have a positive safety benefit in low-light conditions.

Centerline Rumble Strips

Research has shown centerline rumble strips can help reduce rural roadway crashes. NCHRP Report 641 indicates the presence of centerline rumble strips can result in a nine percent reduction in total crashes and 12 percent reduction in fatal/injury crashes. The largest crash reduction for centerline

rumble strips is realized for targeted crashes which are defined as head-on and opposite-direction sideswipe crashes. On low volume roads, crashes involving a vehicle crossing the centerline end up recorded as single-vehicle run off the road crash. Research shows the combination of centerline and shoulder rumble strips could potentially reduce the total number of crashes along a corridor; including fatal and injury crashes.

Speed Treatments

Speed Feedback Signs

Electronic signs can measure and dynamically display the speed of approaching vehicles. Certain signs may also be accompanied by a "SLOW DOWN" or similar message. Average speed reductions of approximately 6 miles per hour have been observed with installation of the feedback signs.

Optical Speed Bars

Transverse markings placed in and across travel lanes with the intent of increasing the optical flow of information and creating a sense of increasing speed could be installed leading up to horizontal curves and intersections. Studies have shown speed reductions of 1 to 9.5 mph.

High Friction Surface Treatment

To address weather-related crashes, the County and ODOT could consider installing high friction surface treatment (HFST) to increase traction for vehicles. HFST maintains pavement friction by applying durable aggregates using a polymer binder to a specific area. The Federal Highway Administration (FHWA) has tested HFST in a number of types of applications. HFST may be applied on areas where high friction or anti-skidding properties are particularly desired. This could include segments having horizontal curves or pavement surfaces susceptible to icing like bridges.

BRIDGES

Within the study areas, the County owns 26 bridges and associated supporting structures. With the exception of the Willamette River bridges, the majority of the County's bridges are in the rural areas. The locations of the County bridges are shown Figures 13A and 13B as well as Table 11. The table also provides information about the structural sufficiency rating for each bridge. ODOT maintains an inventory of bridge conditions within Multnomah County. State, County, and City owned facilities over 20-feet in length are assigned a sufficiency rating based on inspections conducted at regular intervals, usually every two years. The sufficiency rating is a measure between 0 and 100 calculated by the Federal Highway Administration (FHWA), based on factors such as condition, materials, load capacity, and geometry (i.e., dimensions). FHWA uses the rating as a tool to prioritize the allocation of funds for bridge repairs. In general, bridges with a sufficiency rating of less than 50 are given priority. The sufficiency rating is used to identify deficiencies, which may include structural issues or functional

issues. For example, older bridges may be narrow and not designed to the same width or height clearance of today's standards. Therefore, a sufficiency rating does not necessarily indicate a structural issue. Structural sufficiency rating data was limited for the study areas; information was provided for four of the 26 bridges. The Latourell Falls Road Bridge is currently considered structurally deficient.

Table 9 Multnomah County Bridges

Map ID	County Bridge ID	Name	Sufficiency Rating	Sufficiency
1	511	Burnside Bridge	N/A	N/A
2	2757	Hawthorne Bridge	N/A	N/A
3	2758	Morrison Bridge	N/A	N/A
4	4522	Beaver Creek Bridge	N/A	N/A
5	6757	Broadway Bridge	N/A	N/A
6	6879	Sellwood Bridge	N/A	N/A
7	9321	223rd/Marine Drive Overpass	N/A	N/A
8	11112	Stark Street Bridge	N/A	N/A
9	11113	Stark Street Viaduct	N/A	N/A
10	17211	207th Ave over UPRR	N/A	N/A
11	17356	238th Ave over UPRR	N/A	N/A
12	18206	207th over Fairview Creek	N/A	N/A
13	20136	Sauvie Island Bridge	N/A	N/A
14	20722	282nd over Johnson Creek	N/A	N/A
15	25T05	Halsey Street Box Culvert	N/A	N/A
16	25T08	252nd Avenue Bridge	N/A	N/A
17	25T16	Jenne Road/174th Av Bridge	N/A	N/A
18	51B002	Highland Drive over Johnson Creek	N/A	N/A
19	51C09	Littlepage Rd Box Culvert	N/A	N/A
20	51C10	Latourell Falls Road Bridge	32.9	Structurally Deficient
21	51C12	Smith Road Bridge	91	Not Deficient
22	51C13	Gordon Creek Road Viaduct	59.7	Not Deficient
23	51C14	Gordon Creek Bridge	57	Not Deficient
24	51C15	Circle Avenue Bridge #1	N/A	N/A
25	51C34	Circle Avenue Bridge #2	N/A	N/A
26	6967A	257th over UPRR	N/A	N/A

RAIL

Figures 14A and 14B depict the railroads traversing Multnomah County as well as the locations of public and private railroad crossings in the rural areas. The Portland and Western railroad has two routes through the west side of the County, one going up the West Hills and the other along Highway 30. Union Pacific has a route on the east side of the County that follows I-84. The majority of the

railroad crossings throughout the rural areas are private crossings (crossings of private roads, driveways, and accesses). There are two public County owned crossings in the Multnomah Channel area; one at-grace crossing located on Lower Rocky Point Road on the east side of Highway 30 and one grade-separated crossing on NW McNamee Road.

BICYCLE SYSTEM

Figures 15A and 15B depict the bicycle system in the study area. As shown, only three facilities have on-street bike facilities, including Highway 30 (ODOT facility) in West County, and Highway 26 (ODOT facility) and Stark Street in East County. Figures 15A and 15B identify three design treatments used to accommodate bicycle travel on roadways and four design treatments used to accommodate bicycle travel that is separated from the roadway. These design treatments are described below.

Bike Lane — Some roadways dedicate a portion of the roadway for preferential use by bicyclists. Bike lanes are appropriate on urban arterials and major collectors where motor vehicle speeds are significantly higher than bicycle speeds. Bike lanes on local streets are appropriate where bicycle volumes are high, vehicle speeds are higher than 25 miles per hour, and/or poor sight distance exists. Bike lanes must always be well-marked to call attention to their preferential use by bicyclists.

Shoulder Bikeways – In rural areas, paved shoulders that are a minimum of 4 feet wide, are commonly considered shoulder bikeways. These facilities are not shown on the map as paved shoulder width data is not currently available. However, Figures 9A and 9B show paved widths. Two-lane roadways with a paved width of 28 – 31 may have 4 foot paved shoulders. Two-lane roadways with a paved of 32 feet or greater are likely to include 4 foot paved shoulders on each side of the roadway. As shown in Figures 9A and 9B, very few rural facilities have a 28 foot or greater paved width.

Bicycle Boulevard – The bicycle boulevard is a refinement of the shared roadway treatment. On bicycle boulevards, the typical operation of a local street is modified to function as a through street for bicyclist while maintaining local access for motor vehicles. Traffic calming devices reduce motor vehicle speeds and through trips and traffic controls limit the potential for conflicts between bicyclists and motorists.

Low Traffic Through Street (Shared Roadway) — On a shared roadway, bicyclists and motorists share the same travel lanes. A motorist will usually have to cross over into the adjacent travel lane to pass a bicyclist. Shared roadways are common on neighborhood streets and on low volume rural roads and highways and may, or may not, include “sharrows” (pavement marking that indicate the shared use of the roadway). Allowing bicycle traffic to mix with automobile traffic is acceptable where the average daily traffic (ADT) on a roadway is less than 3,000 vehicles per day. Generally, most collectors in the rural parts of Multnomah

County carry less than 3,000 ADT, but most arterials, and some collectors within UGBs, carry more than 3,000 ADT.

Regional, Community, and Local Multi-Use Trails — Multi-use trails are separated from the roadway by an open space or barrier. Multi-use trails are typically used by pedestrians and bicyclists as two-way facilities. Multi-use trails are appropriate in corridors with high traffic volumes not well served by the street system. Such paths can also be used to create pedestrian and bicycle short cuts and can serve as elements of a community recreational trail system. They can be used for regional travel as well as within a community and locally.

Despite the lack of bike lanes and shoulder bikeways, many of the County's rural roadways are popular cycling routes.

PUBLIC TRANSPORTATION SYSTEM

Three transit agencies serve Multnomah County's rural areas, including TriMet, Columbia County Rider, and Sandy Area Metro. The highlights of this service include:

- TriMet primarily serves Portland Metro urban areas but has transit stops located near the perimeter of several of the County's rural areas including the West Hills, Sauvie Island, Troutdale and Gresham.
- TriMet has a Park-and-Ride located on Sauvie Island and several in Gresham that could serve residents of East County.
- Columbia County Rider has a route along Highway 30 but it does not currently stop on Sauvie Island but may in the future.
- Sandy Area Metro has a route along Highway 26 in the West of Sandy River area.

Figures 16A and 16B show the transit routes, stops, centers, and park n' ride locations in and near the rural areas. As shown in Figures 16A and 16B, the County's rural areas are not served by fixed route transit; however, fixed route transit and park-and-ride facilities are provided at the urban fringes to help provide access to commuters from rural areas.

TRUCK FREIGHT ROUTES

Figures 17A and 17B show the freight routes in the study areas. ODOT has two freight routes through the rural areas: Highway 30 in West County and on Interstate 84 in East County. Multnomah County has a number of freight routes extending into the rural areas from the ODOT freight routes.

AIR TRANSPORTATION SYSTEM

The Sandy River Airport is the only public airport located in the study areas. In addition, Lehman Airport is a private airport located three miles southeast of Corbett. Portland International Airport serves most air passenger and freight transportation needs for Multnomah County.

FUNDING ANALYSIS

This section summarizes the historical transportation funding sources for Multnomah County. The information summarized below will be used to assist in identifying potential funding gaps associated with future county projects and programs.

Historically, transportation funds have been collected through local sources, private contributions, state government, federal government, and non-jurisdiction work which includes non-road and street work and work for other jurisdictions. Local sources include, but are not limited to, fuel taxes and local governments such as cities. Motor vehicle registration fees were introduced and collected starting in the year 2011 and are a part of the funds from local sources. Federal stimulus funds (ARRA) dedicated to transportation projects represent a new federal funding source for 2010. The transportation program includes streets, sidewalks, bike paths, railroad crossings, and transit.

Exhibit 5 reports the total transportation funding for Multnomah County for the year 2005 through 2014. Table 12 details the County's transportation funding by source. As shown, 2013 and 2014 received the most funding over the last decade with over double the funding of prior years. In 2013, funding from local sources spiked due to sales of bonds totaling $128,000,000. Funds from fuel tax have remained fairly consistent over the last decade contributing between $6,500,000 and $7,400,000 each year. Like fuel tax, state funds have remained within a relatively narrow range, between $29,000,000 and $39,000,000, with the exception of 2005 which saw a contribution of about $55,600,000. State funding is the biggest funding source throughout the past ten years, excluding the 2013 sale of bonds as previously mentioned.

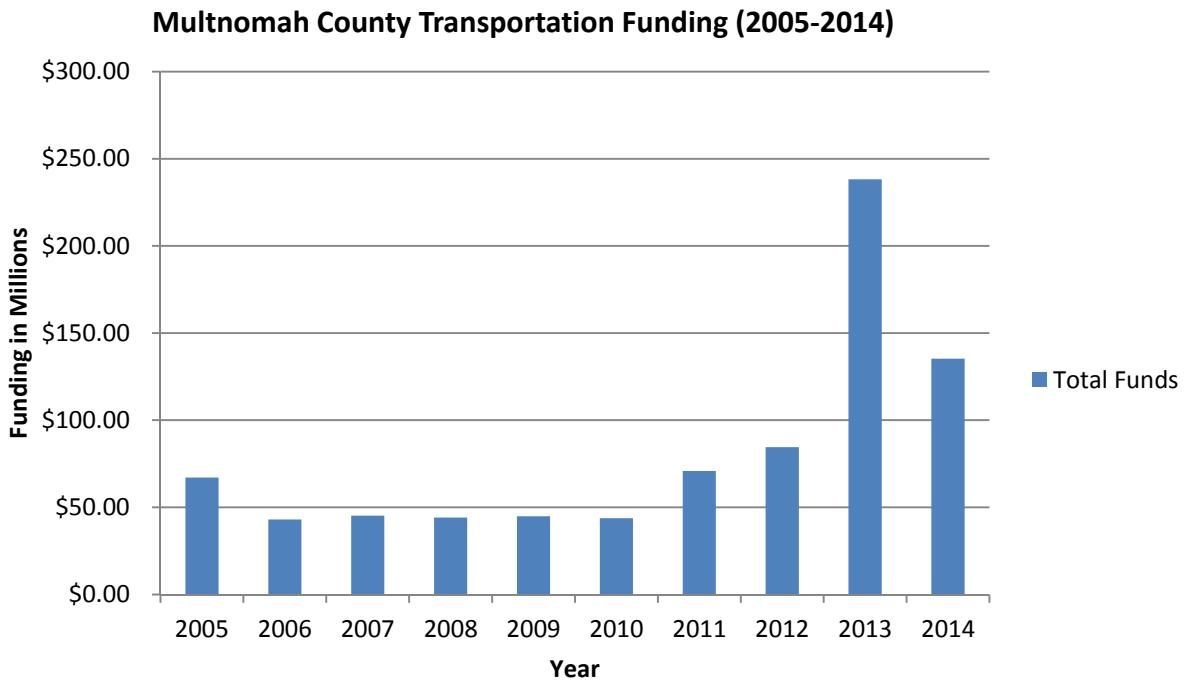


Exhibit 5 Multnomah County Funding for Transportation (2005-2014)

Table 10 Multnomah County Funding for Transportation Years 2005-2014

Year	Source						Total
	Fuel Tax	Local Sources	Private Contributions	State Funding	Federal Funding	Non-Jurisdictional Work	
2005	$6,744,233	$2,037,616	$0	$55,586,395	$1,869,318	$837,315	$67,074,877
2006	$7,114,721	$2,337,147	$213,243	$31,040,765	$1,417,995	$943,352	$43,067,223
2007	$7,110,272	$1,567,375	$130,880	$32,385,736	$1,105,605	$2,963,682	$45,263,550
2008	$7,356,083	$1,339,539	$0	$29,298,036	$3,418,294	$2,681,591	$44,093,543
2009	$6,878,197	$2,569,042	$0	$30,370,214	$2,884,584	$2,179,068	$44,881,105
2010	$6,982,150	$1,311,827	$0	$29,004,662	$4,363,057	$2,121,595	$43,783,291
2011	$7,052,045	$17,519,052	$0	$33,561,224	$9,883,713	$2,856,357	$70,872,391
2012	$6,811,257	$26,294,096	$0	$36,227,457	$12,990,232	$2,222,274	$84,545,316
2013	$6,573,115	$188,254,386	$0	$38,972,767	$2,399,555	$1,992,451	$238,192,274
2014	$6,627,984	$61,920,847	$0	$38,527,230	$26,201,381	$2,059,726	$135,337,168

Exhibit 6 reports the total expenditures of Multnomah County for transportation in the years 2005 through 2014. Table 11 summarizes the County's transportation expenditures by source. Years 2013 and 2014 had the most spending with over double what the majority of the other years spent. Those years also saw additional local funding from bonds as discussed above. Spending on Capital Projects

and Payments to other Governments/Jurisdictions were the two largest expenditures over the past decade. Payments to other governments and jurisdictions included payments to counties, cities, other local agencies, and state and state highway projects.

Spending on capital projects increased significantly starting in 2012. The majority of the spike in spending went to system preservation. The year 2012 increase was almost evenly split between project engineering and system preservation, each with approximately $21 million, but 2013 and 2014 spent about $56 million and $73 million, respectively, on system preservation alone. Prior to the bond funds, average annual spending on capital projects was approximately $13 million including both engineering and preservation projects.

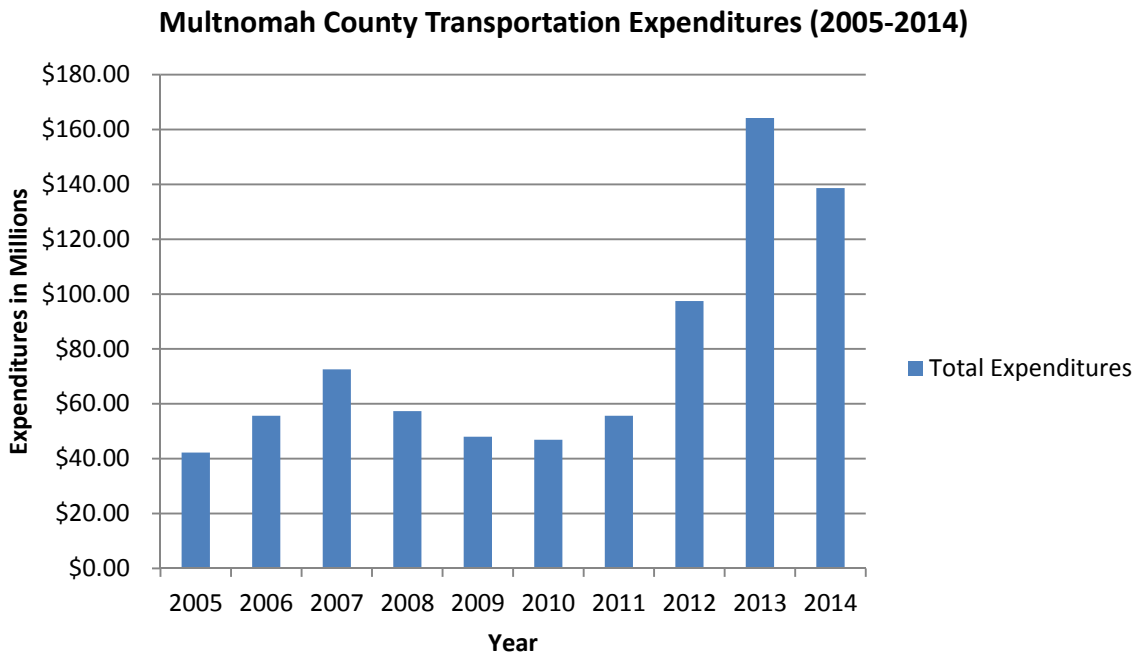


Exhibit 6 Multnomah County Expenditures for Transportation (2005-2014)

Table 11 Multnomah County Expenditures for Transportation Years 2005-2014

Year	Source							Total
	Capital Projects	Operations & Maintenance	Administration & General Engineering	Match Payments for Local Agency Projects	Debt Service on Local Obligations	Payments to Other Governments /Jurisdictions	Reimburse -ments[1]	
2005	$8,822,124	$7,403,780	$3,423,016	$0	$288,022	$21,349,429	$942,708	$42,229,079
2006	$7,788,562	$7,164,162	$3,943,756	$0	$291,289	$35,333,705	$1,440,134	$55,661,608
2007	$21,856,624	$5,821,601	$4,080,165	$14,534,934	$287,996	$23,493,283	$2,513,914	$72,588,517
2008	$18,669,634	$5,942,808	$3,931,355	$3,065,694	$287,996	$22,903,091	$2,508,531	$57,309,109
2009	$11,156,600	$7,797,336	$4,318,754	$1,356,283	$288,000	$20,885,234	$2,179,068	$47,981,275
2010	$8,481,991	$9,107,884	$3,126,007	$1,458,258	$288,000	$20,008,305	$2,432,796	$46,903,241
2011	$15,646,108	$8,445,260	$2,828,115	$1,487,761	$288,000	$24,673,775	$2,263,774	$55,632,793
2012	$54,067,309	$9,061,593	$3,215,765	$780,522	$701,151	$27,415,906	$2,222,275	$97,464,521
2013	$69,568,440	$8,075,180	$4,563,300	$0	$52,495,665	$27,523,385	$1,990,000	$164,215,970
2014	$85,669,337	$7,554,458	$4,582,540	$0	$9,929,719	$28,793,395	$2,109,428	$138,638,877

[1]Expenditures that are reimbursed for work done on others' roads/streets

EXISTING CONDITIONS SUMMARY

The key highlights of the existing conditions are summarized below.

- The primary transportation issue in Multnomah County's rural areas is safety. Identifying and prioritizing safety improvements will be a primary objective of the TSP Update.
- General County-wide trends indicate that some low-cost systemic treatments such as shoulder widening and installation of centerline and shoulder rumble strips may be effective on County facilities in addition to treatments addressing speed and improving intersections with poor geometry.
- Paved shoulders serve multiple functions in rural areas. They increase safety for vehicles, provide space for farm equipment and emergency pull-offs, but they also act as pedestrian and bicycle facilities. The needs and priorities for shoulder improvements for vehicle safety should also be coordinated with additional considerations below.
- Despite the lack of shoulder bikeways, many of the County's rural roadways are popular cycling routes. A desired network and priorities of shoulder bikeway facilities for the purpose of transportation and tourism should be included in the TSP Update.
- County's rural areas are not served by fixed route transit; however, fixed route transit and park-and-ride facilities are provided at the urban fringes to help provide access to commuters from rural areas. Access to these park-and-rides for pedestrians and bicycles should be considered in the TSP Update.
- Multnomah County has a number of designated freight routes extending into the rural areas from the ODOT freight routes. These should be considered in the prioritization of shoulder improvements.

FUTURE CONDITIONS

The following describes future projections for population and employment in unincorporated Multnomah County, projected traffic volumes on ODOT facilities, and an overview of currently planned projects to address existing and future needs.

EMPLOYMENT AND HOUSEHOLD PROJECTIONS

Metro provided information about anticipated employee and household growth in Multnomah County's unincorporated areas. This information is summarized in Table 12. Employment is projected to grow at approximately 3.5 percent per year from 2010 to 2040. Households are projected to grow at about 3.2 percent per year from 2010 to 2040. However, these projections include both the urban and rural areas of unincorporated Multnomah County.

Table 12 Employee and Household Projections for Unincorporated Areas in Multnomah County

Year	2010	2025	2035	2040	2010-2040 Growth	Annual % Growth
Employees	3,961	5,866	7,170	8,100	4,139	3.48%
Households	4,911	6,555	7,092	9,579	4,668	3.16%

Figures 18A and 18B and 19A and 19B depict the projected changes in employees and households by TAZ from 2010 to 2040, respectively. As shown, minimal increases in jobs and housing are projected for the majority of the East County rural areas with the exception of moderate projected growth in households and employment in the western portions of the West of Sandy River area. In West County, Sauvie Island is projected to have moderate growth in employment and the northern portion of the West Hills Rural Area is projected to have moderate growth in both employment and households.

FUTURE TRAFFIC VOLUMES

As discussed in the existing conditions, ODOT collects traffic volumes on all state facilities. They also provide information about future anticipated growth on these same facilities. Table 13 provides estimates of future traffic volumes at the state facilities in the rural areas.

Table 13 Projected Future State Highway Traffic Volumes

Primary Road	HWY	MP	Description	Future Year		Annual Growth Rate (from 2013 to 2033)
				2033	Source	
Columbia River Highway (US 30)	002	18.12	0.30 mile east of Jordan Interchange	31,900	Historic Growth	1.09
	002	22.40	0.30 mile east of Corbett Interchange	30,200	Historic Growth	1.24
	002	25.19	0.20 mile east of Rooster Rock State Park Interchange	30,400	Historic Growth	1.36
	002	28.16	0.30 mile east of Bridal Veil connection	28,400	Historic Growth	1.40
	002	31.89	0.50 mile east of Multnomah Falls Interchange	27,400	Historic Growth	1.37
	002	35.73	0.10 mile east of Historic Columbia Highway (US30)	27,500	Historic Growth	1.40
Mt. Hood Highway (US 26)	026	14.80	0.05 mile south of S.E. Palmquist Road	32,500	Model	0.89
	026	18.30	0.05 mile northwest of S.E. Haley Road	33,300	Model	1.82
Lower Columbia River (US 30)	092	10.75	0.08 mile south of Sauvie Island Road	23,300	Model	1.93
	092	10.95	0.12 mile north of Sauvie Island Road	23,800	Model	2.04
	092	13.12	0.10 mile south of Cornelius Pass Road	24,200	Model	2.03
	092	17.34	0.05 mile south of Rocky Point Road	30,300	Model	1.64

PLANNED PROJECTS

Multnomah County has several different plans that identify transportation improvements in the County's rural unincorporated areas. These projects will be evaluated in the Alternatives Analysis phase of this project to determine if they are still warranted, how they should be prioritized, and if there are additional needs that require additional projects, programs, or policies to address them. Table 14 provides a summary of the currently planned projects by area in the County's Capital Improvement Plan (CIP) and in each of the Rural Area Plans and TSPs (if applicable). The multimodal project locations are shown in Figures 20A, 20B, 21A and 21B.

Table 14 Planned Projects

Document	Project Number	Project Name	Project Description
Sauvie Island/Multnomah Channel			
Westside Rural TSP	1	Sauvie Island Road	Safety improvement – Add to shoulders (4 ft) and add guardrail from Gillihan Road to Reeder Road. Replace culverts. $3,675,000
	2	US 30	Commuter rail study – Conduct study to determine feasibility of commuter rail from Portland to Astoria. $100,000
	3	Gillihan Road	Safety improvement – Add to shoulders (4 ft). $2,055,000
	4	Reeder Road	Safety improvement – Add to shoulders (4 ft). $5,925,000
	5	US 30	Ride share parking – Provide parking for 100 spaces next to truck scale near county line. $325,000
	6	US 30	Speed zone study – Conduct speed zone study to determine safe speed zone from Linnton north. $5,000
	7	US 30/Cornelius Pass Road	Public transportation – Provide commuter transit service from Columbia County over Cornelius Pass Road to Washington County. $78,000/year
	8	Reeder Road	Improve parking and intersection safety with Sauvie Island Road. $250,000
	9	US 30	RAZ service expansion – Expand assuming 20 hours of additional service per work day for one bus. $78,000/year
	10	Sauvie Island Wildlife Refuge	Recreational bike path – Conduct study to determine feasibility of a bike path north of Reeder Road for recreational purposes only, followed by implementation of the findings. $1,060,000
	11	Sauvie Island Road	Improve park and ride – Delineate parking and traffic circulation. $300,000
	12	US 30	Exclusive car pool lane study – Conduct study to determine feasibility and cost of adding a reversible exclusive car pool lane on US 30. $100,000
	13	US 30	Harborton sign installation – Provide signing for Harborton. $ 1,000
	14	US 30	Scenic viewing opportunities – Access provided across railroad tracks adjacent to Burlington Bottoms using existing road approaches (per location). Exact locations to be determined. Providing pull outs of widening along US 30 will not be acceptable on the basis of safety. $350,000
Multnomah County CIPP	15	Sauvie Island Road: Bridge to Reeder Road (PN 159)	Reconstruct road to rural collector standards with 2 travel lanes. Requires working on dike. $8,275,636
	16	Sauvie Island Road: Gillihan Road to Reeder Road	Bike path. $2,114,214
	17	Sauvie Island: Reeder to Ferry Road	Shoulder bikeway. $535,851
Sauvie Island/Multnomah Channel Rural Area Plan	18	Multnomah Channel/U.S. 30	*Ride share parking* – Provide parking for 100 spaces next to truck scale near county line. Project to be coordinated with ODOT, Multnomah, and Columbia Counties.
	19	U.S. 30/Cornelius Pass Road	*Public transportation* – Provide commuter van pool or transit service from Columbia County over Cornelius Pass

			Road to Washington County.
	21	U.S. 30	*Scenic viewing opportunities* – Access provided across railroad tracks adjacent to Burlington Bottoms using existing road approaches (per location).Exact locations to be determined. Providing linear pull outs or widening adjacent to U.S. 30 will not be acceptable on the basis of safety and access management standards.
	21	Cornelius Pass Road	*U.S. 30 intersection improvements* – Include a northbound turn lane and shared northbound left-turn/right-turn lane.
	22	Gillihan Loop Road	*Safety improvement* – Add to 6. 13 miles of shoulders (4 ft).
	23	Reeder Road	*Safety improvement* – Add to 4.33 miles of shoulders (4 ft).
	24	Reeder Road	*Safety improvements* – Improve intersection sight distance with Sauvie Island Road.
	25	Sauvie Island Road	*Safety improvement* – Add to 2.15 miles of shoulders (4 ft) and add guardrail from Gillihan Road to Reeder Road. Replace culverts.
	26	Sauvie Island Road	*Create park and ride* – Delineate parking and traffic circulation. (**Completed since 1998 TSP)**
West Hills			
Westside Rural TSP	27	Cornelius Pass Road	Safety improvement – Find ways to enforce posted speed limits and safe travel speeds. Install photo radar. $20,000
	28	Cornelius Pass Road	Safety improvement – Install reflectors, delineators, and traffic striping. $200,000
	29	Newberry Road	Safety spot improvement – Install guardrail ¼ mile south of US 30 and install speed hump 1.2 miles from US 30. $450,000
	30	Cornelius Pass Road	Speed Zone Study – Conduct speed zone study to determine average running speed, safe operating speed, and needs for enforcement. $5,000
	31	Germantown Road	Safety improvement – Add to 2.22 miles of shoulders (4 ft). $6,744,000
	32	Skyline Boulevard	Safety improvement – Add to shoulders from UGB to Cornelius Pass Road (1.49 miles). $ 2,039,000
	33	Skyline Boulevard	Safety improvement – Add to shoulders from Cornelius Pass Road to Rocky Point Road (4 ft). $ 11,153,000
	34	Skyline Boulevard	Cornelius Pass Road intersection improvements – install signal, provide westbound left-turn lane and through/right lane on Skyline Boulevard. $695,000
	35	Cornelius Pass Road	Safety and capacity needs – Study to look at climbing lanes, guardrail, drainage, addition of shoulders, and alternate routes. $180,000
	36	Germantown Road	Safety spot improvements – Widen lanes on curves only, install center skip like reflective markers, and install mirror at intersection with Old Germantown Road. $750,000
	37	Cornelius Pass Road	Safety Improvement – contract with the City of Portland for speed enforcement. Assume 0.25 staff per year including equipment and overhead. $50,000/year

	38	Skyline Boulevard	Speed zone study – Conduct speed study to determine appropriate speed limit for Skyline Boulevard from Cornelius Pass Road east to city limits of Portland. $5,000
	39	Springville Road	Safety improvement – Add to shoulders (4 ft). $3,160,000
	40	Laidlaw Road	Safety improvement – Add to shoulders (4 ft). $643,000
	41	Thompson Road	Safety improvement – Add to shoulders (4 ft). $100,000
	42	Cornelius Pass Road	Realignment – Recuce curvature and eliminate switchback while minimizing grade increase of 1,500-foor section (assume average cut of 60 feet). $2,020,000
	43	Skyline Boulevard	Safety improvement – Install traffic calming devices such as speed humps to reduce speeds from UGB to Cornelius Pass Road. $485,000
	44	Skyline Boulevard	Scenic viewing opportunities – Acquire property through fee or donation for development of parking area adjacent to roadway. $350,000
	45	Cornelius Pass Road	Safety improvement – Construct pullouts at a number of locations for the purposes of speed enforcement. $750,000
	46	Germantown Road	Safety improvement – Install traffic calming devices such as speed humps to reduce speeds. $887,000
Multnomah County CIPP	47	Cornelius Pass Road: MP 3.0 to MP 3.5 (PN 103a)	Realign and widen Cornelius Pass Road to provide southbound passing lane. $35,135,976
	48	Cornelius Pass Road: MUS 30 to MP 2 (PN 389)	Reconstruct Cornelius Pass Road including passing lane, safety, shoulder and drainage improvements. $54,159,714
	49	Cornelius Pass Road: MP 2 to MP 3 (PN 103)	Widen Cornelius Pass Road, including new box culvert and passing lane. $21,893,536
	50	Germantown Road/Old Germantown Road (PN 726)	Widen Germantown Road to create left turn pocket and improve sight distance. $780,835
	51	Skyline Boulevard: McNamee to Cornelius Pass	Shoulder bikeway. $2,629,164
	52	Skyline Boulevard: Cornelius Pass to Rocky Point	Shoulder bikeway. $15,153,851
	53	Springville Road: Skyline Boulevard to County Line	Shoulder bikeway. $4,254,950
	54	Cornelius Pass Road: (old) St. Helens Road to MP 2	Shoulder bikeway. $3,684,602
East of Sandy River			
Multnomah County CIPP	55	Ogden Road: Mershon to Woodard	Shoulder bikeway. $463,789
	56	Larch Mt. Road: HCRH to End of Road	Shoulder bikeway. $26,341,706
	57	Knieriem Road: Littlepage Road to HCRH	Shoulder bikeway. $3,122,720
	58	Hurlburt Road: HCRH to Littlepage Road	Shoulder bikeway. $4,344,240
	59	Evan Road: Hurlburt Road to HCRH	Shoulder bikeway. $4,463,908
	60	Woodard Road: HCRH to Ogden Road	Shoulder bikeway. $2,338,065

	61	Mershon Road: Ogden to HCRH	Shoulder bikeway. $4,009,646
East of Sandy River Rural Area Plan			
No major capital improvement improvements are proposed within the study area			
West of Sandy River			
West of Sandy River Rural Area Plan	62	Orient Road/Dodge Park Boulevard Realignment	Realign the intersection to create a more perpendicular angle. Driveway modifications would be required to serve the autobody shop in the northwest quadrant of the intersection.
	63	Division Drive/Troutdale Road Realignment	Eliminate the northeast leg of the intersection between SE Division Drive and SE Troutdale Road to create one intersection. Realign each end of the segment proposed for closure. While projected 2020 PM peak hour traffic volumes satisfy signal warrants, signalization is not recommended until additional warrants are satisfied. All-way stop control would provide LOS D with projected 2020 PM peak hour traffic volumes, while adding an eastbound right turn lane would provide LOS C.
	64	302nd Avenue/Orient Drive/Bluff Road Realignment	Potential options include realigning SE Orient Drive to intersect SE Bluff at a more perpendicular angle or creating a left turn lane for eastbound traffic on SE Orient Drive. Either option may require realignment of SE Teton Drive. Further engineering analysis will be necessary to determine a preferred alignment. Signalize realigned intersection when warranted.
	65	Oxbow Drive/327th Avenue Realignment	Channelizing the broad paved area on SE 327th Avenue at the approach to SE Oxbow Drive to create a more perpendicular intersection is recommended to improve sight distance and reduce the potential for conflict between westbound left turns and northbound left turns.
	66	Lusted Road/302nd Avenue/Pipeline Road Realignment/Intersection Consolidation	Further engineering analysis is recommended to determine if intersection consolidation is feasible fiven the surrounding vertical grades and the location of a sewage holding tank in the center of the intersection. Recent parking restrictions enacted by the County may be adequate for the near term.
	67	Lusted Road/Powell Valley Road/282nd Avenue Consolidation	Realignment to connect SE Lusted Road directly with SE Powell Valley Road is included in the County's Capital Improvement Plan and Program. The project would require further engineering analysis and coordination with the City of Gresham to develop a recommend alignment. A traffic signal is warranted based on projected 2020 PM peak hour volumes, and would provide LOS B operations.
	68	282nd Avenue/Stone Road Turn Lanes	The addition of turn lanes in the northbound and southbound direction on 282nd would reduce the high incidence of rear end crashes at this location. Some roadway widening would be necessary.
	69	Shoulder Widening to Meet Updated Standards	Prioritization for shoulder improvements within the West of Sandy River rural area should be given to roadways connecting to school sites, especially Barlow High School. Proposed shoulder widening should be evaluated based on potential impacts on drainage and adjacent productive lands. For shoulders wider than 1.8 meters, the adopted County standards require paved width of 1.5 meters. The remaining 0.3 meters may be unpaved. Shoulder widening should be incorporated into routine roadway maintenance wherever possible.
Multnomah County CIPP	70	Cochran Drive: Troutdale Road to westerly 2175' (PN 145)	Reconstruct to major collector standards: 2 travel lanes, center lane/median, sidewalks, bike lanes, and culvert replacement. $7,442,765

	71	Troutdale Road: Stark St to Division Drive (PN TBD)	Reconstruct with 2 travel lanes; construct center turn lane/median, sidewalks, bicycle lanes between Stark and Strebin. Reconstruct Troutdale Road/Division Drive intersection including new fish culverts. $8,297,000
	72	Sweetbriar Road: Troutdale Road to E City Limit (PN 149)	Widen to neighborhood collector standards with 2 travel lanes, sidewalk and bike lanes. $2,740,748
	73	Orient Drive/Bluff Road (PN 706)	Widen Orient Drive to create eastbound left turn lane to Bluff Road, realign Bluff and Teton to create perpendicular intersection. $685,247
	74	Orient Drive/Dodge Park Boulevard (PN 703)	Widen Orient Drive to create eastbound left turn lane. $373,616
	75	Oxbow Drive/Altman Road (PN 707)	Widen Oxbow Drive to create westbound left turn lane to Altman Road, realign intersection to a 5 perpendicular intersection. $ 790,693
	76	302nd Avenue/Lusted Road (PN 704)	Realign Lusted Road and Pipeline Road to create perpendicular intersection at 302nd, add left turn lane to each leg of intersection. $5,613,717
	77	Division Drive/Troutdale Road (Included in Collector project above) (PN 186)	Realign intersection, eliminating NE leg, producing a 4-way intersection. Replace 3 existing culverts identified as fish barriers. $ -
	78	Dodge Park Boulevard: 302nd to County Line	Shoulder bikeway. $7,592,686
	79	302nd Avenue: Division to Bluff	Shoulder bikeway. $3,878,852
	80	Orient Drive: Welch Road to Dodge Park Boulevard	Shoulder bikeway. $1,523,441
	81	Oxbow Park Road: Oxbow Drive to Road End	Shoulder bikeway. $1,834,695
	82	Oxbow Drive: Division Drive to Hosner Road	Shoulder bikeway. $5,393,681
	83	Oxbow Drive: Hosner Terrace to Oxbow Park Road SE	Shoulder bikeway. $1,259,838
	84	SE Division Drive: UGB to Troutdale Road	Bike lanes. $945,518
	85	Troutdale Road: Strebin Road to 282 Avenue	Bike lanes. $3,292,979
	86	SE Division Drive: Troutdale to Oxbow Parkway	Bike lanes. $3,371,407
Pedestrian Master Plan	87	Stark St: Eavans Ave to 35th St	Add sidewalk to south side
Columbia River Gorge National Scenic Area			
Multnomah County CIPP	88	Historic Columbia River Highway RR Overcrossing: Half miles east of 244th Avenue (PN 199)	Reconstruct railroad bridge to accommodate wider travel lanes, sidewalks, and bike lanes. $9,314,500
	89	Corbett Hill Road/Historic Columbia River Highway (PN 147)	Improve intersection alignment by making stops at right angle. $3,770,920
Other Plans and Projects			

East Metro Connections Plan	90	Sandy River to Springwater multi-modal connection	Projects to provide mutli-modal connections from Downtown Troutdale to Mt. Hood Community College and the Springwater Corridor Trail. CATALYST PROJECTS: Master plan for new multi-modal corridor.
	91	Pleasant Valley	Projects develop the necessary public infrastructure for development of Pleasant Valley Community Plan. CATALYST PROJECTS: Improvements to 174th and Foster.
	92	Catalyst for Springwater District	Projects help develop the necessary public infrastructure for private investment and jobs in this regionally significant employment area. Projects include a new interchange on US 26 and an extension of Rugg Road to connect US 26 and Hogan, as well as collector street improvements to provide needed access for future jobs and employment. CATALYST PROJECTS: New interchange on US 26 and arterial connections.
Pedestrian Master Plan	93	Interlachen Lane: Marine Dr to Blue Lake Rd	Add sidewalks to both sides

FUTURE CONDITIONS SUMMARY

The following highlights key information that can be used as part of future alternatives analyses tasks.

- Population and employment in the rural areas is expected to grow at approximately 3 – 3.5 percent per year. Although not projected to result in traffic congestion in the rural areas, this growth will continue to have impacts on safety and conflicts between different modes.
- Multnomah County has several different plans that identify transportation improvements in the County's rural unincorporated areas. These projects will be evaluated in the Alternatives Analysis phase of this project to determine if they are still warranted, how they should be prioritized, and if there are additional needs that require additional projects, programs, or policies to address them.

NEXT STEPS

The information in this memorandum will be reviewed by County staff and shared with the Transportation Subcommittee of the County's Comprehensive Plan Update Project Advisory Committee. Input will be requested on the existing and future conditions and currently planned project list to provide direction for the alternatives analysis.

REFERENCES

1. ODOT Analysis Procedures Manual
2. Highway Safety Manual
3. NCHRP Report 641 *Guidance for the Design and Application of Shoulder and Centerline Rumble Strips*

MAP ATLAS

Figure 1 Study Area

Figure 2 Existing Housing Density

Figure 3 Existing Zoning

Figure 4 Activity Centers

Figure 5 Roadway Jurisdiction

Figure 6 Roadway Pavement Conditions

Figure 7 Roadway Functional Classification

Figure 8 Speed Limits

Figure 9 Pavement Width

Figure 10 Roadway Intersections

Figure 11 Existing Traffic Volumes

Figure 12 Crash Reports by Severity

Figure 13 Bridge Locations

Figure 14 Railroad Crossings

Figure 15 Bicycle Facilities

Figure 16 Transit Facilities

Figure 17 Truck Routes

Figure 18 Change in Employees by TAZ – 2010 to 2040

Figure 19 Change in Households by TAZ – 2010 to 2040

Figure 20 Planned Projects

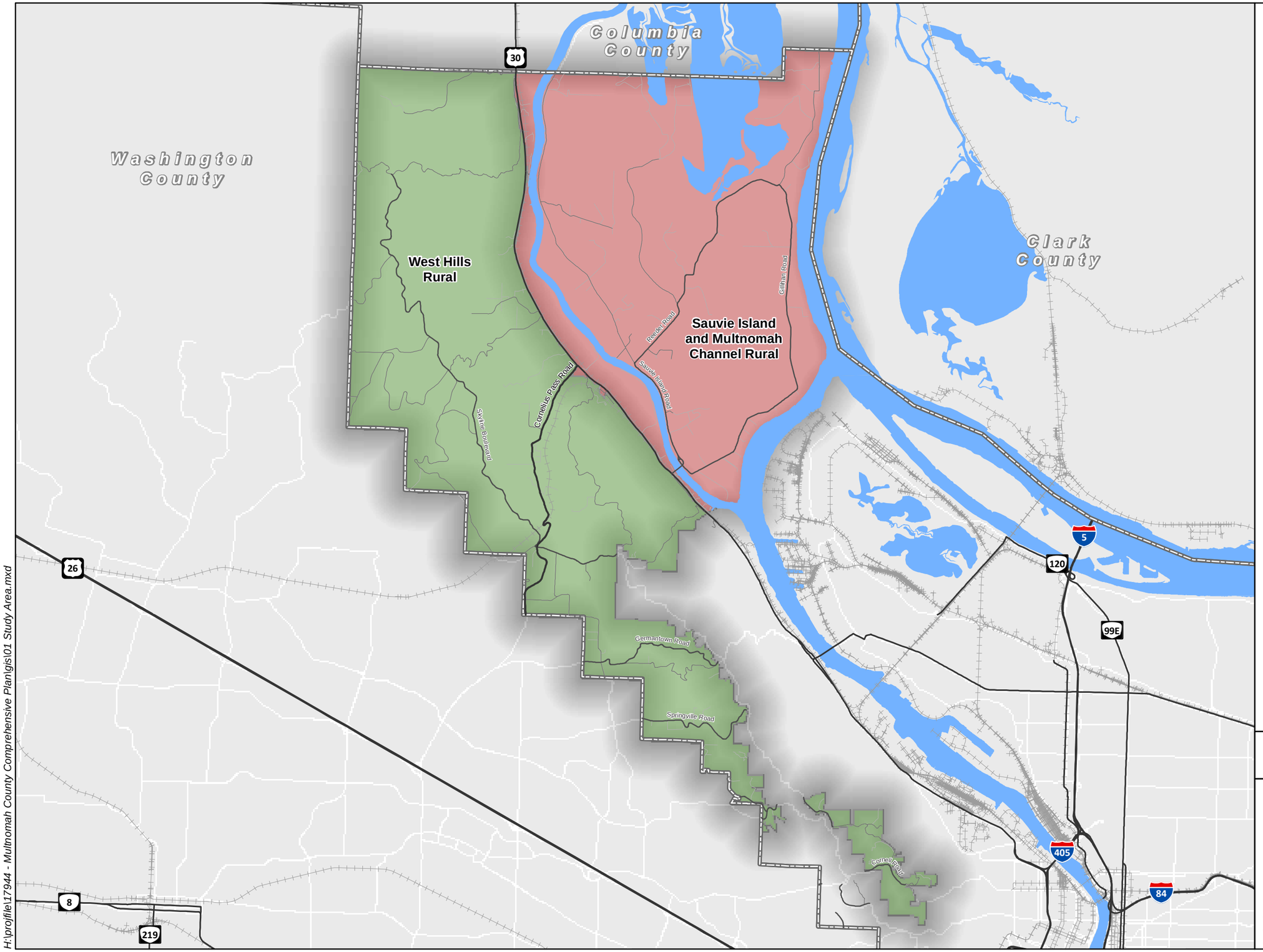
Figure 21 Bicycle Master Plan

Appendix 1 Map Atlas

Multnomah County
Comprehensive Plan

Figure 1A

Study Area



Plan Areas

- Sauvie Island and Multnomah Channel Rural
- West Hills Rural
- County Boundaries

0 0.5 1 2 Miles

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Date:
6/8/2015

Coordinate System:
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Multnomah County
Comprehensive Plan

Figure 1B
Study Area

Clark County
Skamania County
Hood River County
Clackamas County

Government Island
Interlachen Urban
Troutdale UPA
Pleasant Valley Urban
Springwater
West of the Sandy River Rural
East of the Sandy Rural Area
Columbia RIver Gorge National Scenic Rural
Bonneville Dam

Marine Drive
223rd Avenue
Halsey Street
Glisan Street
257thKane Drive
Stark Street
Woodard Road
Hurlburt Road
Evans Road
Brower Road
Lusted Road
Division Drive
Orient Drive
Bluff Road
Gordon Creek Road
Larch Mountain Road
Troutdale Road
302nd Avenue
Quigley Drive

84
30
212
224
211
26

Plan Areas
- Bonneville Dam
- Columbia River Gorge National Scenic Rural Area
- East of Sandy Rural Area
- Government Island
- Interlachen Urban
- Pleasant Valley Urban
- Springwater
- Troutdale UPA
- West of the Sandy River Rural
- County Boundaries

0 1 2 4 Miles

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Multnomah County
Comprehensive Plan

Figure 2A

Existing Household Density

Columbia County

Washington County

Clark County

Gillihan Road

Reeder Road

Sauvie Island Road

Cornelius Pass Road

Skyline Boulevard

Germantown Road

Springville Road

Cornell Road

30

26

8

219

5

120

99E

405

84

Existing Housing Density / Housholds per Acre by TAZ

- 0.00 - 0.07
- 0.08 - 0.16
- 0.17 - 0.60
- 0.61 - 2.03
- 2.04 - 4.52
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

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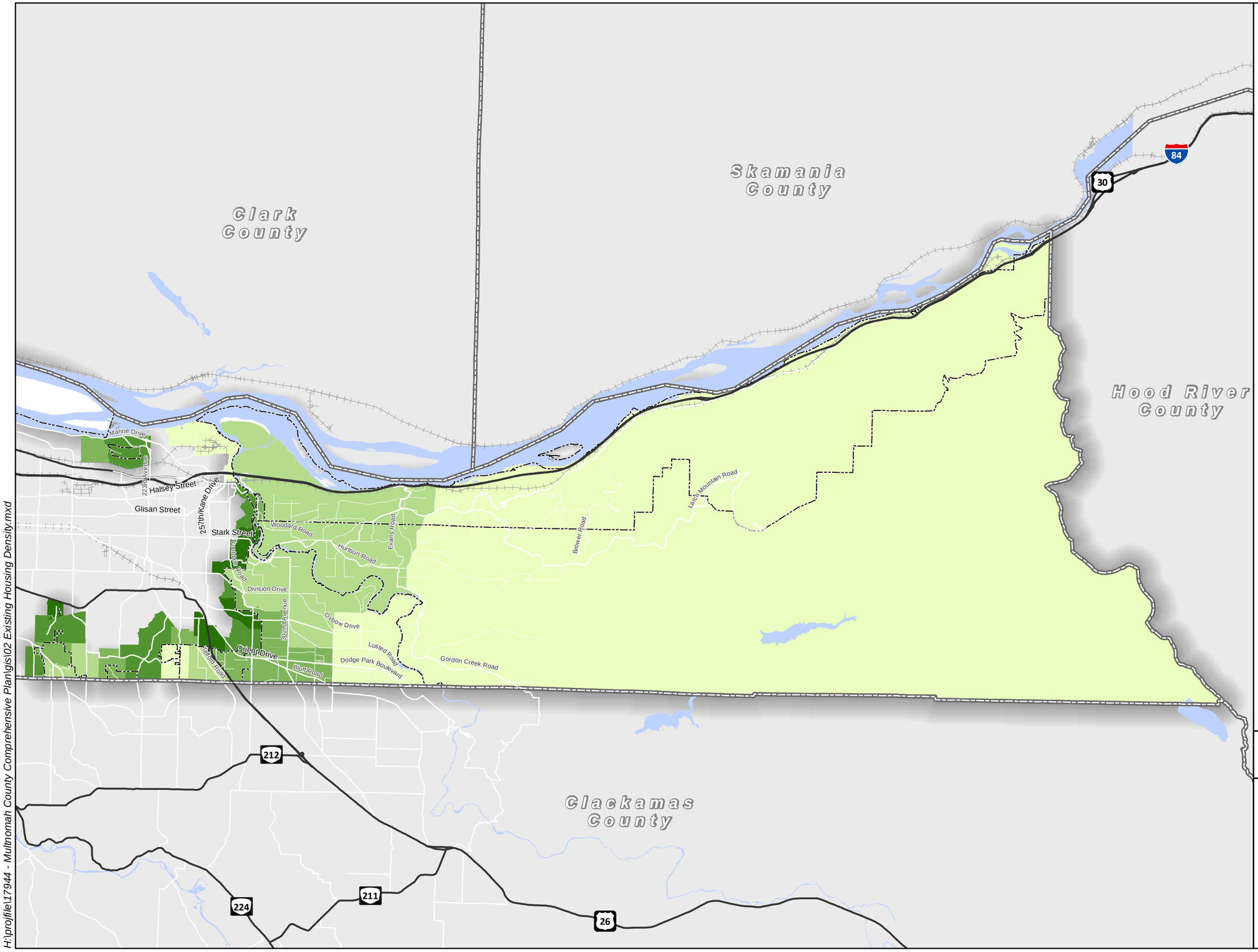

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Multnomah County
Comprehensive Plan

Figure 2B

Existing Household Density

Existing Housing Density / Housholds per Acre by TAZ

- 0.00 - 0.07
- 0.08 - 0.16
- 0.17 - 0.60
- 0.61 - 2.03
- 2.04 - 4.52
- Plan Areas
- County Boundaries

0 1 2 4 Miles

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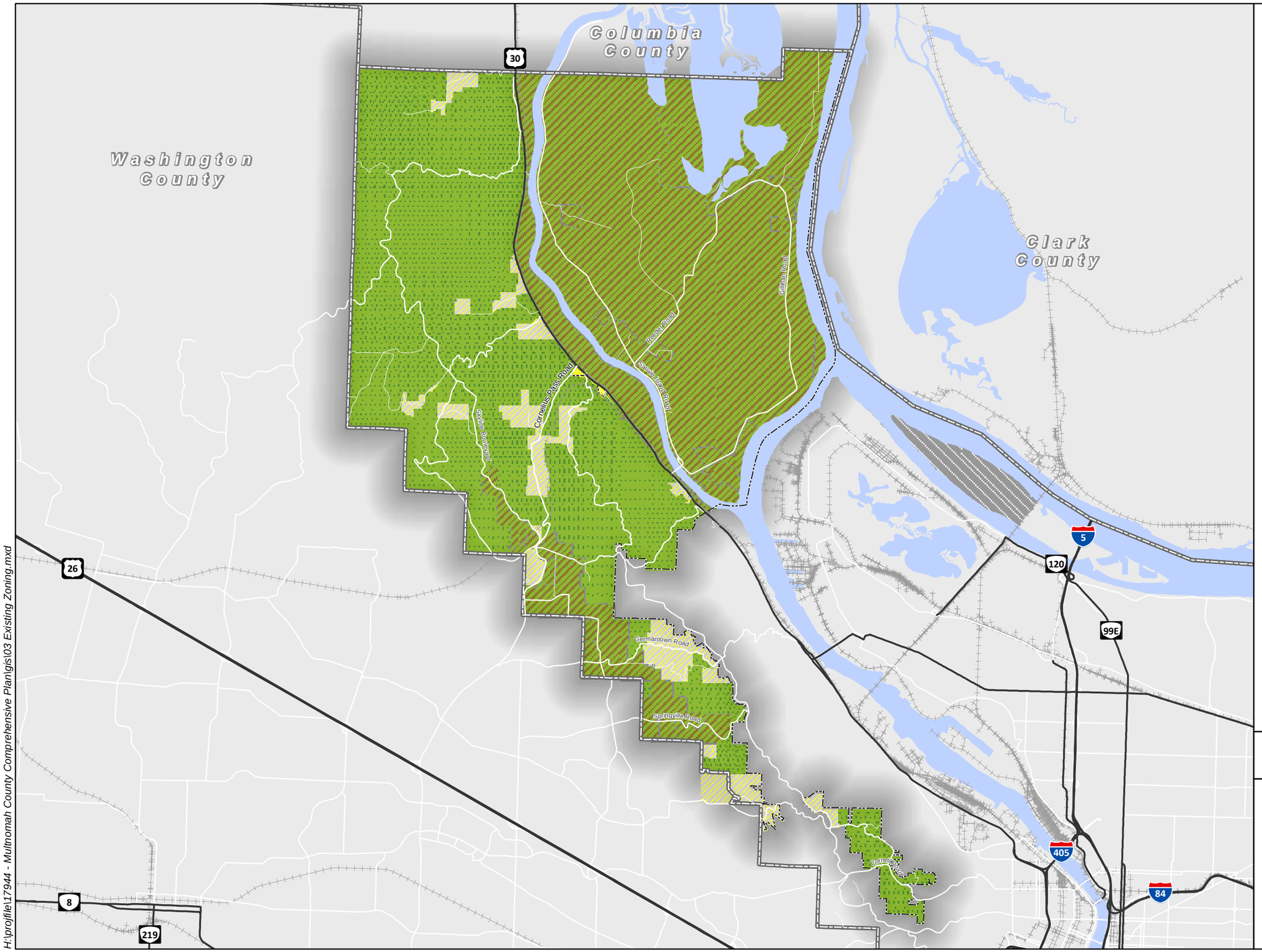
Multnomah County
Comprehensive Plan

Figure 3A

Existing Zoning



Zoning

- Rural Residential
- Rural Center Residential
- Farm Use Areas
- Forest Use Areas
- Portland Zoning Management
- Rural Plan Areas
- County Boundaries

0 0.5 1 2 Miles

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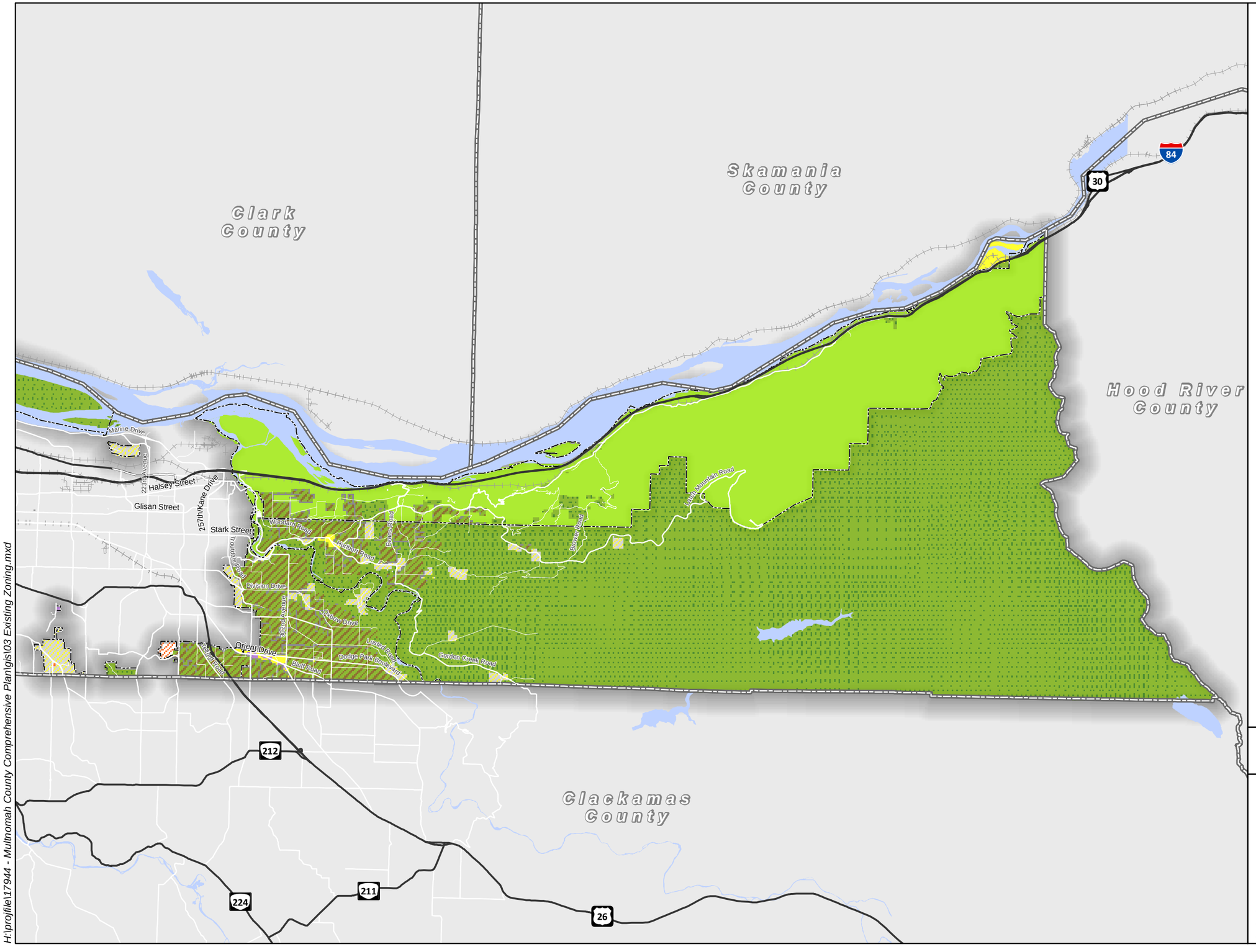
Multnomah County
Comprehensive Plan

Figure 3B
Existing Zoning



Zoning

- Urban Future District
- Rural Residential
- Retail Commercial
- Rural Center Residential
- Industrial, Manufacturing
- Farm Use Areas
- Forest Use Areas
- Columbia River Gorge NSA General Management Area
- Gresham Zoning Management
- Rural Plan Areas
- County Boundaries

0 1 2 4 Miles

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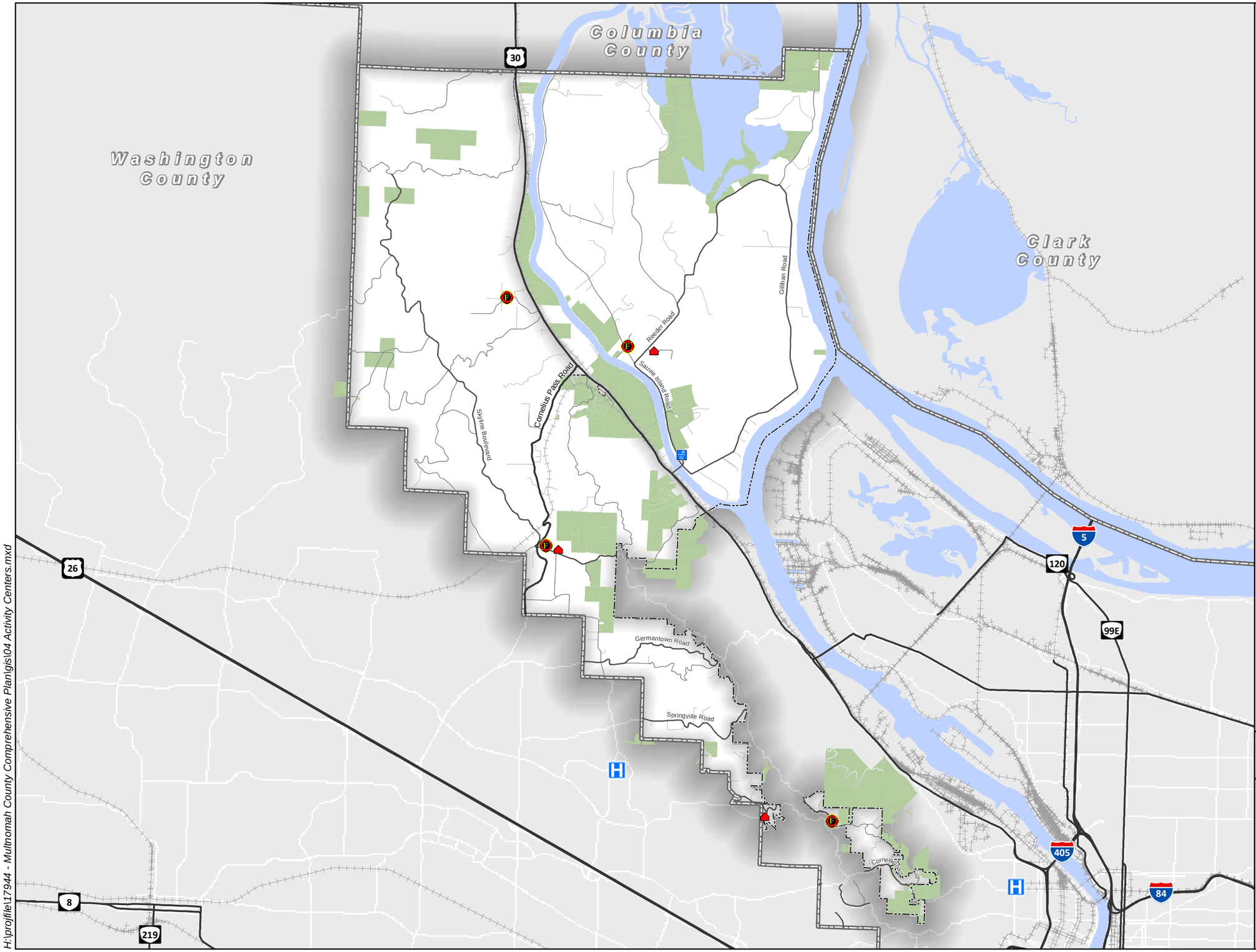

Multnomah County
Comprehensive Plan

Figure 4A
Activity Centers

Activity Centers

- Hospital
- School
- Park N' Ride
- Fire Station
- Public Lands
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

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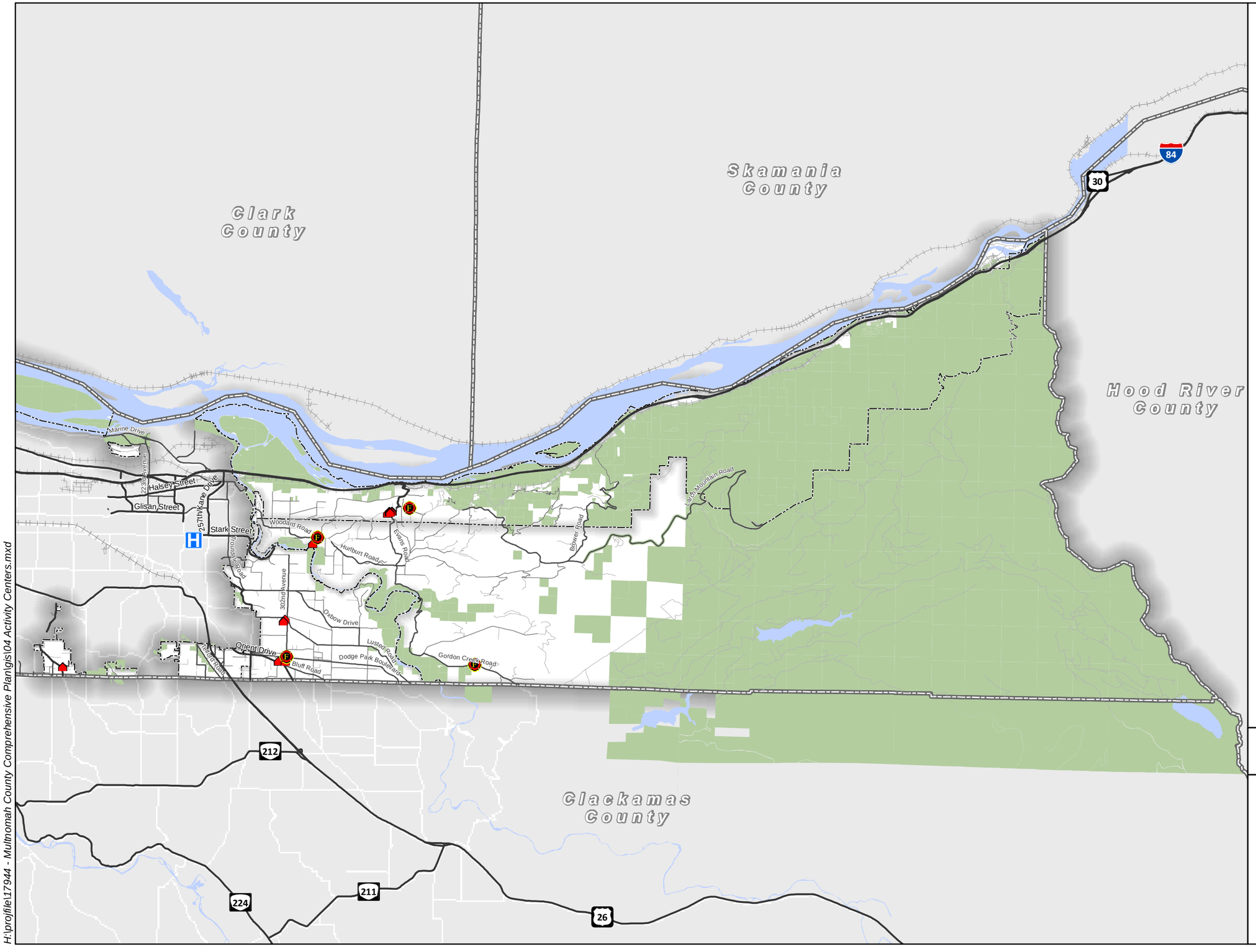
Multnomah County
Comprehensive Plan

Figure 4B
Activity Centers



Activity Centers

- Hospital
- School
- Park N' Ride
- Fire Station
- Public Lands
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- County Boundaries

0 1 2 4 Miles

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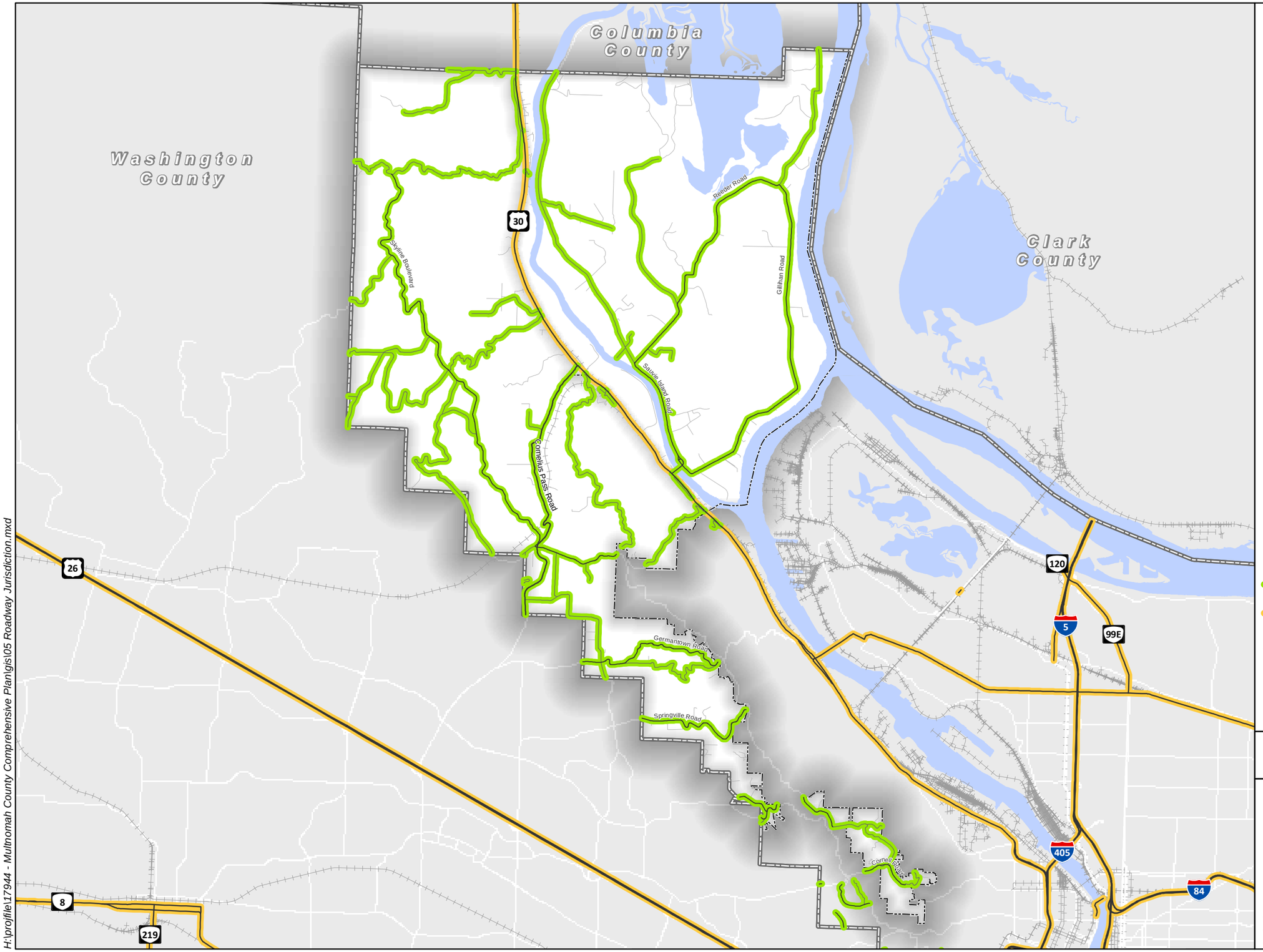

Multnomah County
Comprehensive Plan

Figure 5A

Roadway Jurisdiction

- Multnomah County Roadways
- ODOT Roadways
- Local Roads (not maintained by county)
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

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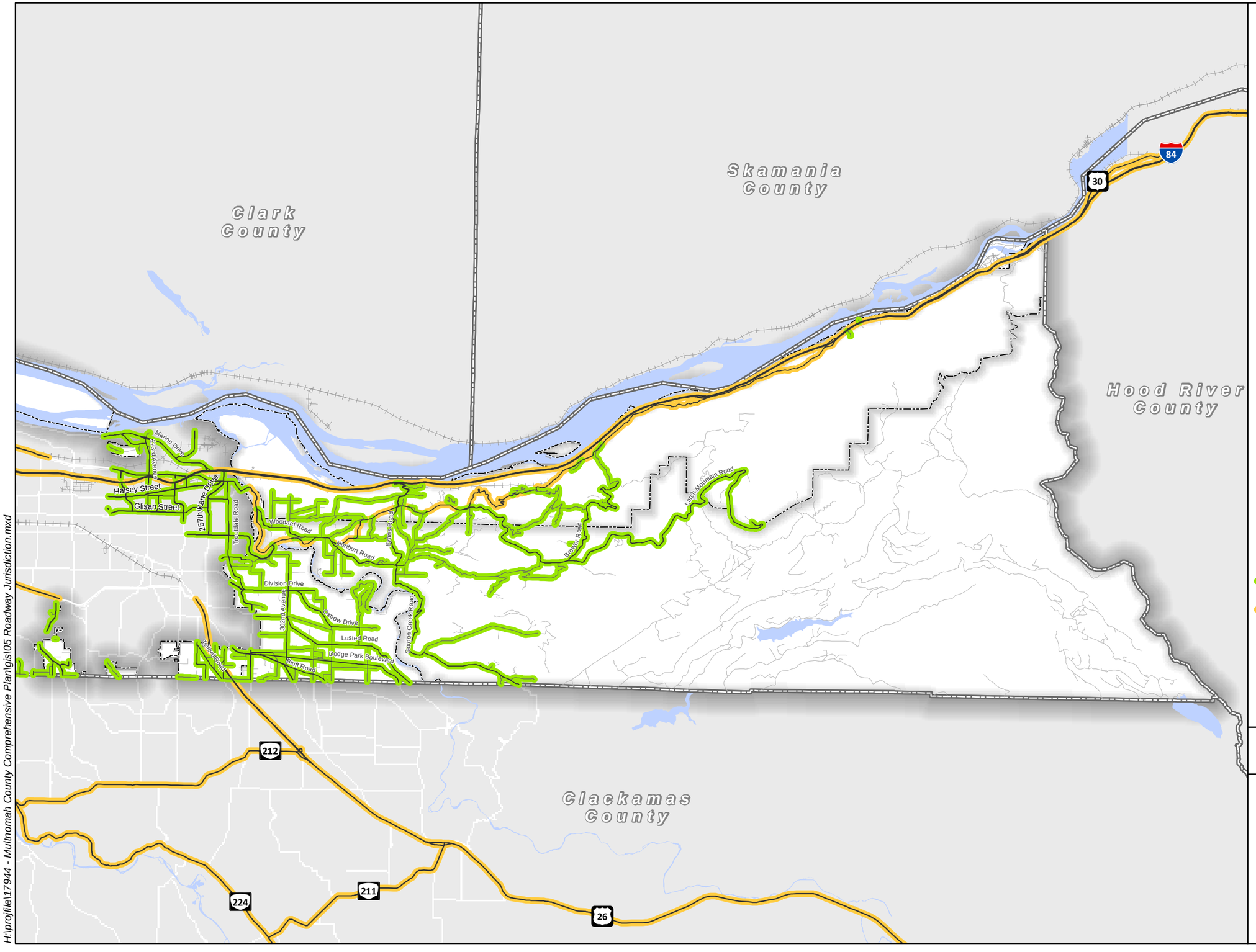
Multnomah County

Comprehensive Plan

Figure 5B

Roadway Jurisdiction



Multnomah County Roadways

ODOT Roadways

Local Roads (not maintained by county)

Plan Areas

County Boundaries

0 1 2 4 Miles

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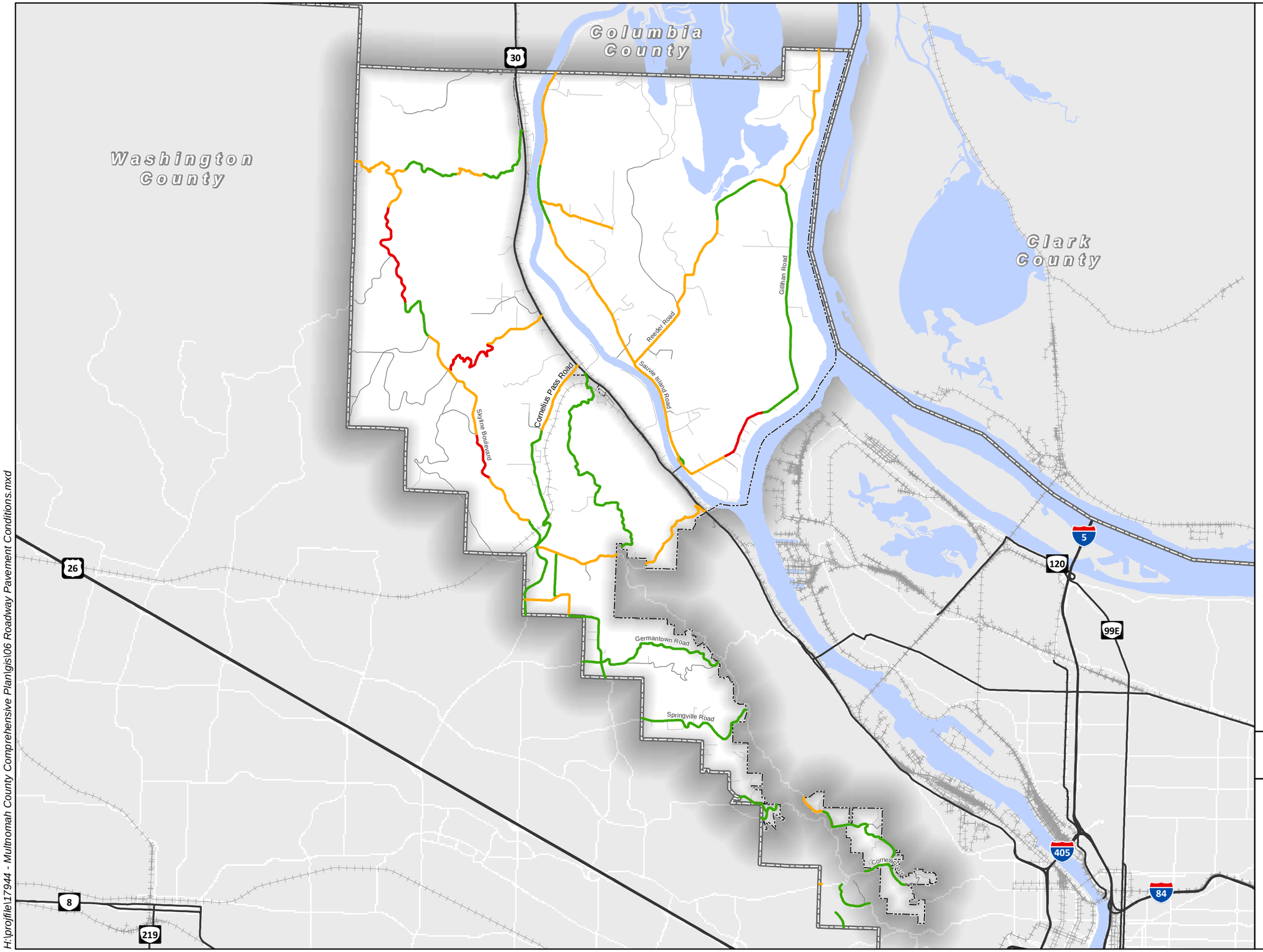
Multnomah County
Comprehensive Plan

Figure 6A

Roadway Pavement Conditions



Current Pavement Conditions Index

- <50 (does not meet county standard)
- 50 - 70 (acceptable for rural roads)
- >70 (meets county standard)
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

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Multnomah County
Comprehensive Plan

Figure 6B

Roadway Pavement Conditions

Clark County

Skamania County

Hood River County

Clackamas County

Marine Drive
223rd Avenue
Halsey Street
Glisan Street
257th Kane Drive
Stark Street
Woodard Road
Hurlburt Road
Evans Road
Blower Road
Larch Mountain Road
Troutdale Road
Division Drive
302nd Avenue
Orbow Drive
Orient Drive
Arata Road
Bluff Road
Dodge Park Boulevard
Lusted Road
Gordon Creek Road

84
30
212
224
211
26

Current Pavement Conditions Index

- <50 (does not meet county standard)
- 50 - 70 (acceptable for rural roads)
- >70 (meets county standard)
- Plan Areas
- County Boundaries

0 1 2 4 Miles

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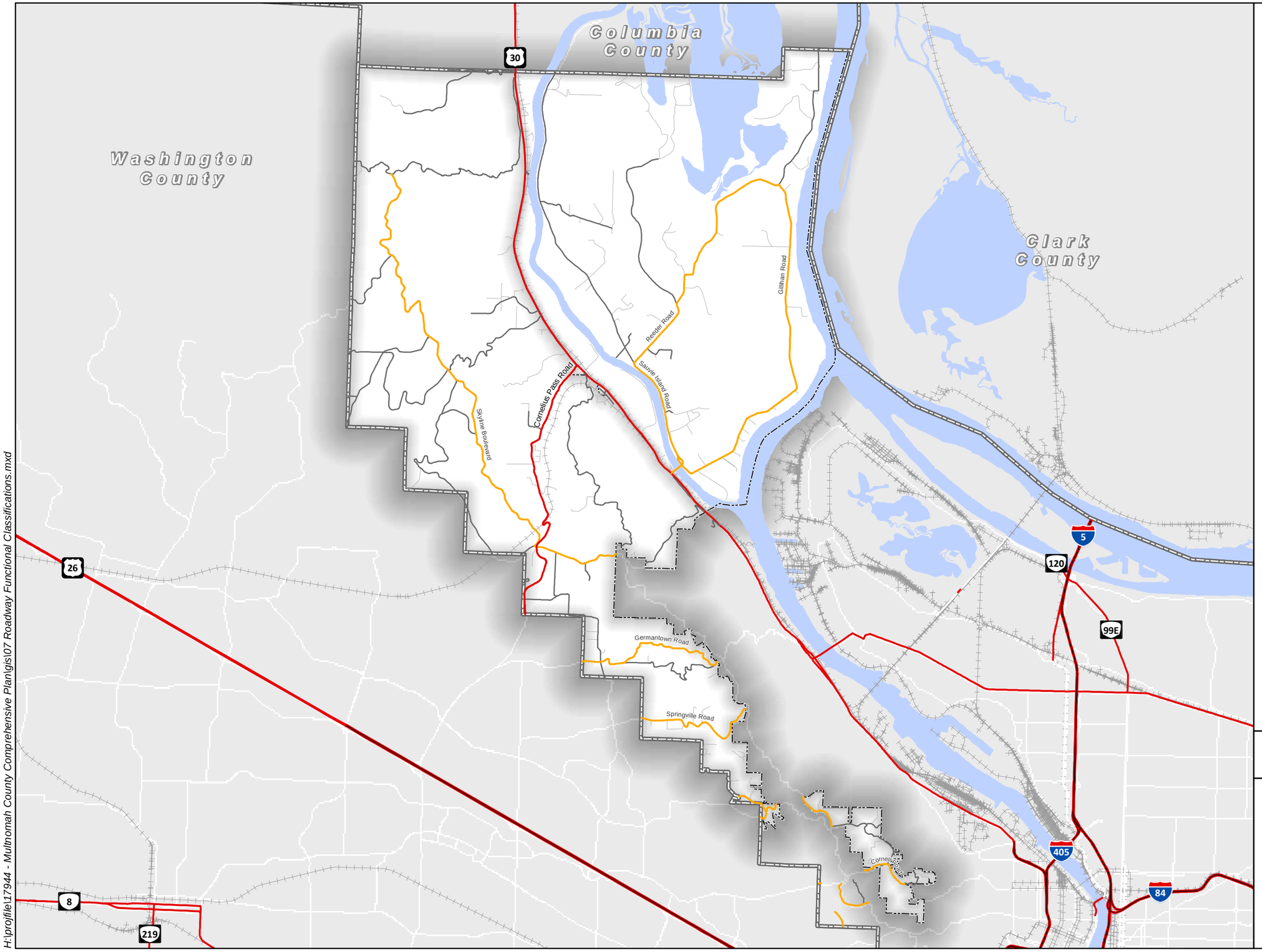
Multnomah County
Comprehensive Plan

Figure 7A

Roadway Functional Classifications



Roadway Functional Classification (MultCo)

- Intersate / Expressway
- Arterials
- Collectors
- Local
- Local (not maintained by county)
- Railroad (ODOT)
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

Prepared By:
Kittelson & Associates, Inc.

Date:
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Coordinate System:
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H:\projfile\17944 - Multnomah County Comprehensive Plan\gis\07 Roadway Functional Classifications.mxd

Multnomah County

Comprehensive Plan

Figure 7B

Roadway Functional Classifications

Clark County

Skamania County

Hood River County

Clackamas County

Marine Drive
Halsey Street
Glisan Street
Stark Street
Woodard Road
Hurlburt Road
Division Drive
Orient Drive
Bluff Road
Dodge Park Boulevard
Lusted Road
Oxbow Drive
Gordon Creek Road
Latch Mountain Road
Blower Road
Evans Road
Fairview Road
Troutdale Road
257th/Kane Drive
223rd Avenue
302nd Avenue

84
30
212
224
211
26

Roadway Functional Classification (MultCo)

- Intersate / Expressway
- Arterials
- Collectors
- Local
- Local (not maintained by county)
- Railroad (ODOT)
- Plan Areas
- County Boundaries

0 1 2 4 Miles

Prepared By:
Kittelson & Associates, Inc.

Date:
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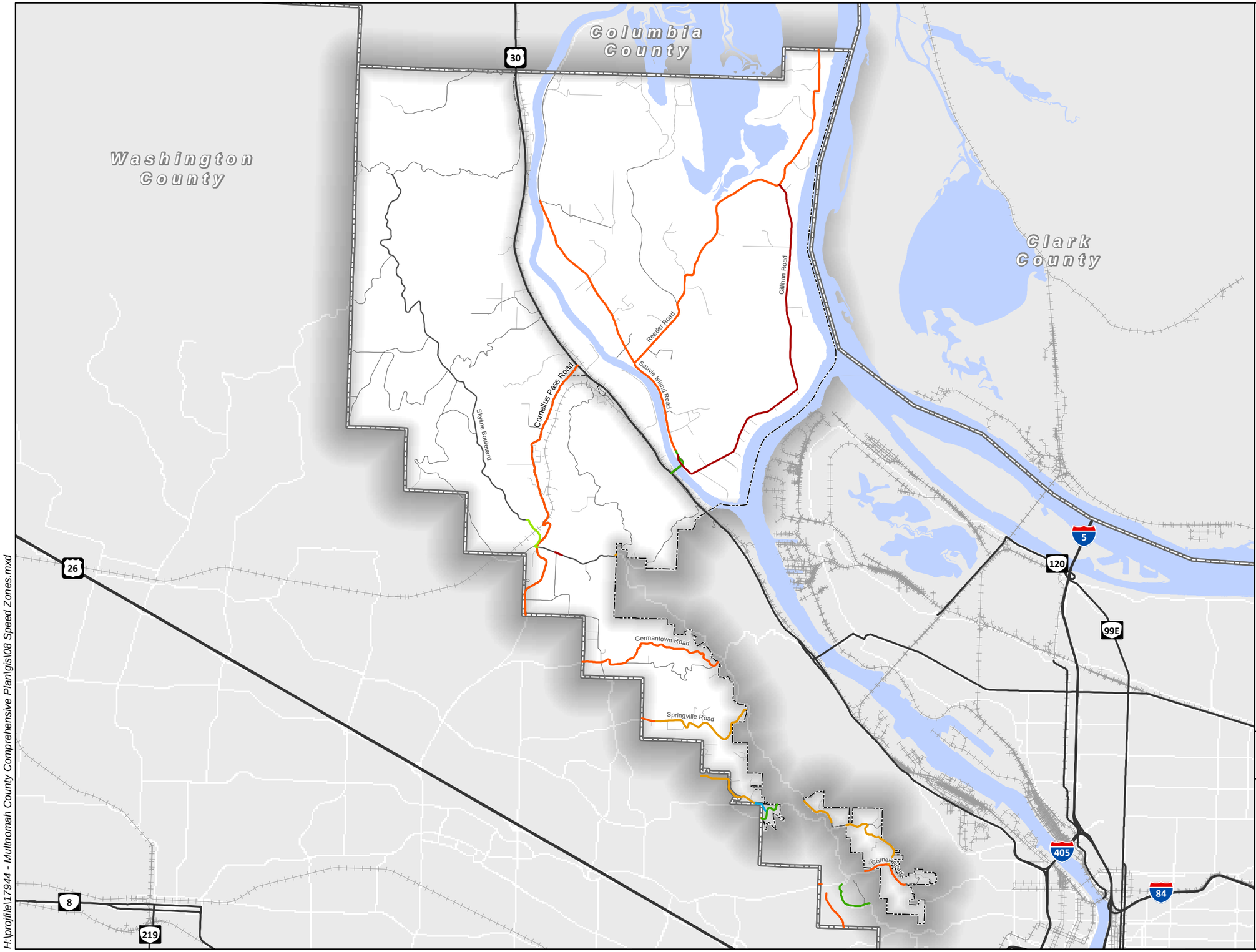

Multnomah County Comprehensive Plan

Figure 8A

Speed Zones

Speed Zones MPH

- 20
- 25
- 30
- 35
- 40
- 45
- 55

Plan Areas

County Boundaries

0 0.5 1 2 Miles

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Date:
6/8/2015

Coordinate System:
NAD 1983 HARN State Plane Oregon North FIPS 3601

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Multnomah County
Comprehensive Plan

Figure 8B
Speed Zones

Clark County
Skamania County
Hood River County
Clackamas County

Marine Drive
223rd Avenue
Halsey Street
Glisan Street
257th/Kane Drive
Stark Street
Troutdale Road
Division Drive
302nd Avenue
Orient Drive
Palmquist Road
Bluff Road
Dodge Park Boulevard
Lusted Road
Gordon Creek Road
Oxbow Drive
Hurlburt Road
Woodard Road
Evans Road
Blower Road
Larch Mountain Road

84
30
212
224
211
26

Speed Zones MPH
- 20
- 25
- 30
- 35
- 40
- 45
- 55

Plan Areas
County Boundaries

0 1 2 4 Miles

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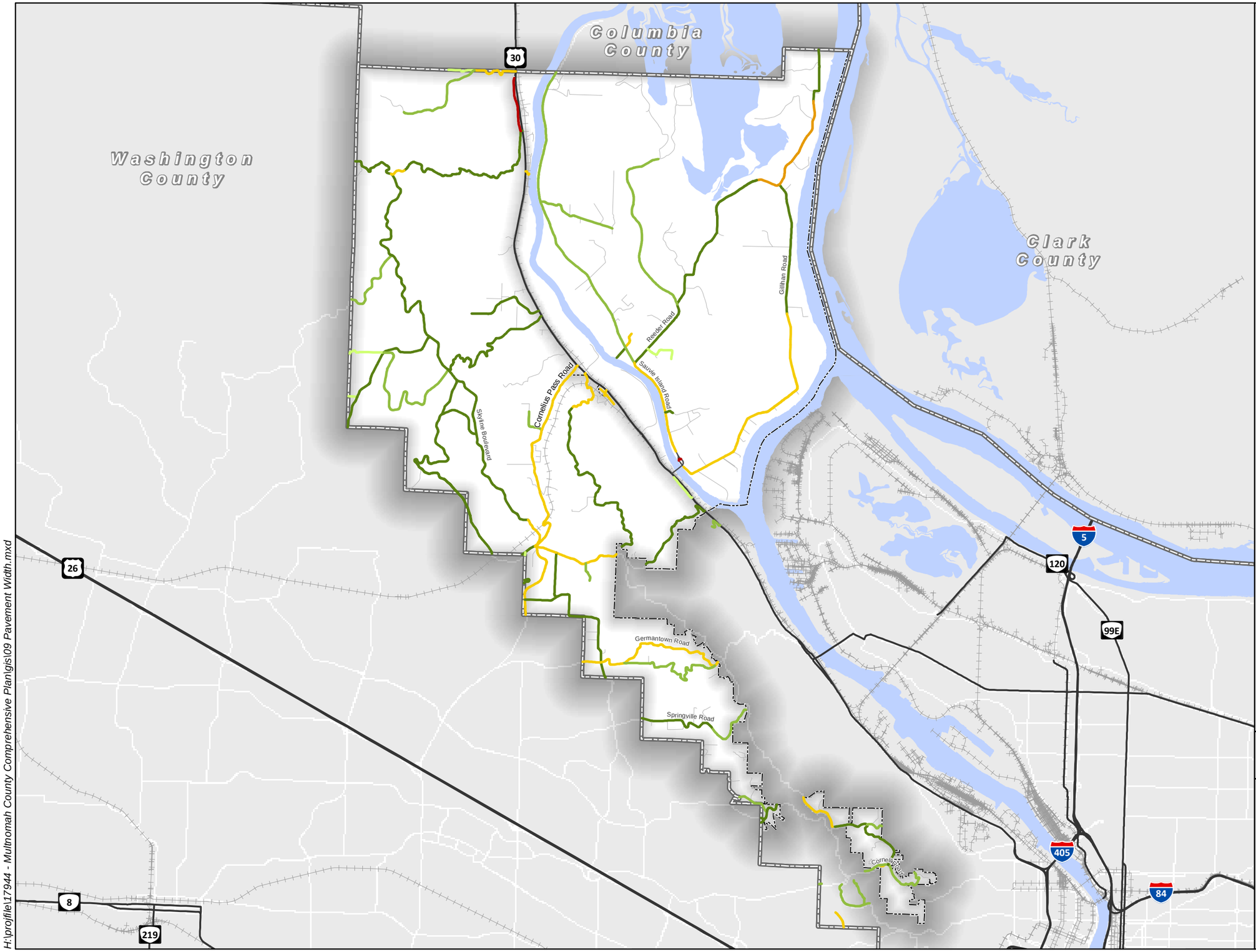

Multnomah County
Comprehensive Plan

Figure 9A
Pavement Width

Pavement Widths
- 10 - 17 ft
- 18 - 21 ft
- 22 - 23 ft
- 24 - 25 ft
- 26 - 28 ft
- 30 - 38 ft
- Plan
- County Boundaries

0 0.5 1 2 Miles

Prepared By:
Kittelson & Associates, Inc.

Date:
6/8/2015

Coordinate System:
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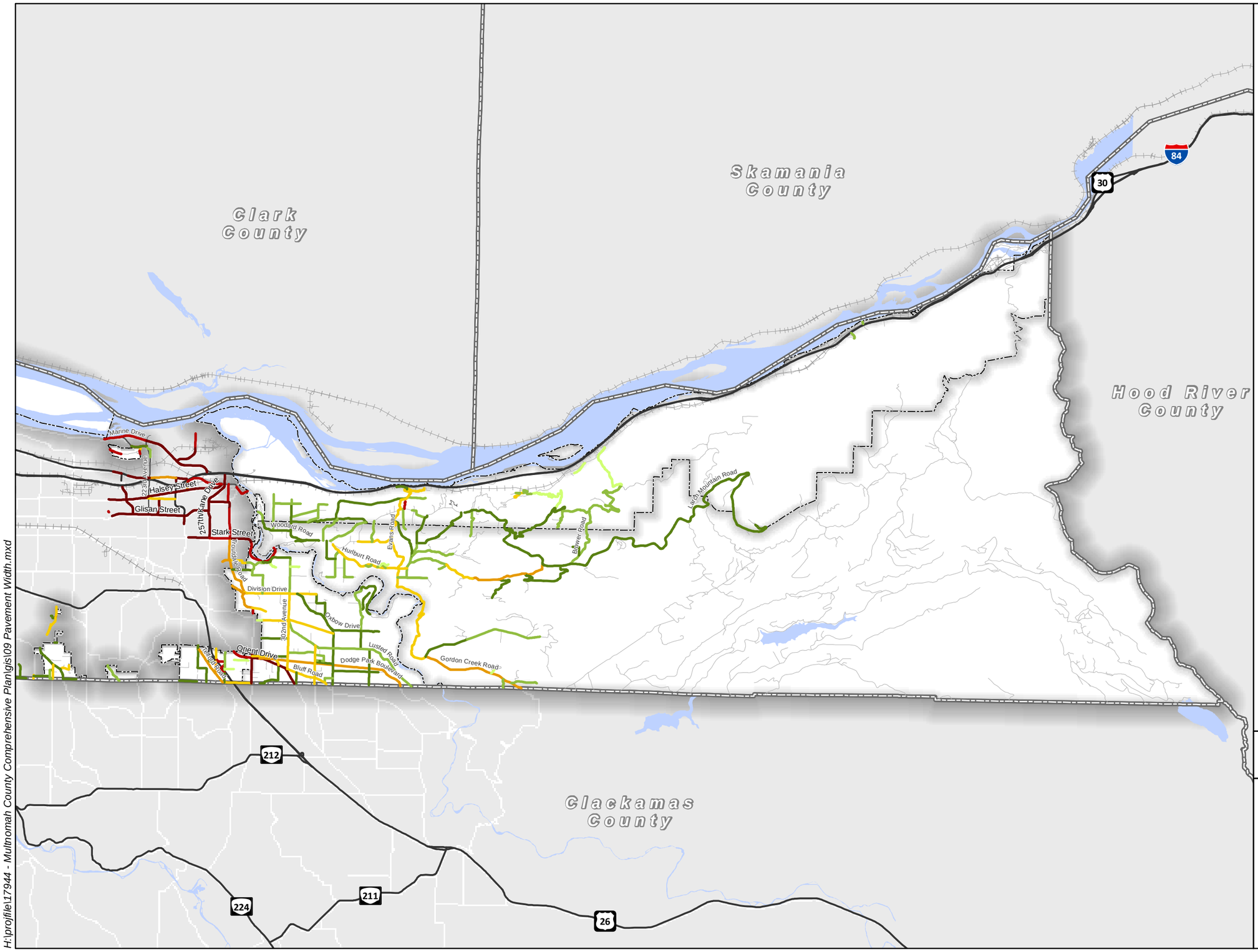

Multnomah County
Comprehensive Plan

Figure 9B
Pavement Width

Pavement Widths
- 10 - 17 ft
- 18 - 21 ft
- 22 - 23 ft
- 24 - 25 ft
- 26 - 28 ft
- 30 - 38 ft
- >39 ft

Plan

County Boundaries

0 1 2 4 Miles

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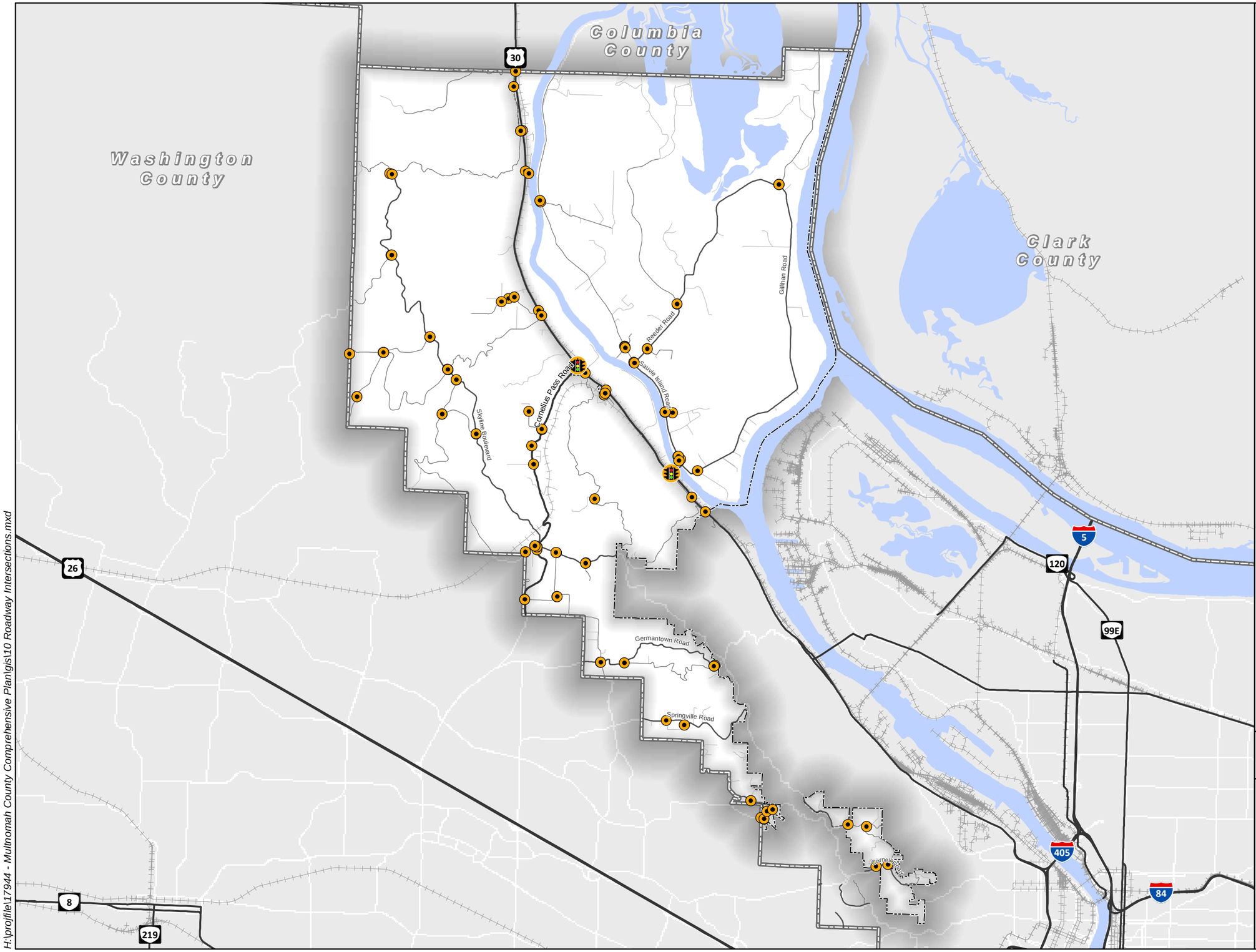

Multnomah County
Comprehensive Plan

Figure 10A

Roadway Intersections

Prepared By:
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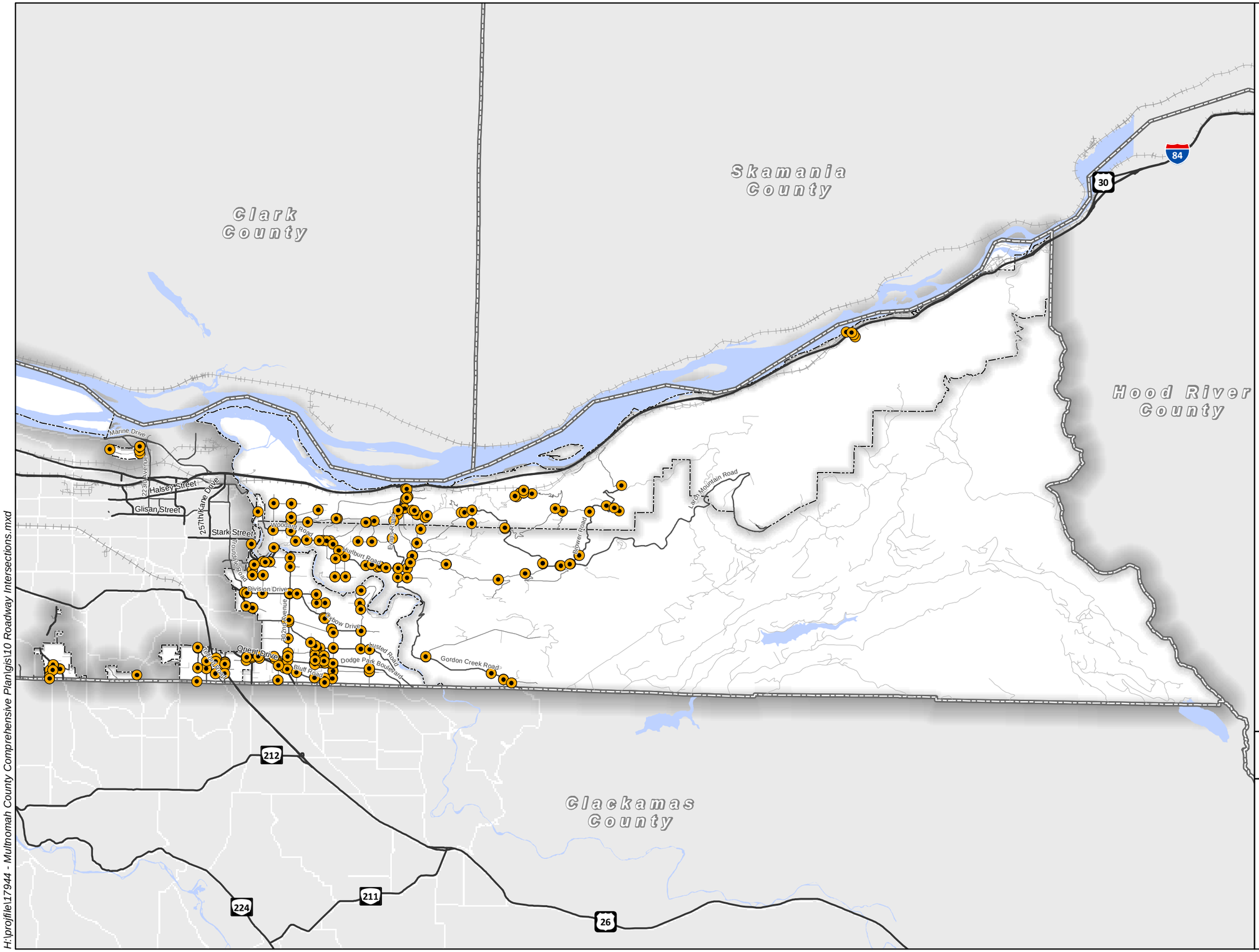
Multnomah County
Comprehensive Plan

Figure 10B

Roadway Intersections



Non-Signalized Intersection

Rural Plan Areas

County Boundaries

0 1 2 4 Miles

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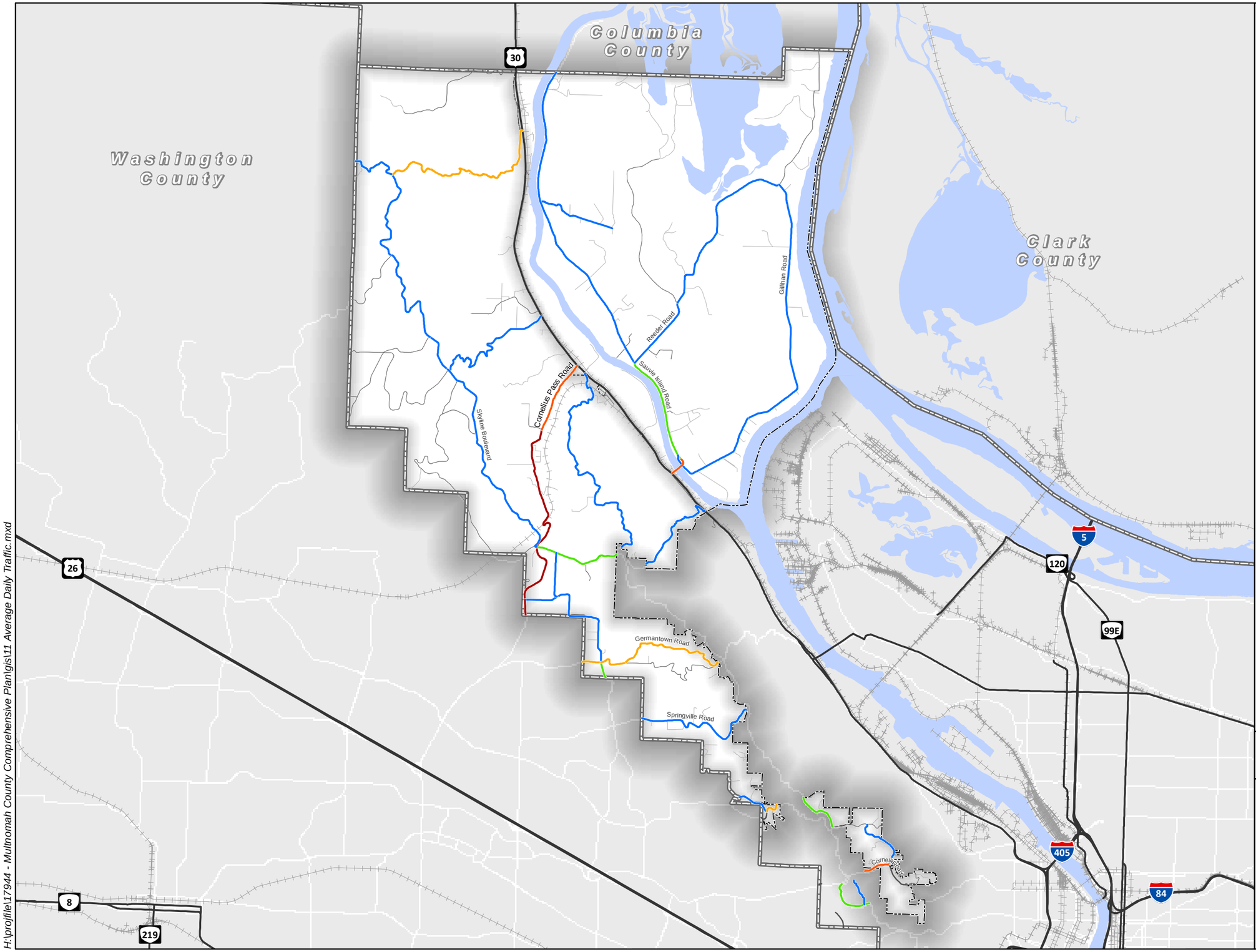

Multnomah County
Comprehensive Plan

Figure 11A
Average Daily Traffic

Average Daliy Traffic (records from 2006 to 2014)

- <1,5000
- 1,500 - 3,000
- 3,001 - 5,000
- 5,001 - 10,000
- >10,000
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

Prepared By:
Kittelson & Associates, Inc.

Date:
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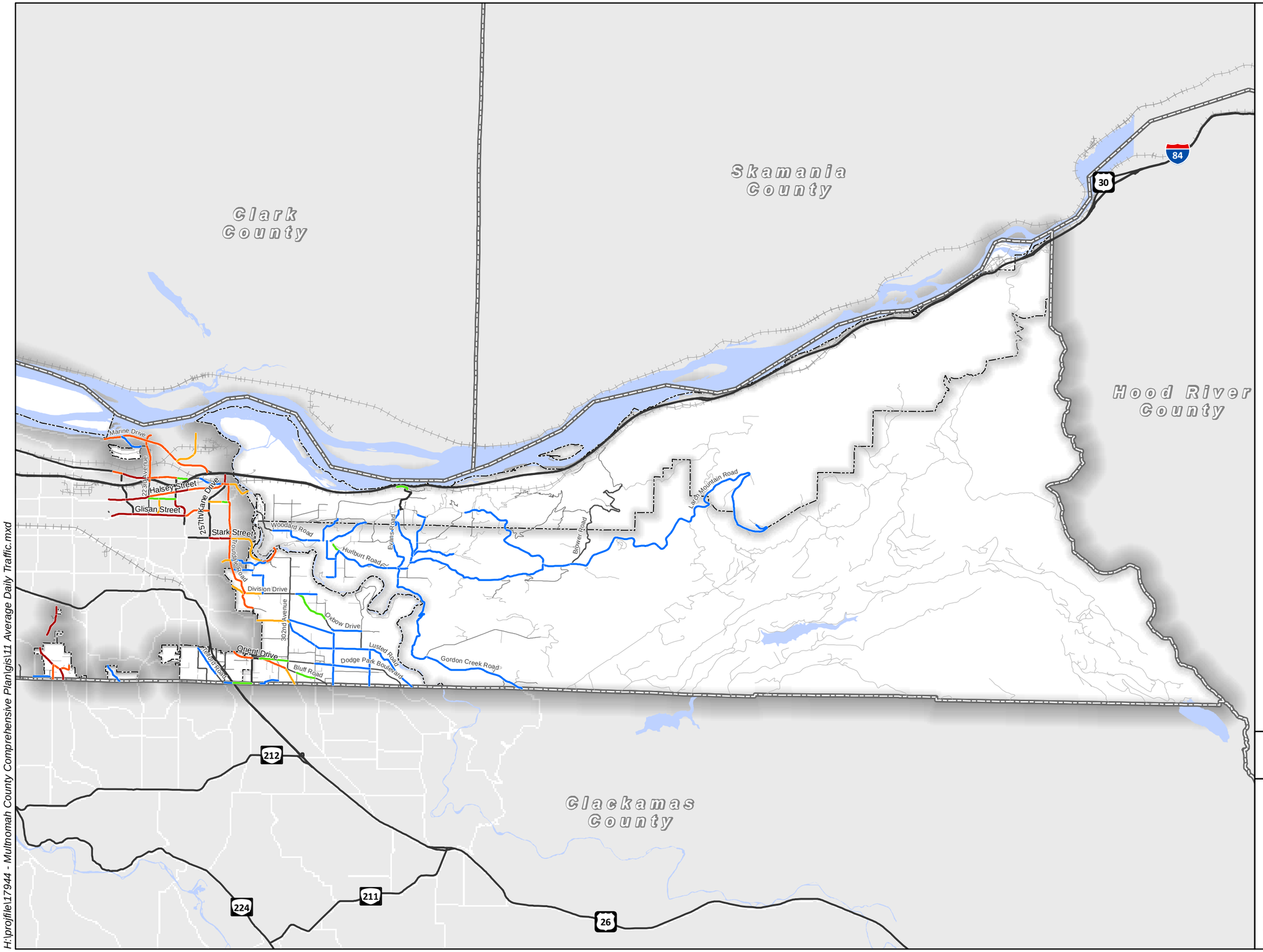
H:\profile\17944 - Multnomah County Comprehensive Plan\gis\11 Average Daily Traffic.mxd



Multnomah County Comprehensive Plan

Figure 11B

Average Daily Traffic

Average Daliy Traffic (records from 2006 to 2014)

- <1,5000
- 1,500 - 3,000
- 3,001 - 5,000
- 5,001 - 10,000
- >10,000
- Plan Areas
- County Boundaries

0 1 2 4 Miles

Prepared By:
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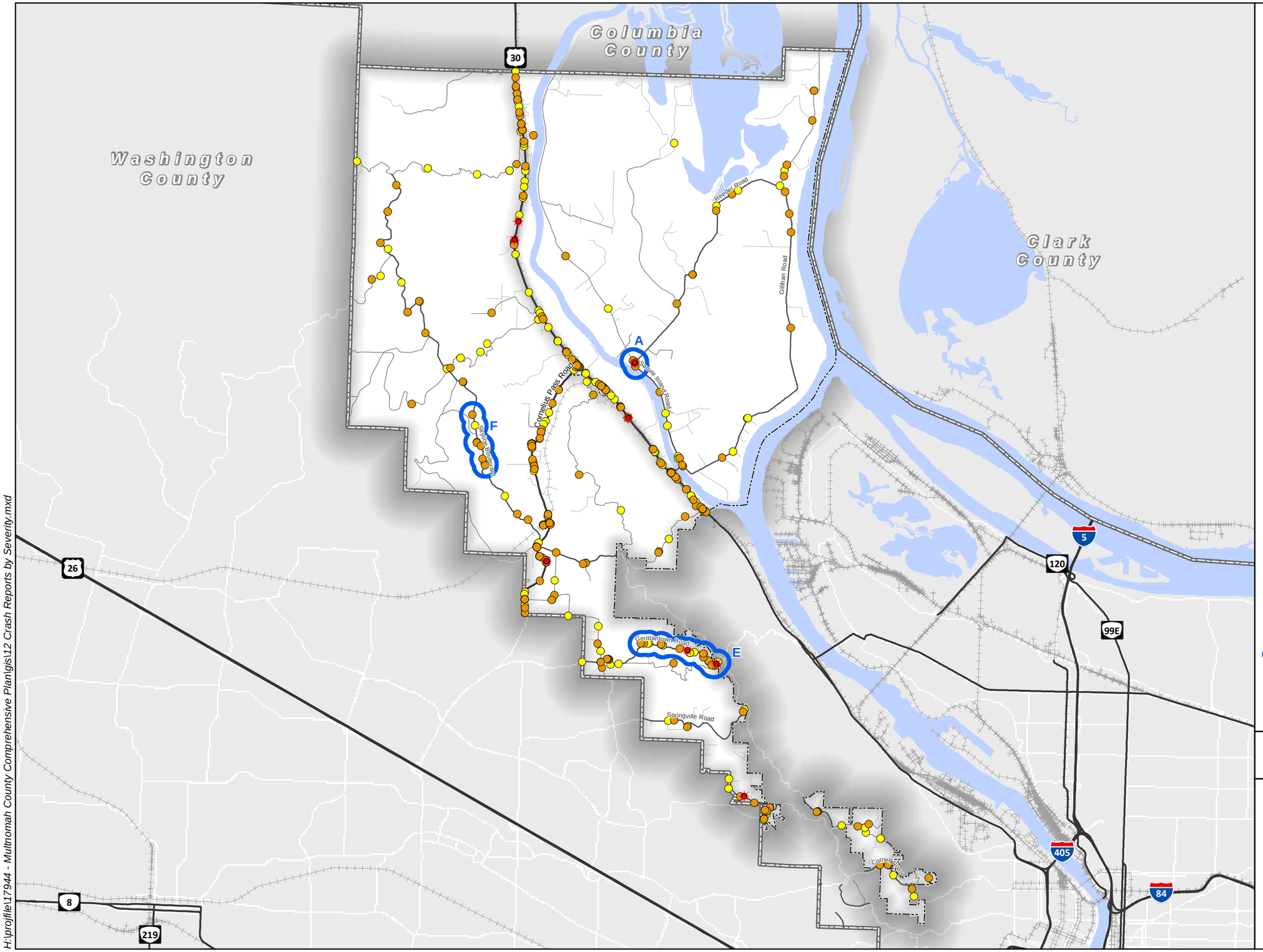

H:\profile\17944 - Multnomah County Comprehensive Plan\gis\12 Crash Reports by Severity.mxd

Multnomah County
Comprehensive Plan

Figure 12A

Crash Reports by Severity

Reported Crashes by Severity from 1/1/2009 thru 1/3/2014

- Fatal crash
- Non-fatal injury crash
- Property damage only crash (PDO)
- Crash Analysis
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

Prepared By:
Kittelson & Associates, Inc.

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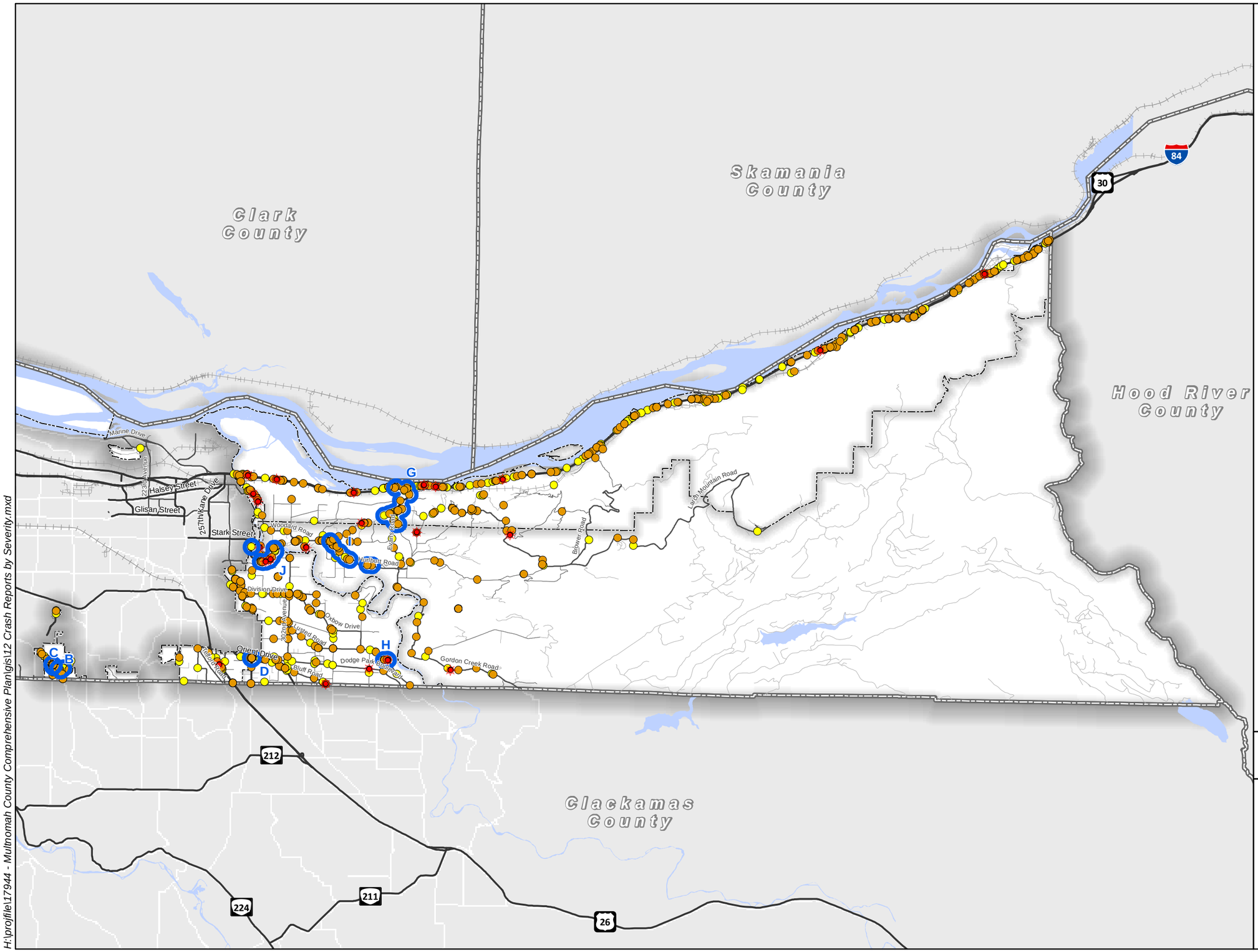

H:\projfile\17944 - Multnomah County Comprehensive Plan\gis\12 Crash Reports by Severity.mxd

Multnomah County
Comprehensive Plan

Figure 12B

Crash Reports by Severity

Reported Crashes by Severity from 1/1/2009 thru 1/3/2014

- Fatal crash
- Non-fatal injury crash
- Property damage only crash (PDO)
- Crash Analysis
- Plan Areas
- County Boundaries

0 1 2 4 Miles

Prepared By:
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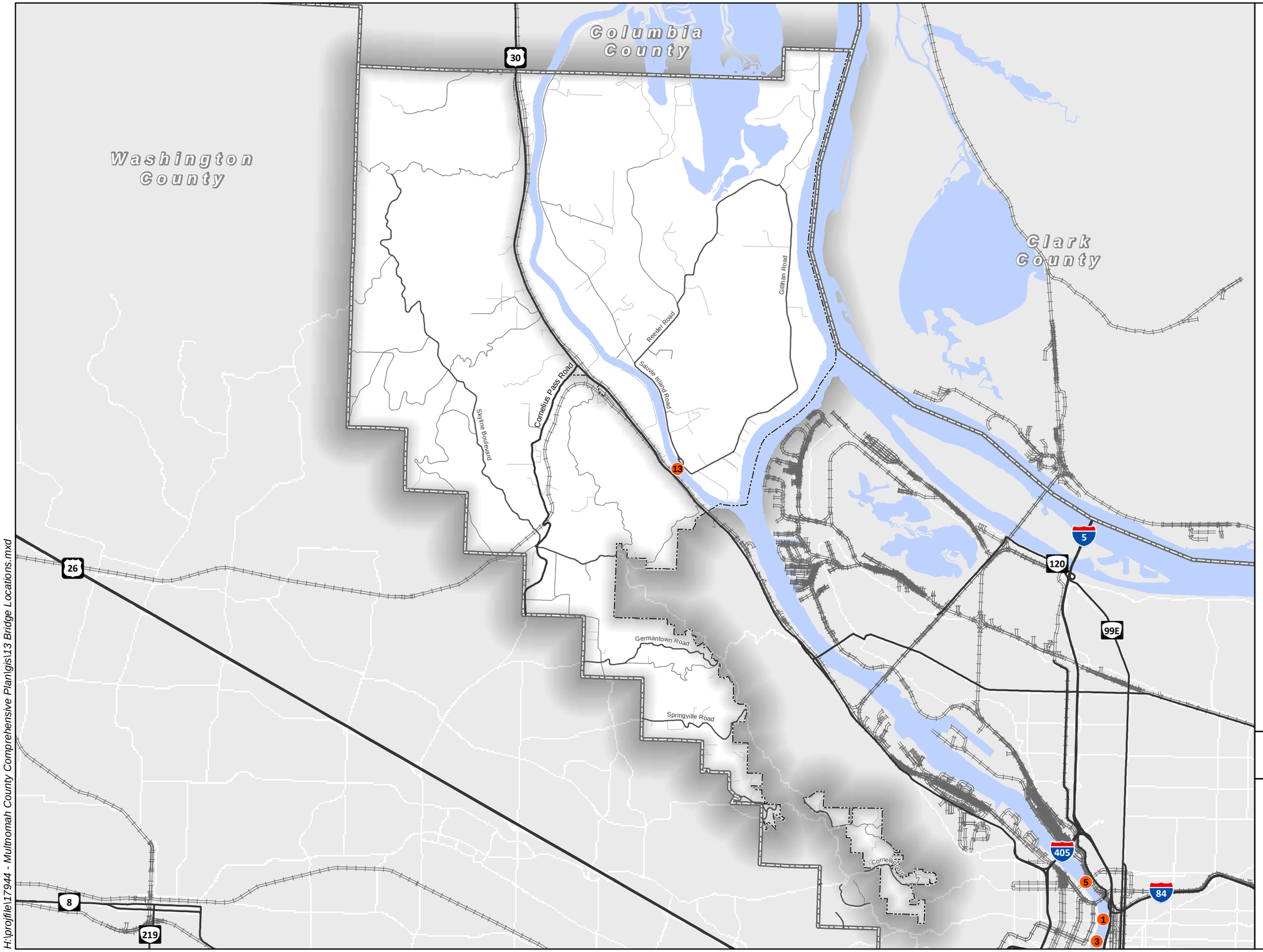

Multnomah County
Comprehensive Plan

Figure 13A

Bridge Locations

Prepared By:
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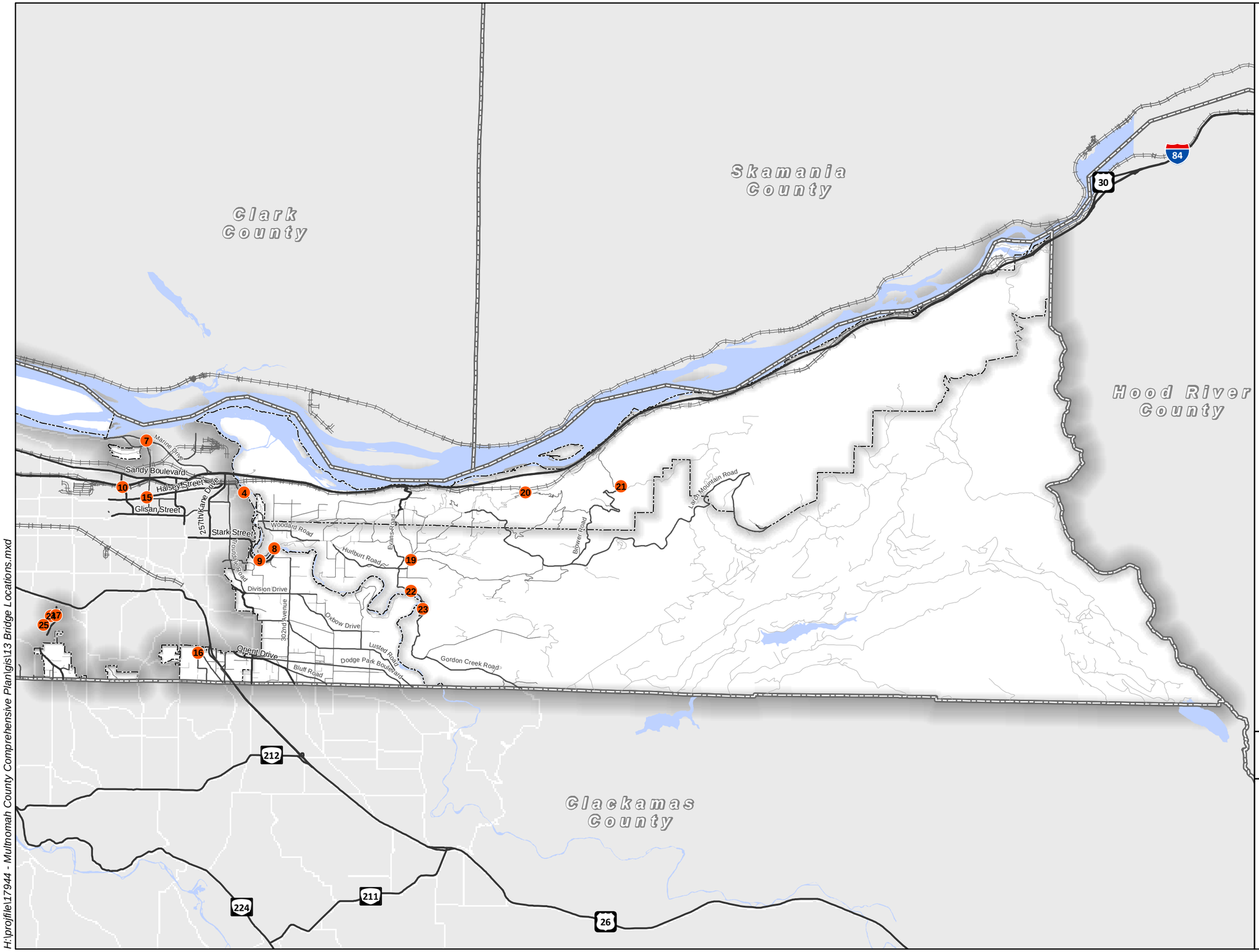
Multnomah County
Comprehensive Plan

Figure 13B
Bridge Locations



Bridge Locations
Plan Areas
County Boundaries

0 1 2 4 Miles

Prepared By:
Kittelson & Associates, Inc.

Date:
6/8/2015

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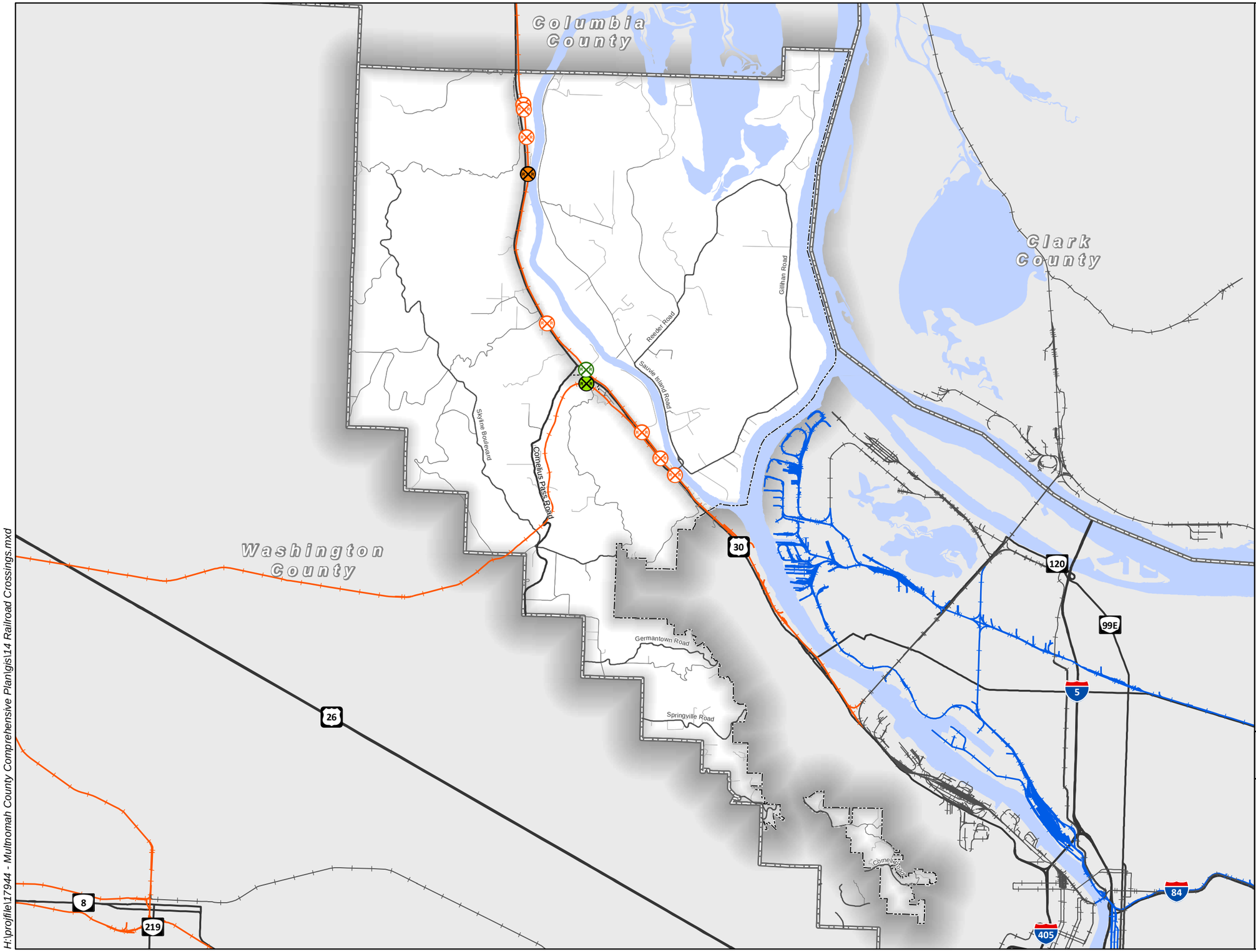

H:\profile\17944 - Multnomah County Comprehensive Plan\gis\14 Railroad Crossings.mxd

Multnomah County
Comprehensive Plan

Figure 14A
Railroad Crossings

Edit, Crossing

- Private At-Grade RR Crossing
- Private Grade-Seperated RR Crossing
- Public At-Grade RR Crossing
- Public Grade-Seperated RR Crossing

Railroad Lines

- Portland and Western
- Union Pacific
- Other Railroad Lines
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

Prepared By:
Kittelson & Associates, Inc.

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Multnomah County
Comprehensive Plan

Figure 14B
Railroad Crossings

Clark County
Skamania County
Hood River County
Clackamas County

Marine Drive
223rd Avenue
Glisan Street
257th Avenue
Stark Street
Woodard Road
Evans Road
Hurlburt Road
Division Drive
Orabow Drive
302nd Avenue
Lusted Road
Dodge Park Boulevard
Bluff Road
Orient Drive
Troutdale Road
Gordon Creek Road
Larch Mountain Road
Blower Road

84
30
212
224
211
26

Edit, Crossing

- Private At-Grade RR Crossing
- Private Grade-Seperated RR Crossing
- Public At-Grade RR Crossing
- Public Grade-Seperated RR Crossing

Railroad Lines

- Portland and Western
- Union Pacific
- Other Railroad Lines
- Plan Areas
- County Boundaries

0 1 2 4 Miles

Prepared By:
Kittelson & Associates, Inc.

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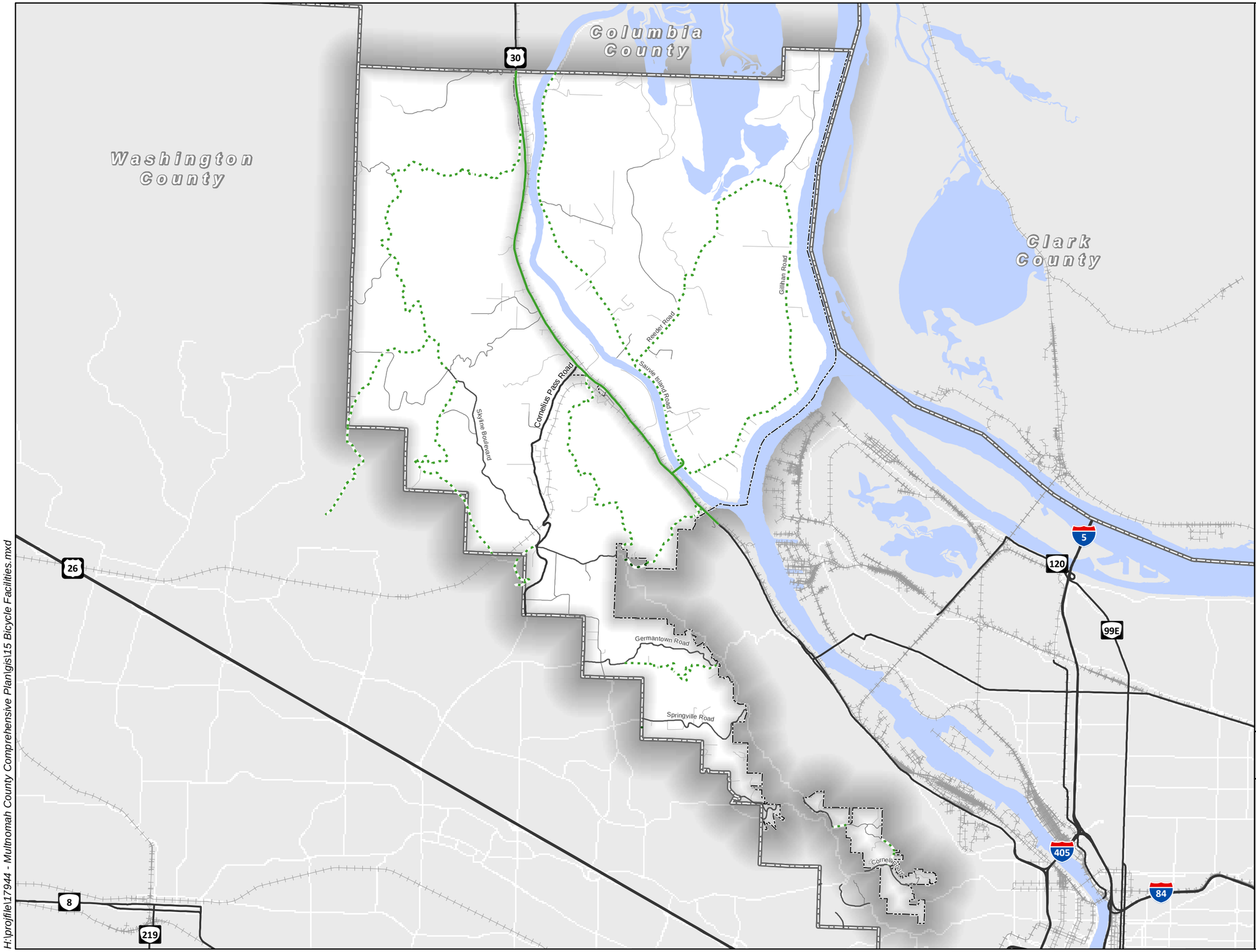

Multnomah County
Comprehensive Plan

Figure 15A
Bicycle Facilities

Bike Routes
- Established bikeway
- Bike friendly street
- Dedicated bike lane
- Helpful connection
- County Boundaries
- Plan Areas

0 0.5 1 2 Miles

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H:\projfile\17944 - Multnomah County Comprehensive Plan\gis\15 Bicycle Facilities.mxd

Multnomah County

Comprehensive Plan

Figure 15B

Bicycle Facilities

Clark County

Skamania County

Hood River County

Clackamas County

Marine Drive

223rd Avenue

Halsey Street

Glisan Street

257th Avenue

Stark Street

Troutdale Road

Woodard Road

Evans Road

Hurlburt Road

Division Drive

302nd Avenue

Orbow Drive

Orient Drive

Lusted Road

Dodge Park Boulevard

Bluff Road

Gordon Creek Road

Larch Mountain Road

Blower Road

84

30

212

224

211

26

Bike Routes

- Established bikeway
- Bike friendly street
- Dedicated bike lane
- Helpful connection
- Local trail
- Bike with caution
- County Boundaries
- Plan Areas

0 1 2 4 Miles

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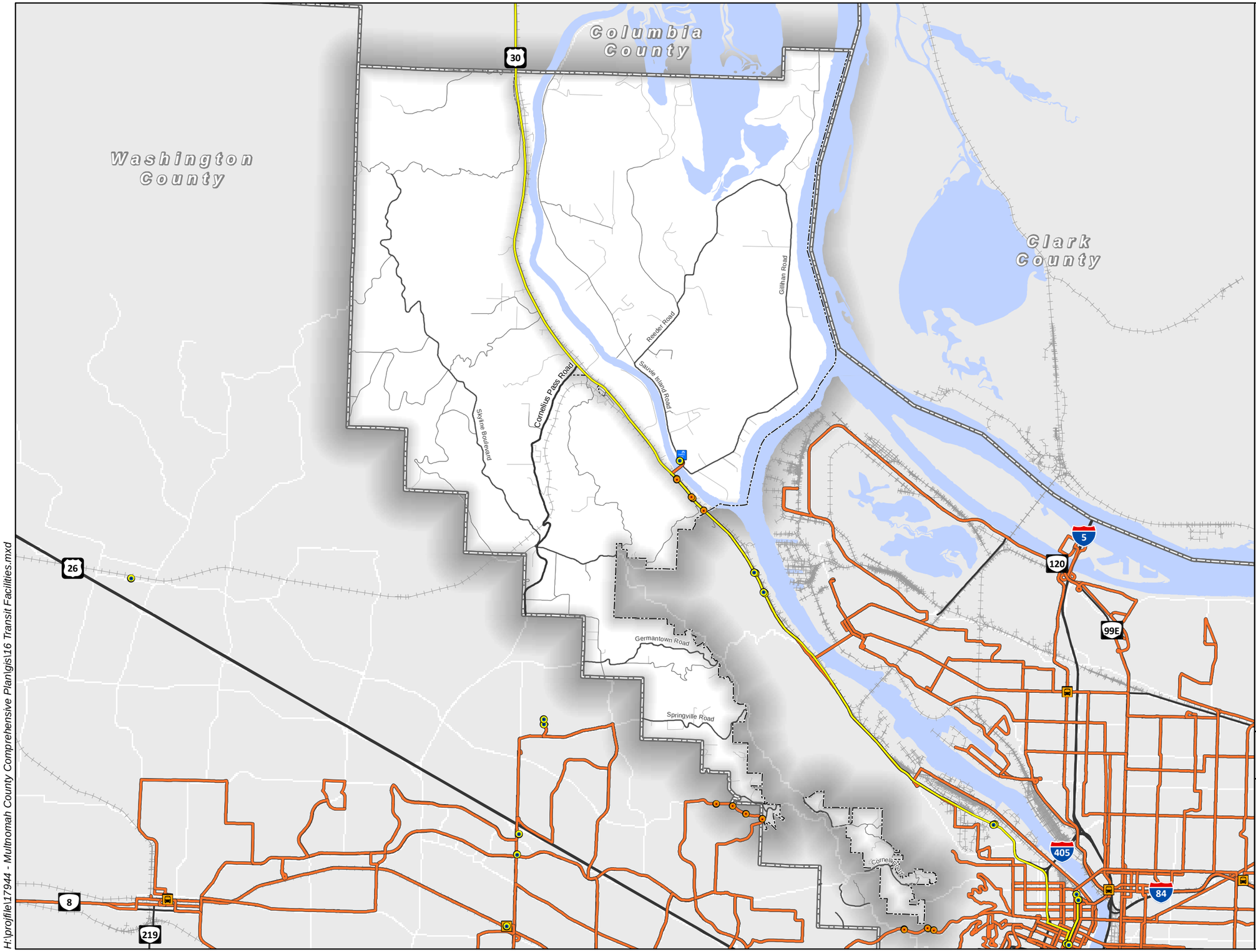

Multnomah County
Comprehensive Plan

Figure 16A
Transit Facilities

- TriMet Stops
- Columbia County Rider Stops
- Transit Centers
- Park N' Ride
- TriMet Routes
- Columbia County Rider Routes
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

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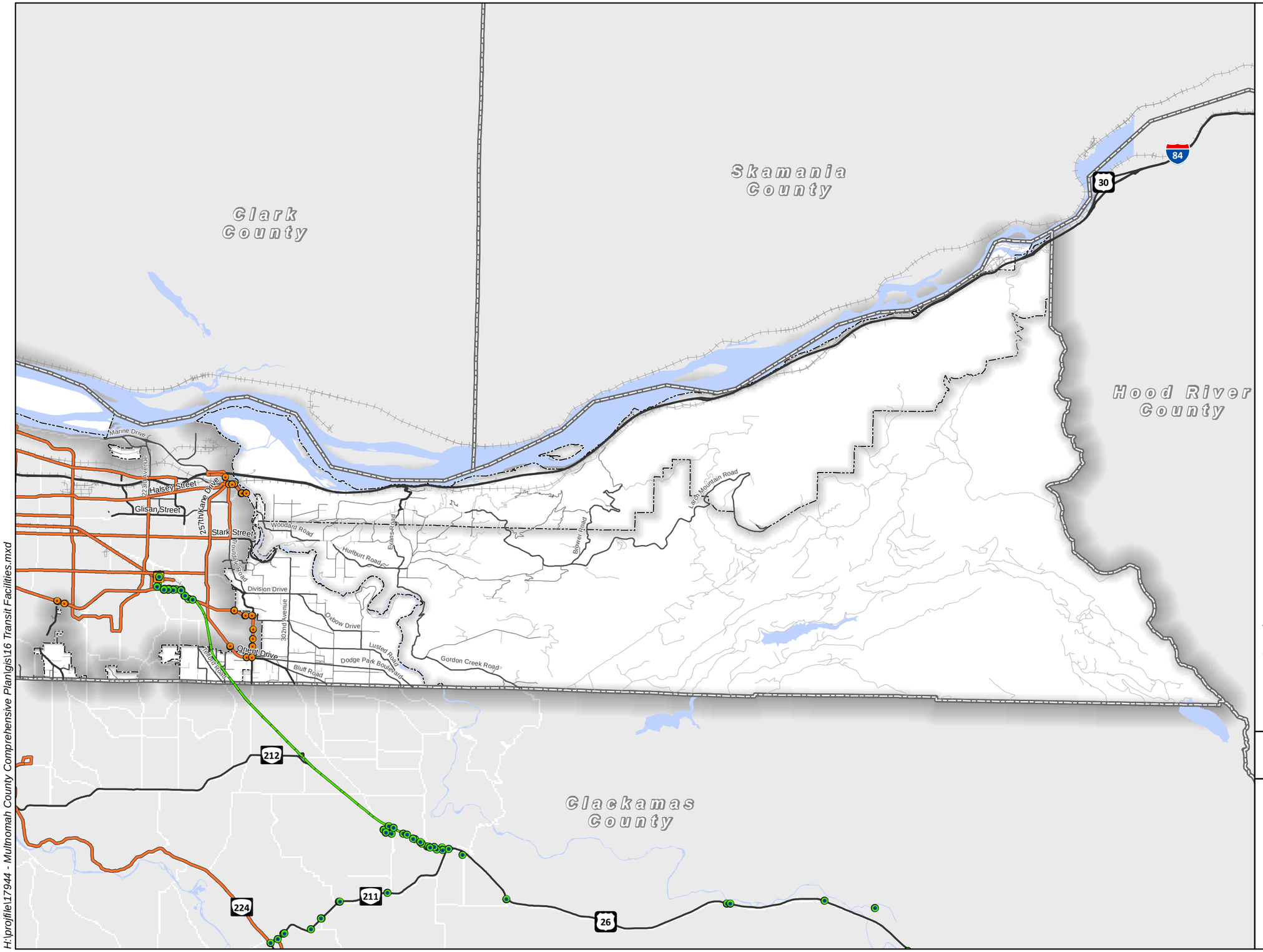
Multnomah County
Comprehensive Plan

Figure 16B
Transit Facilities



- TriMet Stops
- Sandy Area Metro Stops
- Transit Centers
- TriMet Routes
- Sandy Area Metro Routes
- Plan Areas
- County Boundaries

0 1 2 4 Miles

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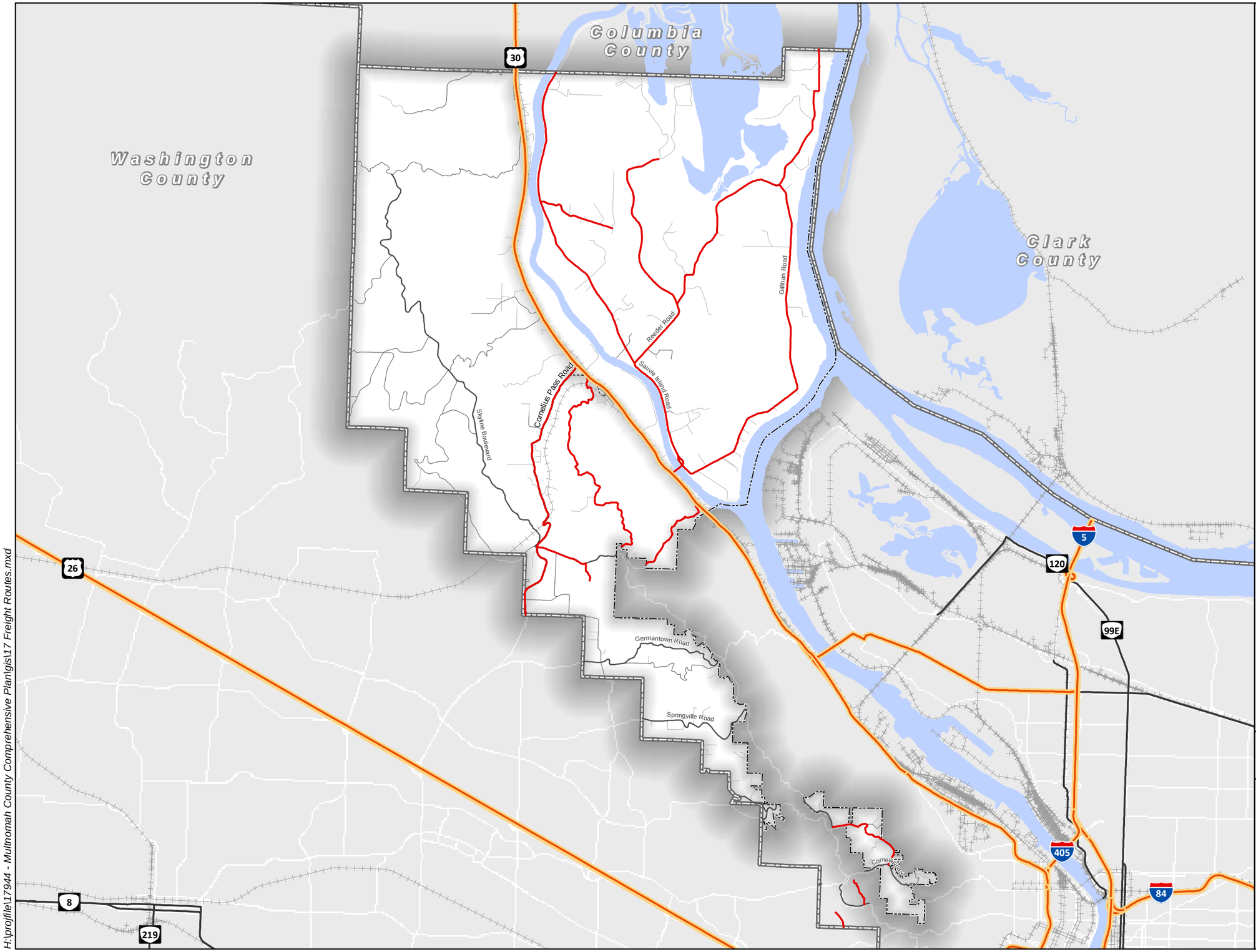

Multnomah County
Comprehensive Plan

Figure 17A

Freight Routes

Multnomah Co. Truck Routes

ODOT Freight Routes

Plan Areas

County Boundaries

0 0.5 1 2 Miles

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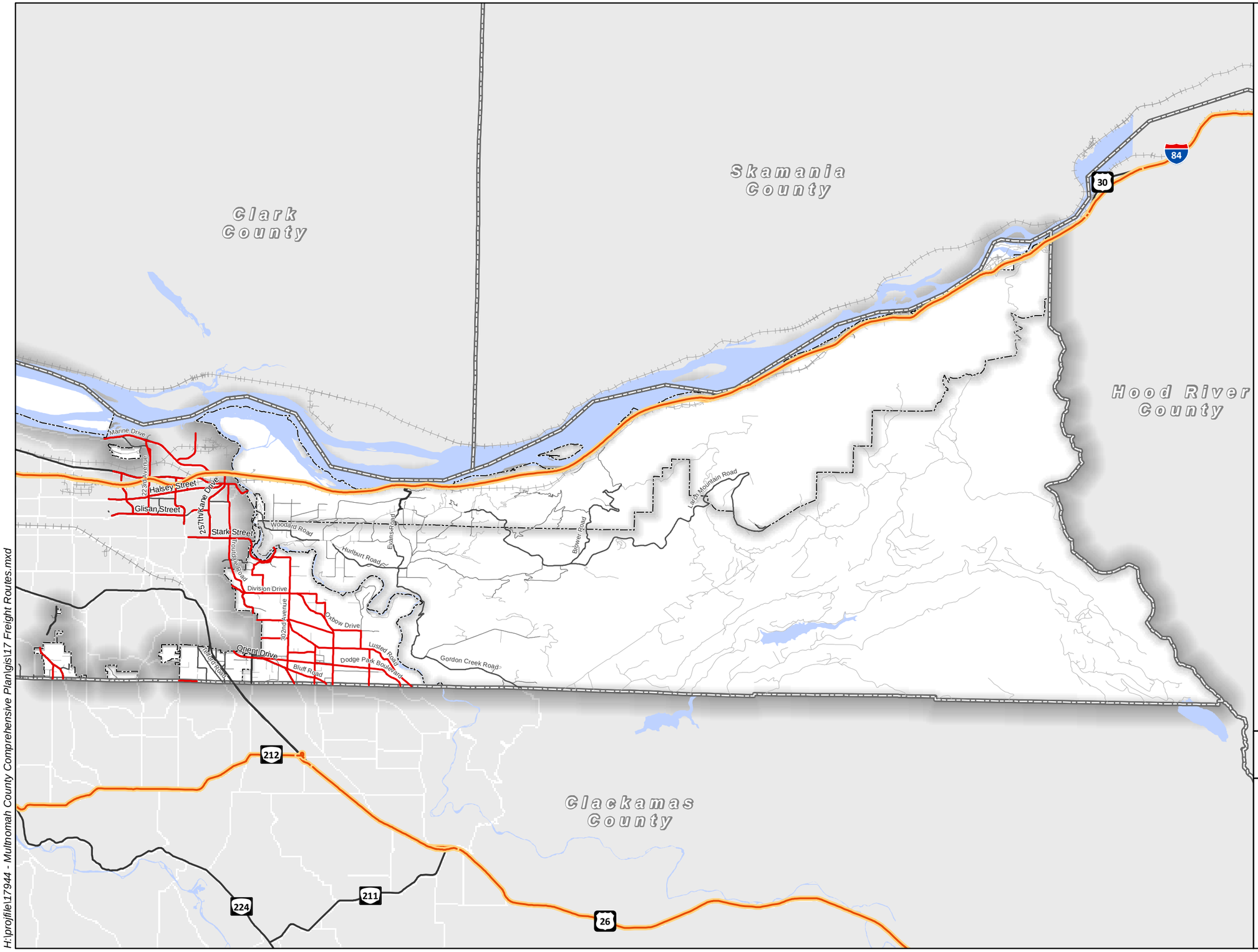
Multnomah County
Comprehensive Plan

Figure 17B
Freight Routes



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Multnomah County
Comprehensive Plan

Figure 18A

Employment Change

Columbia County

Washington County

Clark County

115

177

835

84

113

7

8

15

81

88

79

125

520

610

Cornelius Pass Road

Skyline Boulevard

Sauvie Island Road

Germantown Road

Springville Road

Reeder Road

Gillihan Road

30

26

8

219

5

405

99E

120

84

Change in Empolyees by TAZ from 2010 to 2040

- 6 - 40
- 41 - 88
- 89 - 177
- 178 - 610
- 611 - 1094
- Rural Plan Areas
- County Boundaries

0 0.5 1 2 Miles

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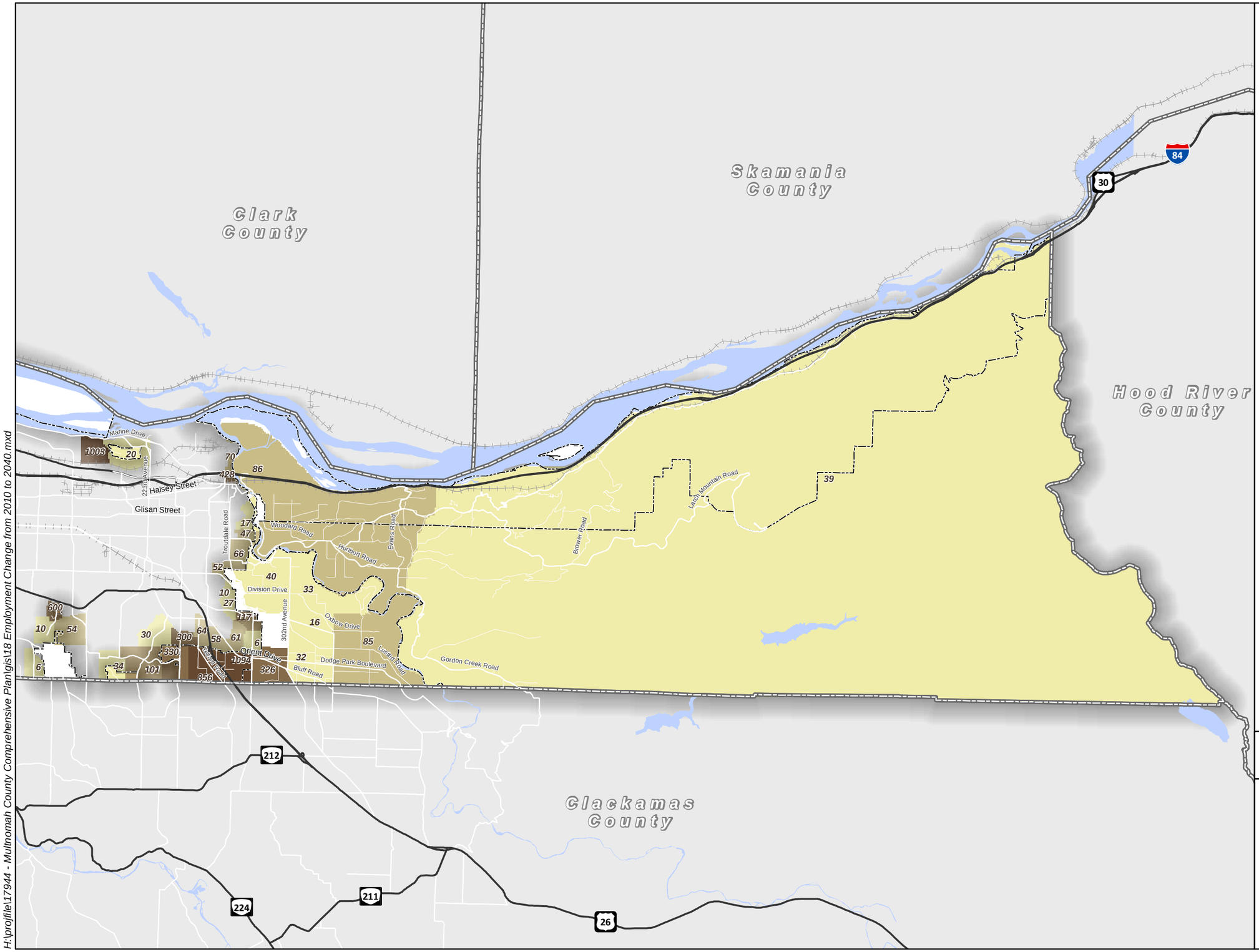

H:\projfile\17944 - Multnomah County Comprehensive Plan\gis\18 Employment Change from 2010 to 2040.mxd

Multnomah County
Comprehensive Plan

Figure 18B
Employment Change

Change in Empolyees by TAZ from 2010 to 2040

- 6 - 40
- 41 - 88
- 89 - 177
- 178 - 610
- 611 - 1094
- Rural Plan Areas
- County Boundaries

0 1 2 4 Miles

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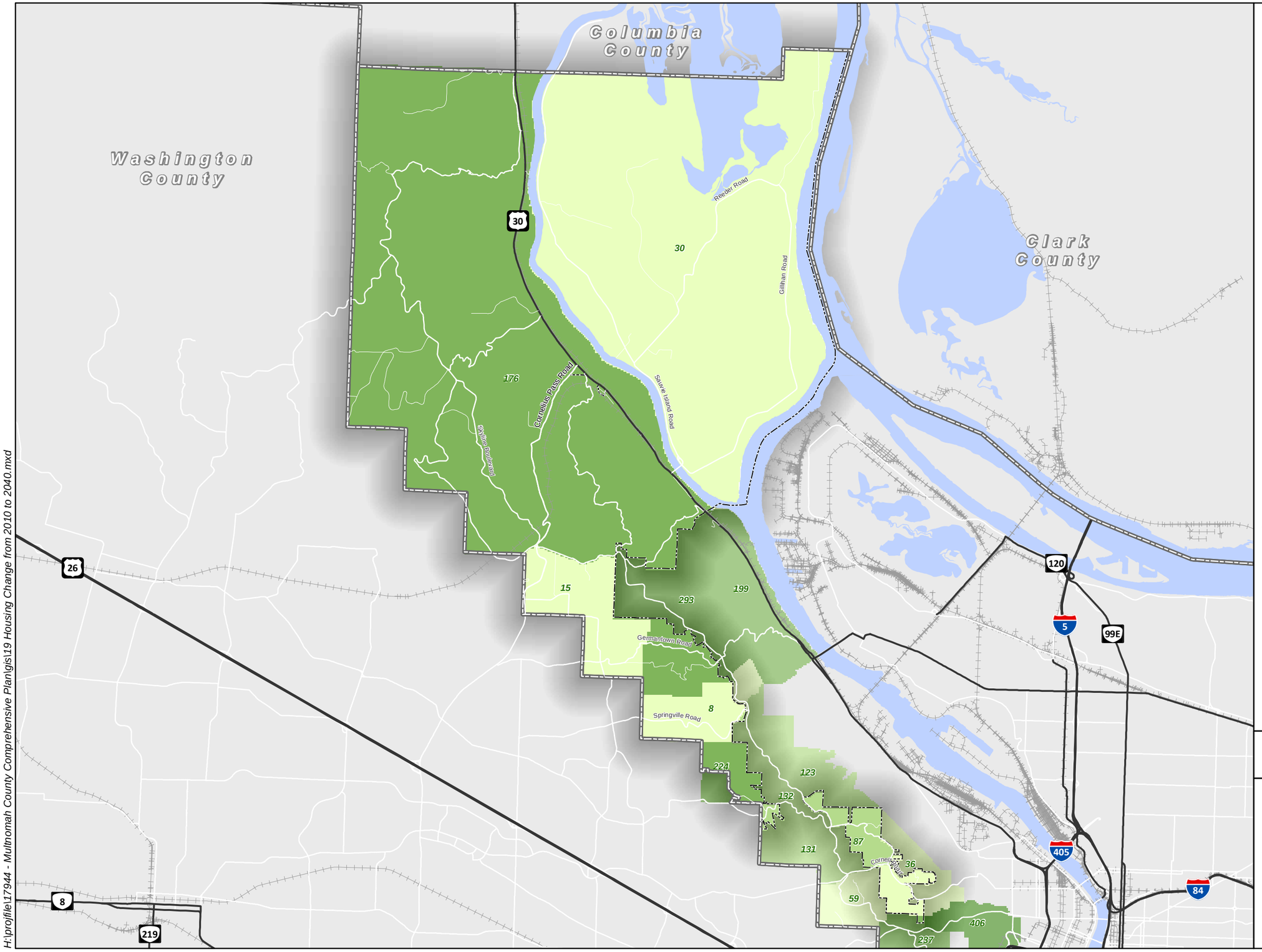

H:\projfile\17944 - Multnomah County Comprehensive Plan\gis\19 Housing Change from 2010 to 2040.mxd

Multnomah County
Comprehensive Plan

Figure 19A

Houshold Change

Change in Households by TAZ from 2010 to 2040

- -32 - 67
- 68 - 151
- 152 - 293
- 294 - 751
- 752 - 1319
- Rural Plan Areas
- County Boundaries

Miles
0 0.5 1 2

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Multnomah County
Comprehensive Plan

Figure 19B

Houshold Change

Clark County

Skamania County

Hood River County

Clackamas County

Marine Drive
223rd Avenue
Halsey Street
Glisan Street
257th/Kane Drive
Troutdale Road
Woodard Road
Hurlburt Road
Evans Road
Brower Road
Larch Mountain Road
Division Drive
Oxbow Drive
Lusted Road
Dodge Park Boulevard
Bluff Road
Gordon Creek Road
Orient Drive

84
30
212
224
211
26

Change in Households by TAZ from 2010 to 2040

- -32 - 67
- 68 - 151
- 152 - 293
- 294 - 751
- 752 - 1319
- Rural Plan Areas
- County Boundaries

0 1 2 4 Miles

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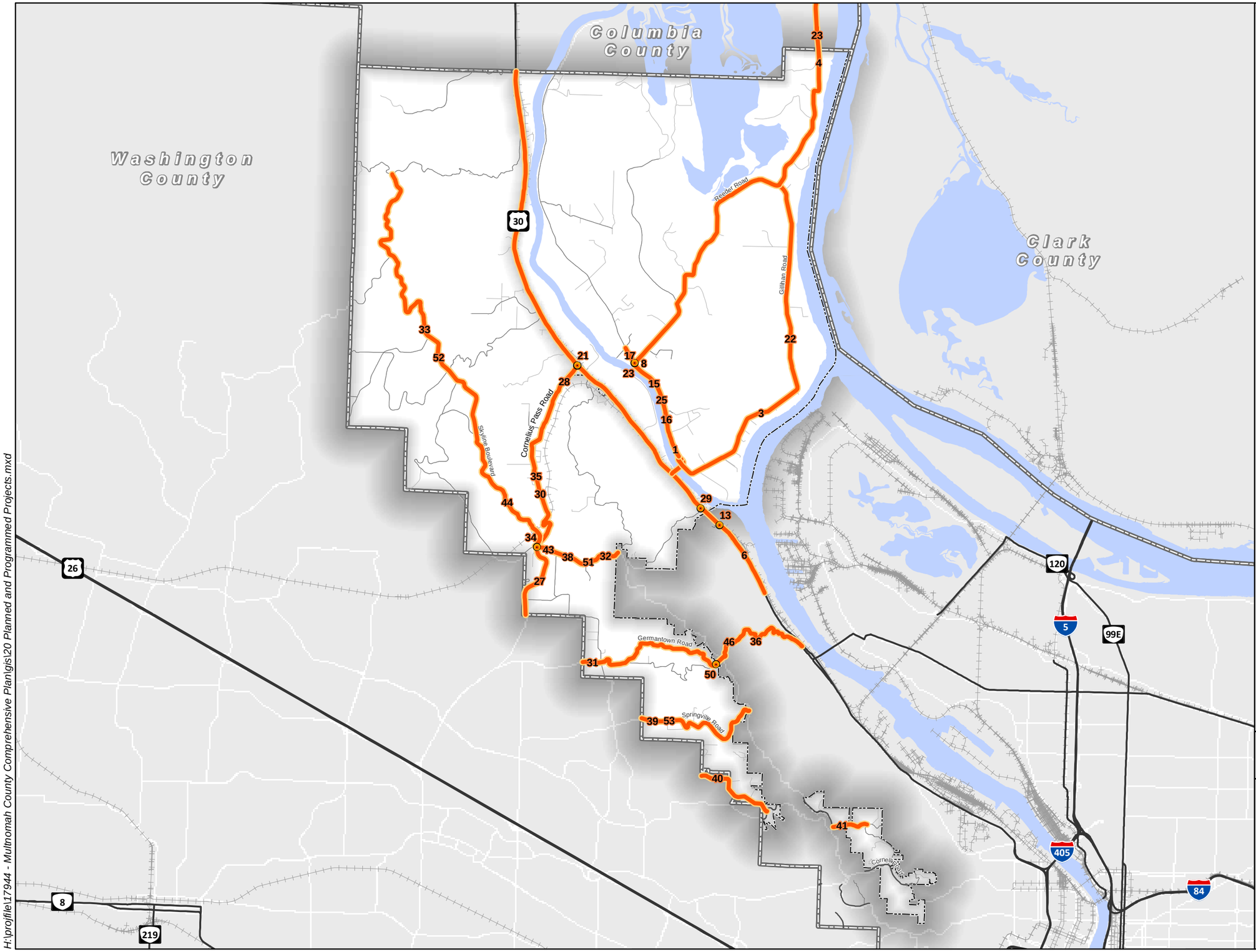

Multnomah County
Comprehensive Plan

Figure 20A

Planned and Programmed Projects

Project Points

Project Segments

Plan Areas

County Boundaries

0 0.5 1 2 Miles

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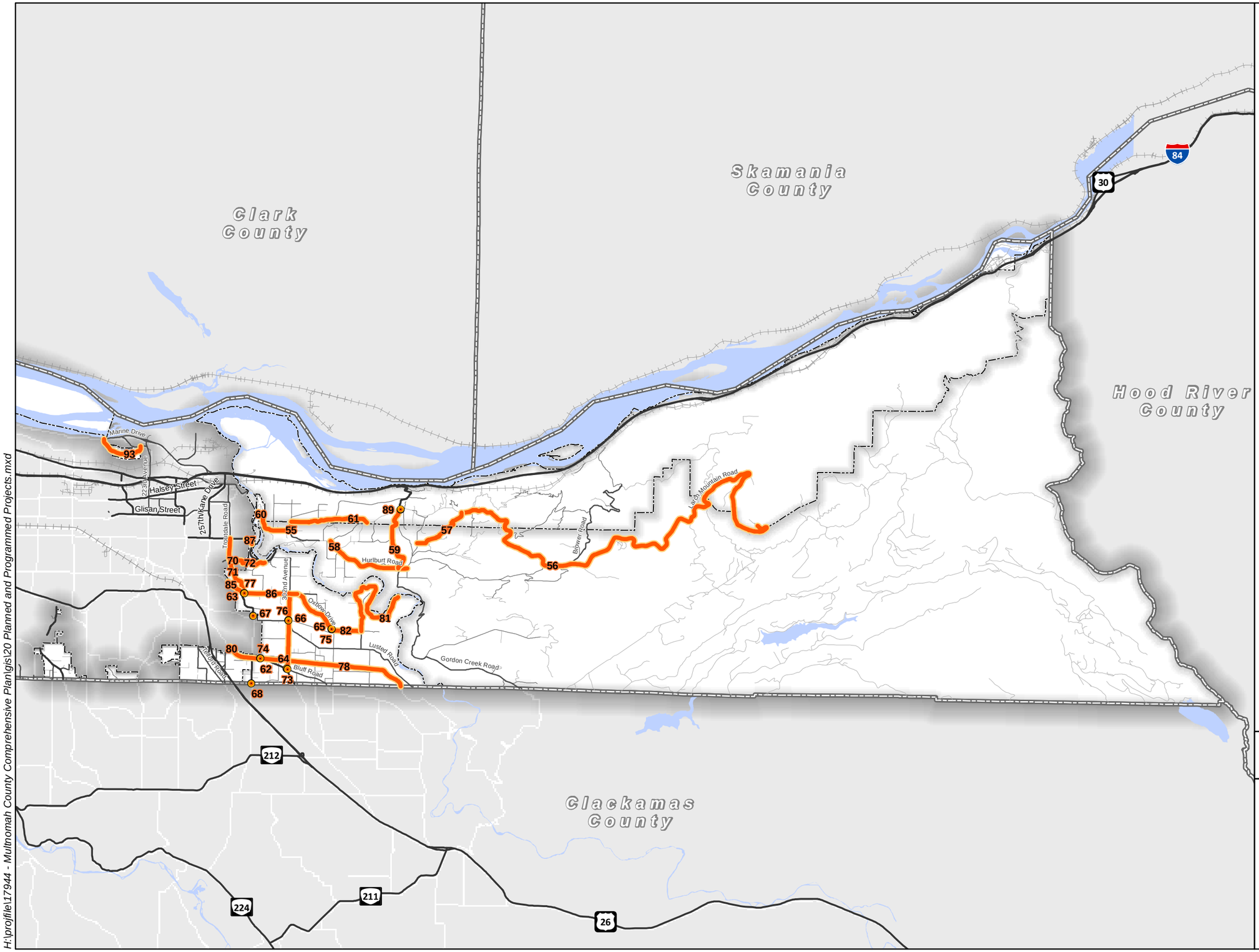

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Multnomah County
Comprehensive Plan

Figure 20B

Planned and Programmed Projects

- Project Points
- Project Segments
- Plan Areas
- County Boundaries

0 1 2 4 Miles

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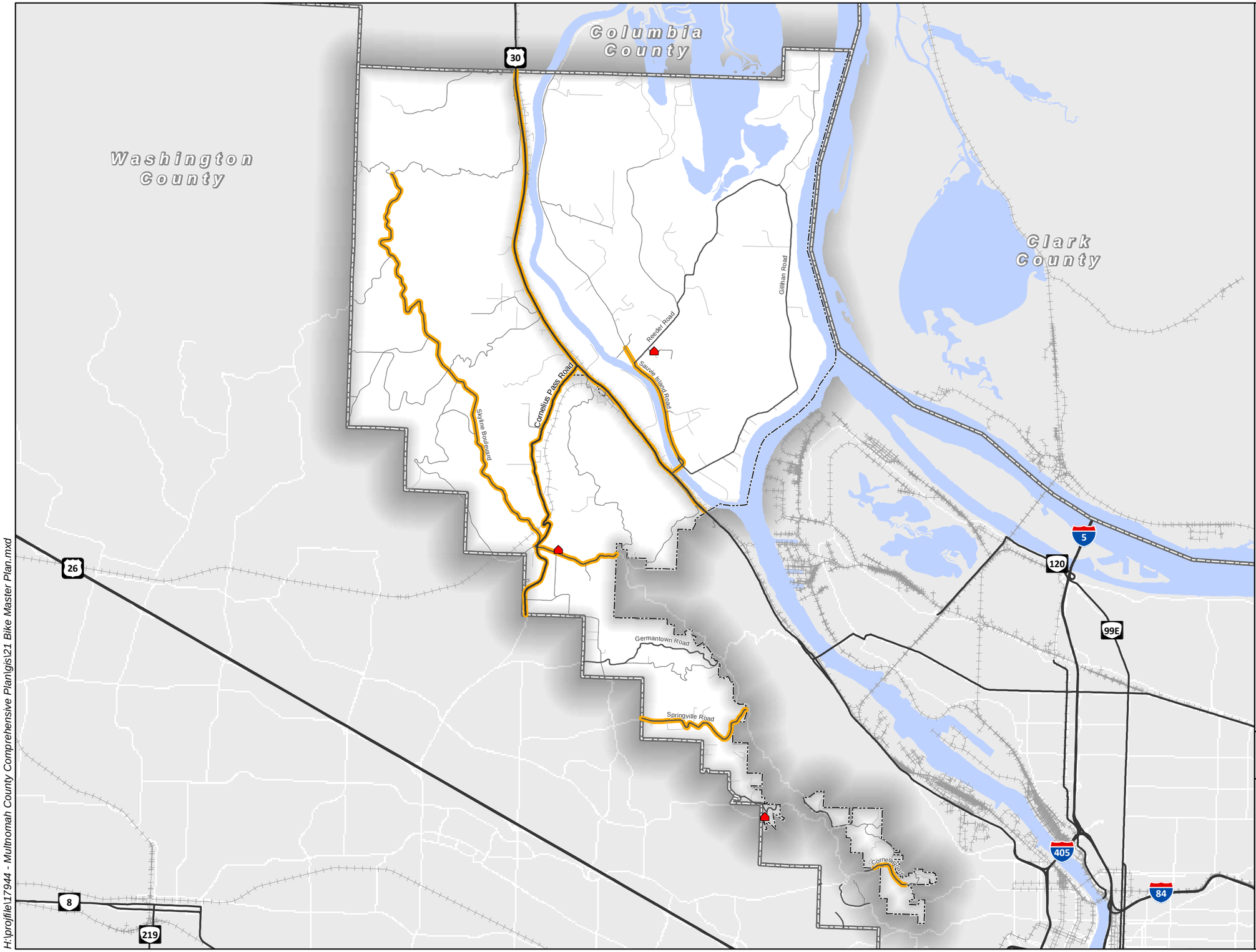

Multnomah County
Comprehensive Plan

Figure 21A

Master Bike Plan

Prepared By:
Kittelson & Associates, Inc.

Date:
6/8/2015

Coordinate System:
NAD 1983 HARN State Plane Oregon North FIPS 3601

Disclaimer:
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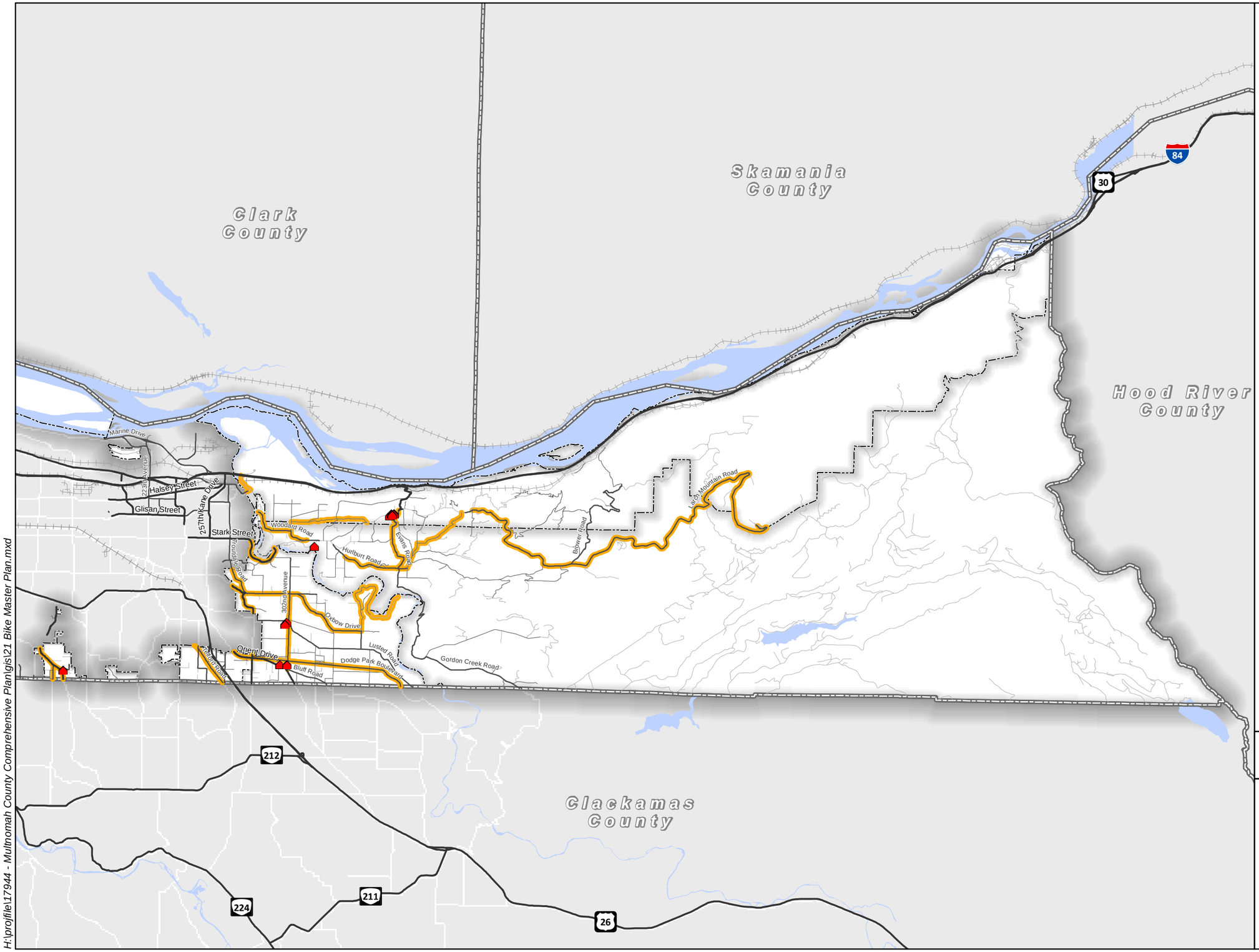
H:\profile\17944 - Multnomah County Comprehensive Plan\gis\21 Bike Master Plan.mxd



Multnomah County
Comprehensive Plan

Figure 21B
Master Bike Plan

Schools
Bikeways Plan
Plan Areas
County Boundaries

0 1 2 4 Miles

Prepared By:
Kittelson & Associates, Inc.

Date:
6/8/2015

Coordinate System:
NAD 1983 HARN State Plane Oregon North FIPS 3601

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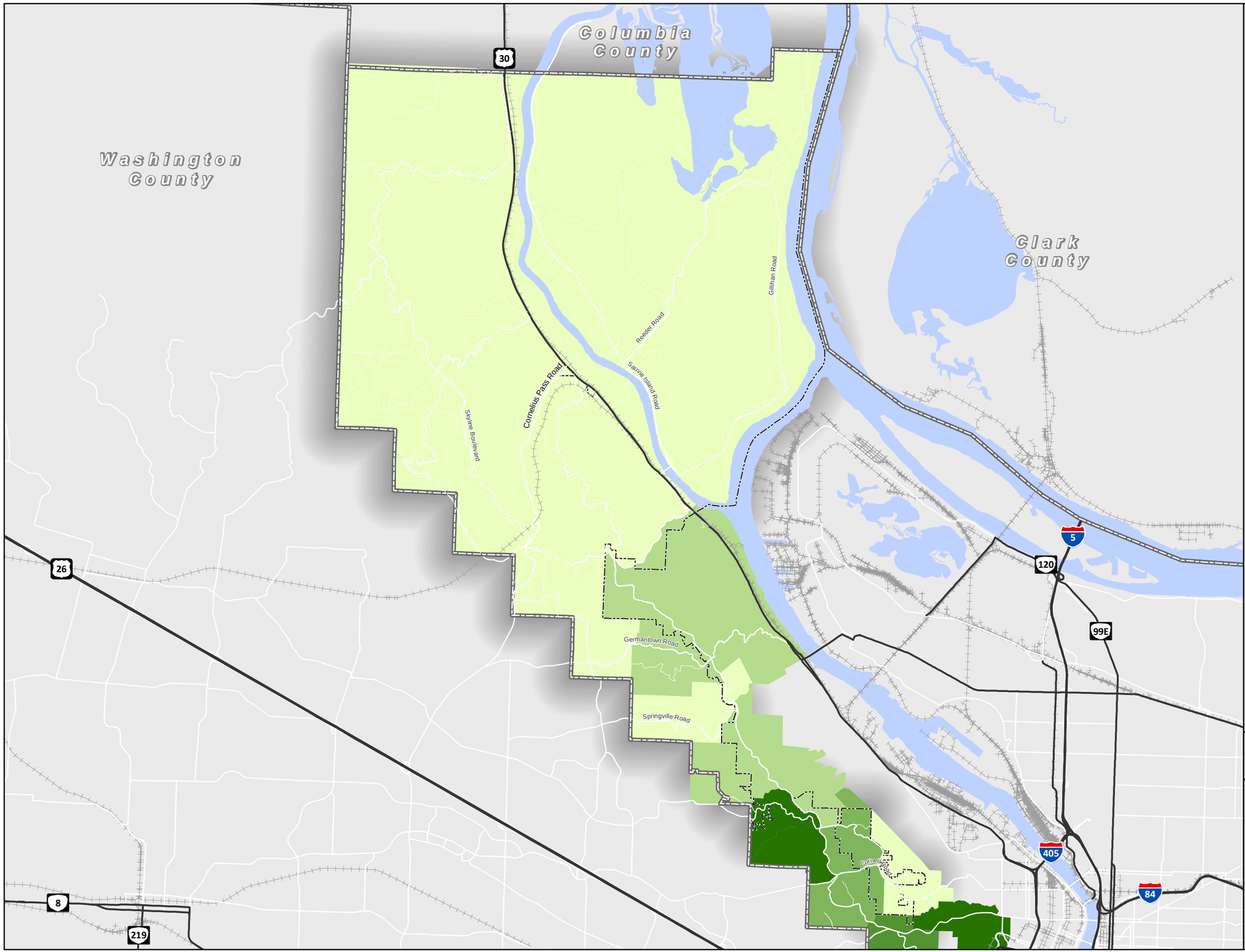
H:\profile\17944 - Multnomah County Comprehensive Plan\gis\21 Bike Master Plan.mxd

Appendix 2 TAZ Map and Data



Multnomah County Comprehensive Plan

Existing Housing Density / Housholds per Acre by TAZ

- 0.00 - 0.07
- 0.08 - 0.16
- 0.17 - 0.60
- 0.61 - 2.03
- 2.04 - 4.52
- Plan Areas
- County Boundaries

0 0.5 1 2 Miles

Prepared By:
Kittelson & Associates, Inc.

Date:
1/22/2015

Coordinate System:
NAD 1983 HARN State Plane Oregon North FIPS 3601

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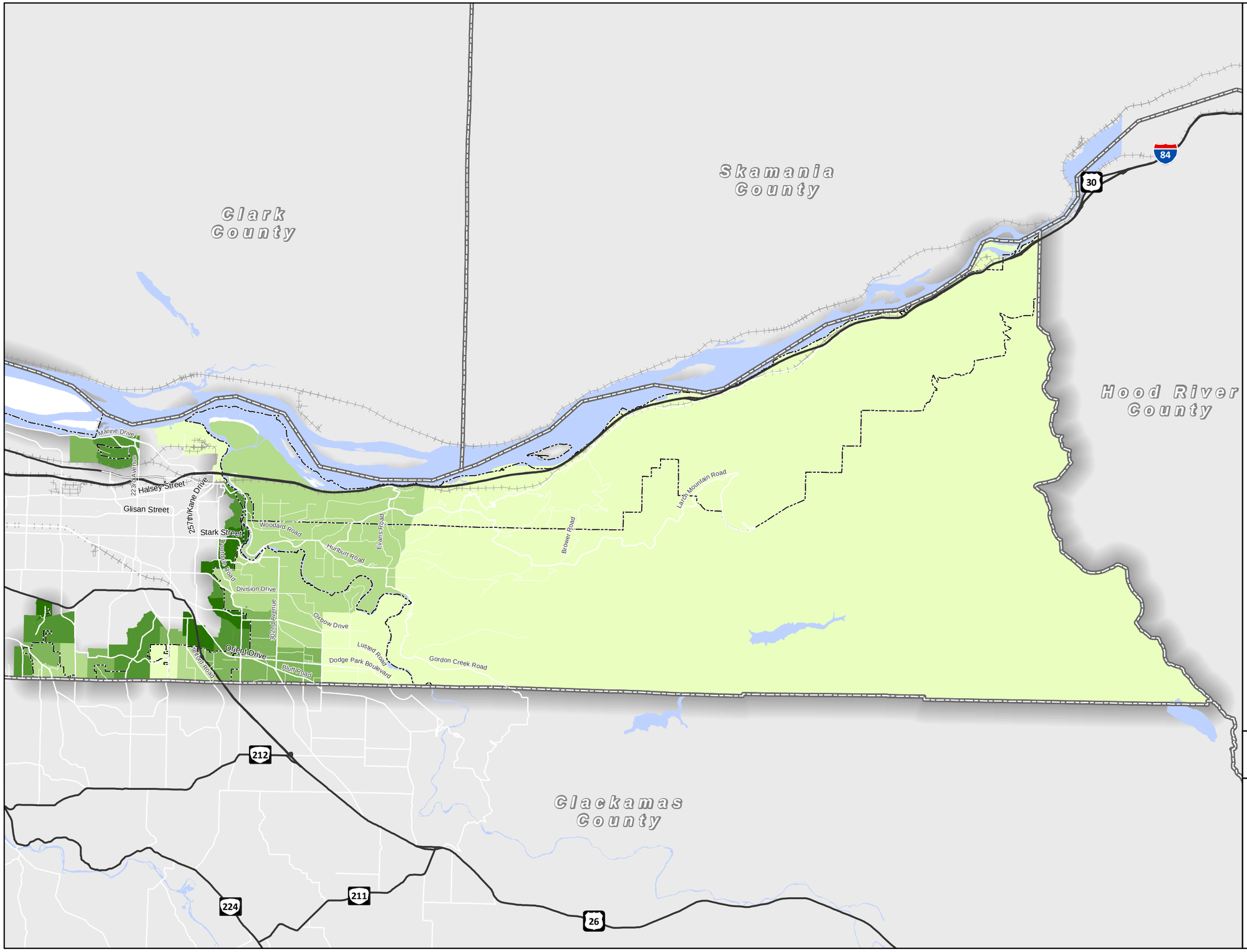

Multnomah County
Comprehensive Plan

Existing Housing Density / Housholds per Acre by TAZ

- 0.00 - 0.07
- 0.08 - 0.16
- 0.17 - 0.60
- 0.61 - 2.03
- 2.04 - 4.52
- Plan Areas
- County Boundaries

0 1 2 4 Miles

Prepared By:
Kittelson & Associates, Inc.

Date:
1/22/2015

Coordinate System:
NAD 1983 HARN State Plane Oregon North FIPS 3601

Disclaimer:
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TAZ	COUNTY	CITYNAME	HH_Est	Acres	HH_Est_Per_Acres	Study_Area	HH_2010	HH_2025	HH_2035	HH_2040
41	Multnomah	Unincorporated Multnomah County	230	677.2785034	0.339594424	Inside	230	280	285	289
42	Multnomah	Unincorporated Multnomah County	88	553.7416992	0.158918858	Inside	88	190	173	175
46	Multnomah	Unincorporated Multnomah County	87	565.5050049	0.153844789	Inside	87	294	310	311
47	Multnomah	Unincorporated Multnomah County	69	994.6202393	0.069373213	Inside	69	76	77	77
50	Multnomah	Unincorporated Multnomah County	112	1617.817871	0.069229051	Inside	112	127	127	127
51	Multnomah	Unincorporated Multnomah County	806	18539.10156	0.043475676	Inside	806	1011	982	982
52	Multnomah	Unincorporated Multnomah County	410	16136.27832	0.025408585	Inside	410	444	440	440
418	Multnomah	Unincorporated Multnomah County	404	133.4250183	3.027917862	Inside	404	573	686	813
469	Multnomah	Unincorporated Multnomah County	78	350.3316345	0.222646177	Inside	78	303	346	348
470	Multnomah	Unincorporated Multnomah County	29	186.9356232	0.15513362	Inside	29	95	157	200
474	Multnomah	Unincorporated Multnomah County	25	480.1582336	0.05206617	Inside	25	264	431	481
475	Multnomah	Unincorporated Multnomah County	72	553.6829224	0.130038321	Inside	72	201	393	461
476	Multnomah	Unincorporated Multnomah County	113	451.9336243	0.250036716	Inside	113	119	119	212
651	Multnomah	Unincorporated Multnomah County	815	9016.890625	0.090385929	Inside	815	860	861	862
652	Multnomah	Unincorporated Multnomah County	88	1261.890503	0.069736637	Inside	88	91	91	92
653	Multnomah	Unincorporated Multnomah County	7	93.94351959	0.074512854	Inside	7	17	19	19
654	Multnomah	Unincorporated Multnomah County	17	105.3690109	0.161337763	Inside	17	18	18	18
655	Multnomah	Unincorporated Multnomah County	102	511.5376892	0.199398801	Inside	102	115	115	973
656	Multnomah	Unincorporated Multnomah County	154	623.8569336	0.246851474	Inside	154	164	164	1380
657	Multnomah	Unincorporated Multnomah County	241	781.2597046	0.30847618	Inside	241	244	244	249
658	Multnomah	Unincorporated Multnomah County	94	790.3630371	0.118932687	Inside	94	97	97	98
659	Multnomah	Unincorporated Multnomah County	124	1600.389038	0.077481158	Inside	124	150	145	154
660	Multnomah	Unincorporated Multnomah County	173	2797.650635	0.061837599	Inside	173	187	184	189
661	Multnomah	Unincorporated Multnomah County	573	107817.2188	0.00531455	Inside	573	635	628	629

Cap_2045	Shape_Length_1	Shape_Area_1	HH_2040_Per_Acres	Shape_Length	Shape_Area	Density_Change_2010_to_2040	Change_2010_to_2040
807.5496574	22432.13611	29502251.09	0.426707774	22432.13618	29502251.16	0.087113351	59
110.5336193	23742.24967	24120988.16	0.316031814	23742.2497	24120987.93	0.157112956	87
450.1998185	21678.52347	24633397.65	0.549950898	21678.52366	24633397.68	0.396106124	224
7.683710195	34505.87115	43325657.24	0.07741648	34505.87127	43325657.58	0.008043267	8
14.95114286	44901.1205	70472146.59	0.0785008	44901.12047	70472146.72	0.009271748	15
246.4731367	139550.758	807563234.2	0.052969124	139550.7577	807563233.7	0.009493448	176
37.33714286	121123.7036	702896270.2	0.02726775	121123.7036	702896270.1	0.001859166	30
880.2769016	12212.47969	5811993.681	6.093309879	12212.47961	5811993.725	3.065392017	409
2640.625923	17335.98278	15260446.56	0.993344486	17335.98288	15260446.62	0.770698309	270
522.726764	14258.03617	8142915.997	1.069887042	14258.03614	8142915.969	0.914753437	171
683.7998921	18443.27774	20915692.49	1.001753092	18443.27774	20915692.69	0.949686944	456
567.7335666	21441.52407	24118429.07	0.832606494	21441.52405	24118428.98	0.702568173	389
391.3412871	19991.55884	19686228.06	0.469095439	19991.55866	19686228.11	0.219058722	99
48.38599821	124070.4482	392775774.6	0.095598362	124070.4485	392775774.5	0.005212434	47
3.75	37855.62758	54967948.97	0.072906487	37855.62792	54967949.34	0.00316985	4
13.75	10735.86522	4092179.686	0.202249184	10735.86531	4092179.719	0.12773633	12
1.25	12503.17729	4589874.28	0.170828208	12503.17731	4589874.269	0.009490445	1
3068.393684	22708.55299	22282581.36	1.902108192	22708.55296	22282581.15	1.702709436	871
4365.113408	23509.83166	27175208.35	2.21204567	23509.8316	27175208.05	1.965194225	1226
11.11995929	23909.05521	34031673.28	0.318716049	23909.05541	34031673.17	0.010239869	8
3.733714286	24616.25592	34428213.35	0.12399365	24616.2561	34428213.45	0.005060963	4
29.96742857	52040.796	69712947.35	0.096226603	52040.79599	69712946.81	0.018745445	30
16.20114286	57555.82094	121865664.1	0.067556687	57555.82099	121865664.6	0.005719088	16
67.386	354248.7535	4696531192	0.005833931	353002.7351	4696518028	0.000519381	56

TAZ	COUNTY	CITYNAME	EMP_Total	Acres	Total_2010_ Per_Acres	COUNTY_1	Total_2025	Total_2035	Total_2040
41	Multnomah	Unincorporated Multnomah County	160	677.2784932	0.236239597	Multnomah	236	271	285
42	Multnomah	Unincorporated Multnomah County	8	553.7416879	0.014447169	Multnomah	49	75	87
46	Multnomah	Unincorporated Multnomah County	15	565.5049972	0.026524965	Multnomah	25	29	30
47	Multnomah	Unincorporated Multnomah County	13	994.6202384	0.013070315	Multnomah	16	19	20
50	Multnomah	Unincorporated Multnomah County	130	1617.817877	0.080355152	Multnomah	182	204	214
51	Multnomah	Unincorporated Multnomah County	174	18539.10087	0.009385568	Multnomah	276	322	351
52	Multnomah	Unincorporated Multnomah County	401	16136.27801	0.024850836	Multnomah	455	487	516
418	Multnomah	Unincorporated Multnomah County	233	133.4250166	1.746299148	Multnomah	583	752	833
469	Multnomah	Unincorporated Multnomah County		350.3316488		Multnomah	457	682	764
470	Multnomah	Unincorporated Multnomah County		186.9356283		Multnomah	121	155	176
474	Multnomah	Unincorporated Multnomah County	29	480.1582343	0.060396757	Multnomah	232	320	359
475	Multnomah	Unincorporated Multnomah County	28	553.6829426	0.050570458	Multnomah	558	774	884
476	Multnomah	Unincorporated Multnomah County	42	451.9336112	0.092934005	Multnomah	707	982	1136
651	Multnomah	Unincorporated Multnomah County	361	9016.891058	0.040035971	Multnomah	410	433	447
652	Multnomah	Unincorporated Multnomah County	145	1261.890481	0.114906959	Multnomah	172	180	185
653	Multnomah	Unincorporated Multnomah County		93.94351973		Multnomah	0	0	0
654	Multnomah	Unincorporated Multnomah County		105.3690144		Multnomah	6	7	7
655	Multnomah	Unincorporated Multnomah County		511.5376756		Multnomah	176	187	315
656	Multnomah	Unincorporated Multnomah County	241	623.856934	0.386306524	Multnomah	346	391	567
657	Multnomah	Unincorporated Multnomah County	45	781.2597146	0.057599284	Multnomah	66	73	77
658	Multnomah	Unincorporated Multnomah County	37	790.3630268	0.046813931	Multnomah	51	52	53
659	Multnomah	Unincorporated Multnomah County	95	1600.389045	0.059360567	Multnomah	117	124	128
660	Multnomah	Unincorporated Multnomah County	261	2797.650702	0.093292564	Multnomah	325	338	346
661	Multnomah	Unincorporated Multnomah County	281	107817.2183	0.002606263	Multnomah	300	313	320

Shape_Length_1	Shape_Area_1	Total_2040_ Per_Acres	Study_Area	Shape_Length	Shape_Area	Density_Change_ From_2010_to_2040	Change_From_ 2010_to_2040
22432.13611	29502251.09	0.420801789	Inside	22432.13618	29502251.16	0.184562191	125
23742.24967	24120988.16	0.157112971	Inside	23742.2497	24120987.93	0.142665803	79
21678.52347	24633397.65	0.053049929	Inside	21678.52366	24633397.68	0.026524965	15
34505.87115	43325657.24	0.020108176	Inside	34505.87127	43325657.58	0.007037861	7
44901.1205	70472146.59	0.132276937	Inside	44901.12047	70472146.72	0.051921785	84
139550.758	807563234.2	0.018932957	Inside	139550.7577	807563233.7	0.009547389	177
121123.7036	702896270.2	0.031977635	Inside	121123.7036	702896270.1	0.007126799	115
12212.47969	5811993.681	6.243206978	Inside	12212.47961	5811993.725	4.496907711	600
17335.98278	15260446.56	2.180790901	Inside	17335.98288	15260446.62		
14258.03617	8142915.997	0.941500604	Inside	14258.03614	8142915.969		
18443.27774	20915692.49	0.747670174	Inside	18443.27774	20915692.69	0.687273443	330
21441.52407	24118429.07	1.596581697	Inside	21441.52405	24118428.98	1.546011209	856
19991.55884	19686228.06	2.513643503	Inside	19991.55866	19686228.11	2.42070961	1094
124070.4482	392775774.6	0.04957363	Inside	124070.4485	392775774.5	0.00953766	86
37855.62758	54967948.97	0.146605432	Inside	37855.62792	54967949.34	0.031698473	40
10735.86522	4092179.686	0	Inside	10735.86531	4092179.719		
12503.17729	4589874.28	0.066433191	Inside	12503.17731	4589874.269		
22708.55299	22282581.36	0.615790427	Inside	22708.55296	22282581.15		
23509.83166	27175208.35	0.908862233	Inside	23509.8316	27175208.05	0.522555709	326
23909.05521	34031673.28	0.098558776	Inside	23909.05541	34031673.17	0.040959492	32
24616.25592	34428213.35	0.067057788	Inside	24616.2561	34428213.45	0.020243857	16
52040.796	69712947.35	0.079980552	Inside	52040.79599	69712946.81	0.020619985	33
57555.82094	121865664.1	0.123675197	Inside	57555.82099	121865664.6	0.030382633	85
354248.7535	4696531192	0.002967978	Inside	353002.7351	4696518028	0.000361715	39

Appendix 3 Historical AADT

Table 15 Historical AADT on State Highways in Rural Multnomah County

Primary Road	HWY	MP	Description	AADT by Year										
				2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Columbia River Highway (US 30)	002	18.12	0.30 mile east of Jordan Interchange	25,100	24,800	26,100	26,600	26,700	26,300	28,000	28,100	25,300	25,700	26,200
	002	22.40	0.30 mile east of Corbett Interchange	22,400	22,100	24,300	24,700	24,900	24,600	26,300	26,400	23,500	23,700	24,200
	002	25.19	0.20 mile east of Rooster Rock State Park Interchange	22,200	21,900	24,400	24,800	25,000	24,500	26,100	26,300	23,300	23,500	23,900
	002	28.16	0.30 mile east of Bridal Veil connection	21,400*	21,100*	23,500*	23,900*	24,000	23,500	25,100	25,300	21,700	21,800	22,200
	002	31.89	0.50 mile east of Multnomah Falls Interchange	21,200	20,900	23,200	23,600	23,800	23,100	24,800	24,900	21,100	21,100	21,500
	002	35.73	0.10 mile east of Historic Columbia Highway (US30)	21,000*	20,700*	23,300*	23,700*	23,800	23,300	25,000	24,900	21,100	21,100	21,500
Mt. Hood Highway (US 26)	026	14.80	0.05 mile south of S.E. Palmquist Road	26,700*	25,700*	26,200*	27,200*	27,000*	25,800	26,600	26,600	25,200	27,300	27,600
	026	18.30	0.05 mile northwest of S.E. Haley Road	22,800*	21,900*	22,300*	24,600*	24,400*	23,300	22,900	22,900	21,700	24,100	24,400
Lower Columbia River (US 30)	092	10.75	0.08 mile south of Sauvie Island Road	-**	-**	-**	23,400	21,400	20,600	20,900	17,000	16,700	16,500	16,800
	092	10.95	0.12 mile north of Sauvie Island Road	-**	-**	-**	21,600	22,100	20,400	20,700	17,100	16,800	16,600	16,900
	092	13.12	0.10 mile south of Cornelius Pass Road	-**	-**	-**	20,800	22,000	20,300	20,500	17,400	17,100	16,900	17,200

	092	17.34	0.05 mile south of Rocky Point Road	-**	-**	-**	25,100	27,800	25,600	26,000	23,100	22,700	22,500	22,800

*Count location shifted 0.1 mile or less from where counts are recorded currently; no major intersections were included or excluded with the shift

**No counts were recorded on the segment for the year reported