ATP Appendix 3

www.oregonmetro.gov

MAKING A GREAT PLACE

Metro

Regional Bicycle Network Evaluation

Technical Report for the Regional Active Transportation Plan

April 2013

About Metro

Clean air and clean water do not stop at city limits or county lines. Neither does the need for jobs, a thriving economy, and sustainable transportation and living choices for people and businesses in the region. Voters have asked Metro to help with the challenges and opportunities that affect the 25 cities and three counties in the Portland metropolitan area.

A regional approach simply makes sense when it comes to providing services, operating venues and making decisions about how the region grows. Metro works with communities to support a resilient economy, keep nature close by and respond to a changing climate. Together we're making a great place, now and for generations to come.

Stay in touch with news, stories and things to do.

www.oregonmetro.gov/connect

Metro Council President

Tom Hughes

Metro Councilors
Shirley Craddick, District 1
Carlotta Collette, District 2
Craig Dirksen, District 3
Kathryn Harrington, District 4
Sam Chase, District 5
Bob Stacey, District 6

Auditor
Suzanne Flynn

Table of Contents

April 2013 1

Acknowledgements 2

Summary 3

Recommended Regional Bicycle Network Concept 3

Findings for Guiding Prioritization 3

Purpose of Analysis 8

Bicycle Networks Analyzed 8

Areas of Analysis 11

TECHNICAL Considerations 13

Bicycle Network Evaluation Measures, Outputs & Findings 16

Access 18

Equity 24

Increased Activity 34

Appendix 1

Appendix 1: 2035 State RTP Bicycle Network 1

Appendix 2: Lanes Removed Maps 3

Appendix 3: Cycle Analysis Zones 6

Appendix 4: Bicycle Model Tool Characteristics 9

Appendix 5: Cost of Networks 11

Appendix 6: Bicycle Crash Maps 12

Appendix 7: Trip Tables 16

Appendix 8: Bikeway Density and Connectivity 26

Appendix 9: Bicycle Volume Plots and Difference Plots 29

Appendix 10: Regional Destinations 39

ACKNOWLEDGEMENTS

Stakeholder Advisory Committee

Hal Bergsma, Tualatin Hills Parks and Recreation Department
Allan Berry, City of Fairview
Todd Borkowitz
Aaron Brown
Brad Choi, City of Hillsboro
Jeff Owen, TriMet
Roger Geller, Portland Bureau of Transportation
Heidi Guenin, Upstream Public Health
Suzanne Hansche, Elders in Action (Multnomah County)
Katherine Kelly, City of Gresham
Lori Mastrantonio-Meuser, Clackamas County
Kate McQuillan, Multnomah County
Councilor Jose Orozco, City of Cornelius
Shelley Oylear, Washington County
Lidwien Rahman, Oregon Dept. of Transportation
Derek J. Robbins, City of Forest Grove
Stephanie Routh, Oregon Walks
Rob Sadowsky, Bicycle Transportation Alliance
Allan Schmidt, Portland Parks and Recreation

Metro Staff

Lake McTighe, *Project Manager*
Anthony Buczek
Aaron Breakstone
Kyle Goodman
Matthew Hampton
Mel Huie
Tom Kloster
John Mermin
Thaya Patton
Cindy Pederson
Brenda Perez
Richard Walker

SUMMARY

RECOMMENDED REGIONAL BICYCLE NETWORK CONCEPT

Based on the evaluation of the bicycle network, a recommended bicycle network concept was identified. The recommended concept combines elements of the Spiderweb concept and the Grid concept. The recommended concept provides a denser network of bicycle parkways than the three scenarios tested; this is in part due to input from local jurisdictions, agencies and stakeholders, as well as outcomes of the evaluation. The recommended network provides:

- A bicycle parkway in each of the region's Mobility Corridors within the urban growth boundary.
- A network of bicycle parkways, spaced approximately every two miles, that connect to and/or through every to town and regional center, many regional destinations and to most employment and industrial land areas and regional parks and natural areas (all areas are connected by regional bikeways, the next functional class of bicycle routes).
- A network of regional bikeways that connect to the bicycle parkways, providing an interconnected regional network. Local bikeways connect to bicycle parkways and regional bikeways.
- Regional bicycle districts. Regional and town centers and station communities were identified as bicycle districts, as well as pedestrian districts.

The recommended regional bicycle network identified bicycle parkway routes that demonstrated a high level of demand (in 2010 and 2035) and serve areas with average underserved populations (in 2010). Routes on the edge of the urban area showed less activity compared to other areas. Therefore, routes on the edge of the urban areas are regional bikeways. Regional bikeways may experience less demand than bicycle parkways, however they provide key routes and connectivity on the regional network; bicycle parkways would not function without them. Routes that showed a high level of demand, but that are not currently on the 2035 Regional Transportation Plan (RTP) bicycle network map are recommended as new bicycle parkway or regional bikeway routes, for example Foster Road in Portland

FINDINGS FOR GUIDING PRIORITIZATION

Results from the evaluation provide *one* set of information to help inform regional and local decision making about where and how to prioritize investments in the recommended regional bicycle network. Below is a summary of the findings from the evaluation.

1. Areas of the region that increased bicycle network density in 2035 saw an increase in bicycle activity. Areas with less density saw less of an increase.

2. Bicycle mode share increases the most for commuting trips, indicating the need to connect bicycle routes to jobs.

3. In general, planned investments in the regional bike network increase bicycle network density in areas with above average underserved populations (in 2010). However, several areas with underserved populations continue to have lower bike network density, compared to other parts of the region:

    - Forest Grove
    - Cornelius
    - Hillsboro South
    - Hillsboro Central
    - Beaverton – East/Raleigh Hills/Washington Square
    - Beaverton- South /Aloha South
    - Tigard
    - Milwaukie – North/ Clackamas Regional Center
    - N. Portland – St. Johns
    - NE Portland – Cully/Rose City Park/Rocky Butte
    - Happy Valley
    - Central Gresham/Wood Village/Fairview

4. As the miles of protected bicycle facilities increases, such as trails and cycletracks, the number of bicycle miles traveled on those types of facilities increases, while the number of miles of bicycle facilities on standard five foot bicycle lanes or routes with no separated facilities decreases. This indicates an increase in bicycling safety since more miles traveled by bicycle are on facilities more fully separated from traffic. An increase in safety can be translated into a reduction crash related costs.

5. While investment in trails and cycle tracks sees a return on the number of bicycle miles traveled on those facilities, it is important to note that even under the most ambitious scenarios, standard bicycle lanes still account for 55% of bicycle network facilities.

6. Bicycle parkways have about 2.5 times more bicycle traffic than the average bicycle facility, indicating that the importance of the routes and the importance of separated facility designs.

7. Routes on the perimeter of the urban growth boundary have lower volumes of bicycle travel due to population levels. However, these routes provide key connections that get people to the higher demand routes.

8. Trails and cycle tracks are highly desirable facility types. Trails and cycle tracks that are in denser population and employment areas and connect to destinations tend to attract more bicycle trips. Diagonal routes also showed a high level of demand for bicycle trips.

Trails that show a high to moderate bicycle volumes:

- Sullivan's Gulch Trail in Portland
- Hwy 26 Trail connecting Portland and Washington County
- I-405 trail in Portland (connects to Hwy 26 Trail)
- Lake Oswego to Portland Trail
- Bronson Creek Greenway, in the North Hillsboro/Bethany areas
- Gresham MAX Path
- Gresham-Fairview Trail
- I-84 Path, Multnomah County
- Springwater Corridor Trail
- Surf to Turf Trail, parallel to Iron Mtn. Road, Lake Oswego
- I-205 Path
- Phillips Creek Trail, connecting to I-205 Path, Clackamas County
- Trolley Trail in Clackamas County
- Sunrise Corridor Trail in Clackamas County
- Trail along McLoughlin Blvd and the future Portland to Milwaukie Light rail
- East Buttes Powerline Corridor Trail, Clackamas, connecting to the Gresham Fairview Trail
- Rock Creek Trail, Hillsboro
- Fanno Creek Trail, Washington County
- Beaverton Creek Greenway, Washington County
- Westside Trail
- Tualatin River Greenway Trail between Fanno Creek and Westside trail
- Willamette River Greenway/Hwy43, south of Lake Oswego, Clackamas County
- Red Electric Trail/Capitol Highway
- Council Creek Trail
- Waterhouse Trail, Washington County
- Tonquin Trail, Washington County
- Oregon City Loop, Clackamas County
- Mt. Scot/Scouter Mtn. Trails that connect to the East Buttes Powerline Corridor Trail, Clackamas and Multnomah County

Roadway routes that show a high to moderate bicycle volumes:

- Sandy Blvd. in Portland
- Foster Road in Portland
- Downtown Portland
- SE Hawthorne Blvd.
- 17th Ave. connection between Trolley Trail and Springwater Corridor
- NE 15th Ave and 20's Bikeway, Portland
- Barbur Blvd./99 W in Portland and Washington County
- SW Multnomah Blvd. Portland/Washington County
- Clinton Bike Boulevard in inner SE Portland
- Williams/Vancouver, Portland
- Cully Blvd. Portland

- 40's and 50's Bikeways, Portland
- Going Street, Portland
- NE Airport Way
- Powell Blvd., especially in inner SE Portland
- SE Lincoln, SE Market, SE Mill, Portland/East Multnomah County
- SE Stark St., I-205 to SW 257th, Multnomah County
- Division Street, Portland to Gresham
- Hogan Road, Multnomah County
- SW 257th, Multnomah County
- SE 181st Ave, East Multnomah County
- SE 162nd, Multnomah County
- SE 136th Multnomah County
- SE 122nd Ave, East Multnomah County
- SE 148th Ave, East Multnomah County
- Burnside in East Multnomah County
- NE Halsey, Multnomah County
- Main Street, Hillsboro
- SW Baseline, Washington County
- Scholls Ferry Road
- SW Canyon Road
- SW 5th and 6th Avenues, Beaverton
- SW Western Ave., Beaverton
- Capitol Highway and Kerr Parkway, Portland and Washington County
- SW Boones ferry Road, Fanno Creek to Wilsonville
- SW Tualatin Sherwood hwy.
- SW Beaverton Hillsdale Hwy.
- SW Oleson Road, Washington County
- SW Brockman St. Washington County
- SW Dosch Road, Washington County
- SW McDonald, SW Gaard St, Washington County
- Tualatin Valley Highway, Washington County
- NW Evergreen Rd, Washington County
- SW Cedar Hills Blvd., Washington County
- Hall Blvd. , Beaverton to Fanno Creek Trail, Washington County
- Kruse Way, Washington County (assumed crossing over I-5)
- SW 72nd, Washignton County, between SW Bonita and 99W
- SE Sunnyside Road, Clackamas
- Monroe Blvd. Clackamas
- SE Thiessen Rd., Clackamas County
- SE Linwood Ave. Clackamas County
- SE Johnson Creek Road, connecting to I-205 Path, Clackamas County
- Pacific Hwy/Willamette Falls Drive, Clackamas
- Pimlico Drive, West Linn
- Lake Road in Milwaukie
- Warner Milne Road, Linn Ave, Central Point Road, Oregon City
- Iron Mountain Road (parallel Surf to Turf Trail)

9. Land use is a key factor in the demand and use of bicycle routes. Bike routes in areas with a lot of destinations show higher volumes of trips, even when no bicycle facilities exist or they are unimproved. This indicates the need to provide bicycle facilities in areas that are destination rich.

10. Areas in the region that show the highest level of bicycle activity (other areas show substantial activity, and all areas of the region show bicycling activity):

    - Downtown Portland
    - Inner SE Portland
    - Outer East Portland/West Gresham
    - Central Gresham/Wood Vilage/Fairview
    - SW Portland
    - Beaverton - South/Aloha-South
    - Beaverton North
    - Tigard
    - SE Portland – Eastmoreland/Woodstock/Foster
    - Inner NE Portland

11. Facilities added that overcome barriers saw a relatively large number of bicycle trips. All bridges, existing and added, showed demand for bicycle trips. These facilities include:

    - The new light rail bridge in downtown Portland
    - TheLake Oswego to Portland Bridge
    - Hwy 26 Trail
    - Crossings of Hwy 26, including the Westside Trail
    - Gaps in the I-205 Trail
    - Crossings of I-84

PURPOSE OF ANALYSIS

This is a technical report of the 2035 Regional Active Transportation Plan (ATP). The report provides a summary and analysis of data outputs from Metro's bicycling modeling tools and geographic information system (GIS) analysis of the 2010 bicycle network, the future 2035 bicycle network (bicycle projects in the Regional Transportation Plan) and three bicycle network concepts developed as part of the ATP.

The purpose of the analysis is to help identify the preferred network of regional bicycle parkways for the ATP, to help set performance targets and policies, to help prioritize areas for regional bicycle investments and to identify potential changes to the routes designated in the current RTP Regional Bicycle Network. The analysis will also be useful for developing and updating local transportation system plans and bicycle plans.

The evaluation process was designed to analyze and evaluate three separate bicycle network concepts using the planned future 2035 bicycle network as a base case in order to identify the preferred regional bicycle network. Differences between 2010 network and the 2035 future network proved the most useful for understanding changes in bicycling activity and density and connectivity of the bicycle network. Analysis of the three network concepts provided useful information on preferred routes for bicycling.

A separate evaluation of improvements to the regional pedestrian network is provided by Alta Planning and Design. A report on the expected benefits of improvements to the regional bicycle and pedestrian networks is provided by CH2MHill using data from this technical report and the analysis of the pedestrian network.

BICYCLE NETWORKS ANALYZED

Model runs of the regional transportation network were completed for five bicycle networks. Bicycle networks are fully integrated into the regional transportation model, which includes the auto and transit networks.

1. **2010 Bicycle Network ("2010 scenario")**. This is the network of bicycle facilities completed as of 2010 and identified in Metro's RLIS (Regional Land Use Information System) bicycle network. The 2010 scenario provides the base case for the 2035 scenario.
2. **2035 State RTP Bicycle Network ("2035 scenario").** Provides the base case scenario for the three bicycle parkway network concepts. Includes the 2010 network plus future planned bike projects that are included on the RTP project list, including bike improvements that are part of roadway projects. The 2035 state RTP project list does not complete every gap in the existing bicycle network. See Appendix 1 for a map of the 2035 State RTP bicycle network.
3. Bicycle Network Concept 1 – Grid ("Grid scenario")
4. Bicycle Network Concept 2 – Spiderweb ("Spiderweb scenario")
5. Bicycle Network Concept 3 – Mobility Corridor (Mobility Corridor scenario")

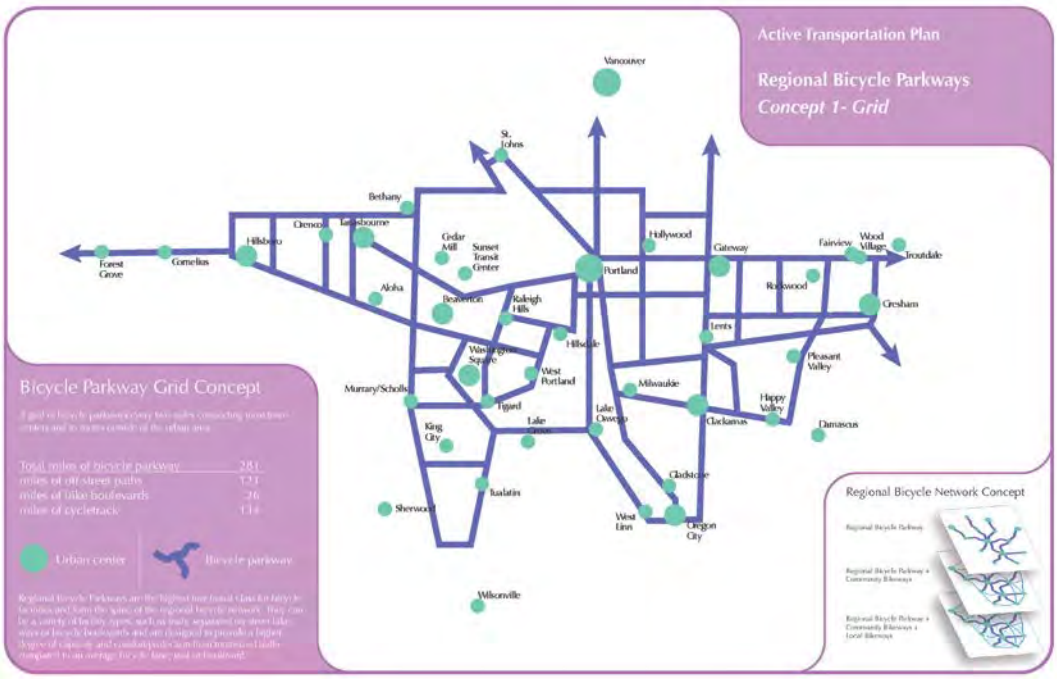
Bicycle parkway network concepts

Metro and the Stakeholder Advisory Committee developed three network concepts of regional bicycle parkways to evaluate against the 2035 scenario.

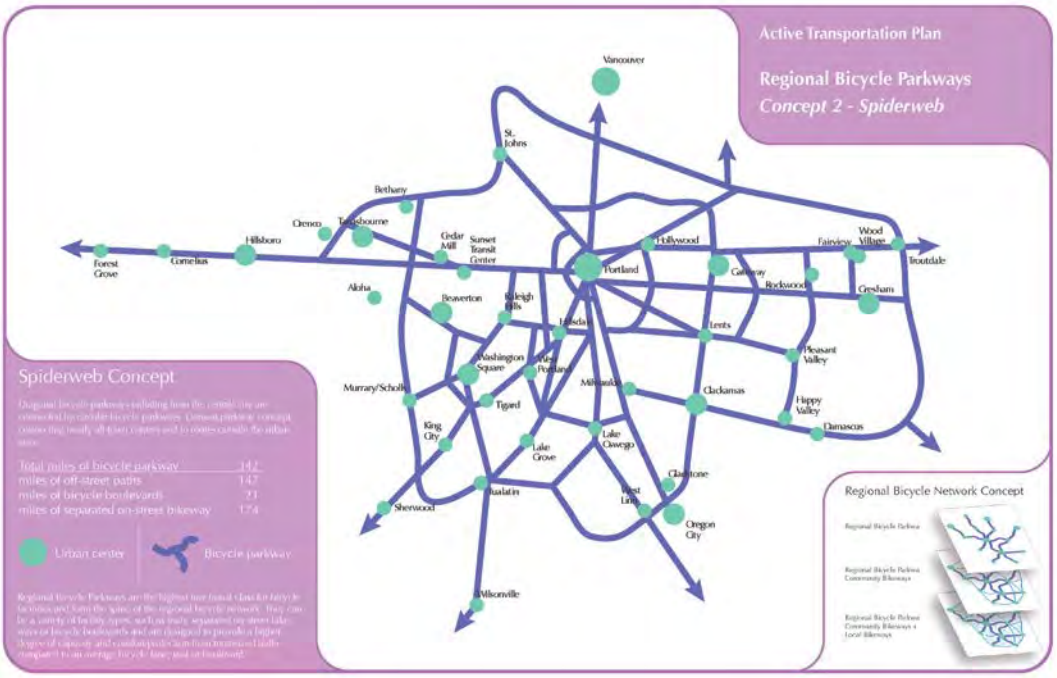
The bicycle parkway is a new concept being proposed in the ATP. Regional bicycle parkways would be the highest functional class for bikeways in the region and form the spine of the bikeway network. Regional parkways would be designed to ensure that bicycle travel is safe, efficient, comfortable, and enjoyable. Bicycle parkways can be various types of facilities but they must provide direct routes, prioritize bicycle travel and provide separation from auto traffic on roadways with higher levels of traffic and speeds.

Each concept has both unique routes and routes shared with the other concepts. Each concept includes a combination of regional bicycle parkways that are off-street paths (regional trails), on-street protected bikeways such as cycle tracks, and bicycle boulevards on low traffic streets. Some of the routes were fully built in 2010, some are identified as projects in the 2035 State RTP project list and some were added as new projects. Concepts 2 and 3, Spiderweb and Mobility Corridors, removed travel lanes from a few on-street routes to test the impact on mode choice. Lanes were removed in the model to test a "what-if" scenario of the impact of narrowing a roadway (i.e. a road diet) to accommodate in-roadway bikeways, such as a cycle track. Roadways were chosen to reflect different areas of the region and are merely to test the "what-if" scenario, and not to endorse narrowing roadways on any particular route. Decisions to narrow roadways would be made during project development and not in the ATP. See the Appendix 2 for maps showing where lanes were removed.

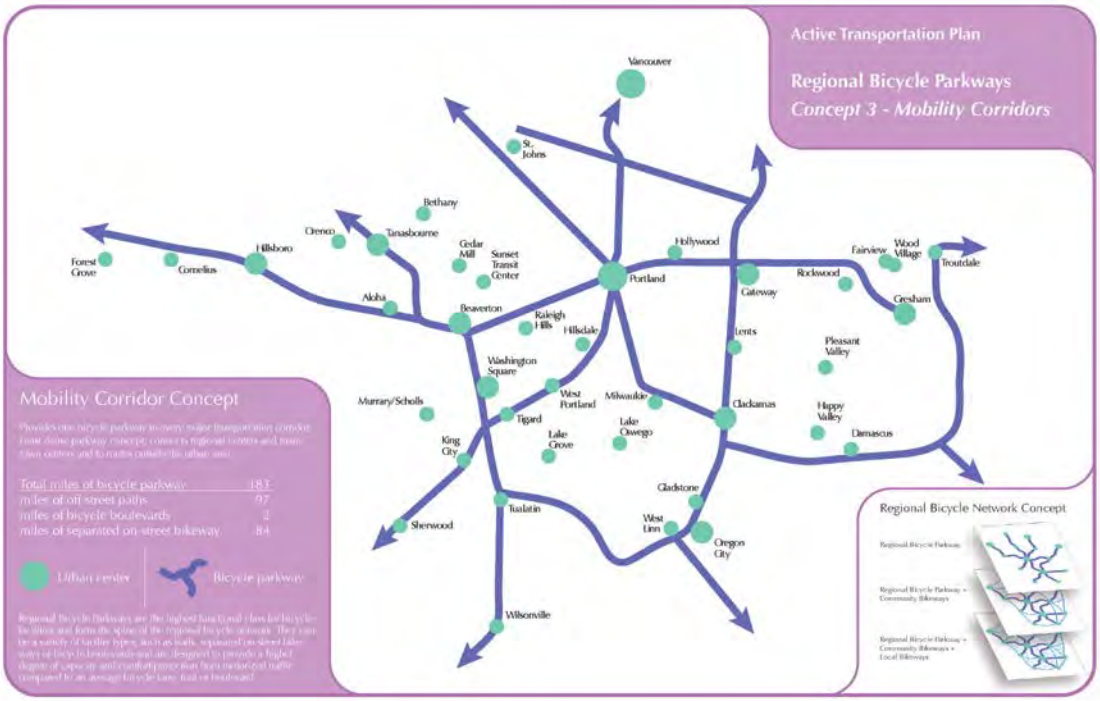
1. **Concept 1- Grid Network.** Comprised of a grid of 281 miles of regional bicycle parkways spaced approximately every 2 miles north/south and east/west. Emphasizes connecting to regional centers and areas of higher density employment and households. This is the medium density concept. Removes zero auto lane miles.



2. **Concept 2 – Spiderweb Network**. Comprised of long radials with circular connectors, 342 miles of regional bicycle parkways with connections to regional centers and emphasizes areas of higher density employment and households. This is the densest of the bicycle parkway concepts and has the most auto travel lanes removed. Removes 40 auto lane miles



3. **Concept 3 – Mobility Corridors Network.** Identifies one regional bicycle parkway per regional mobility corridor. Mobility corridors that extend outside the urban growth boundary are not included. This is the least dense concept with 183 miles of bicycle parkways. Removes 25 auto lane miles.

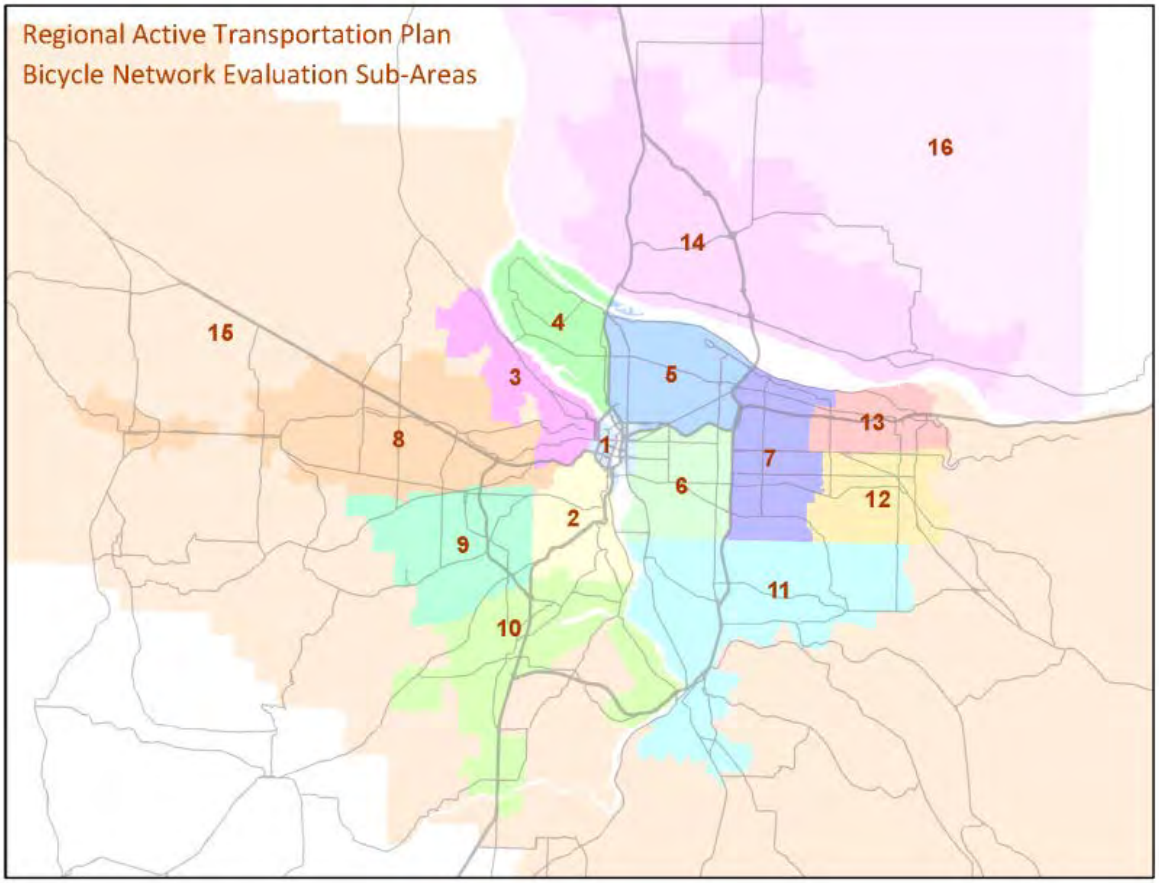


AREAS OF ANALYSIS

Three geographical areas of analysis were used in the evaluation of the regional bicycle network:

1. The area within urban growth boundary (UGB).
2. Thirteen sub-areas within the UGB.
3. Fifty cycle analysis zones (CAZs) within the UGB. The sub-areas and the CAZs are aggregates of transportation analysis zones (TAZs).

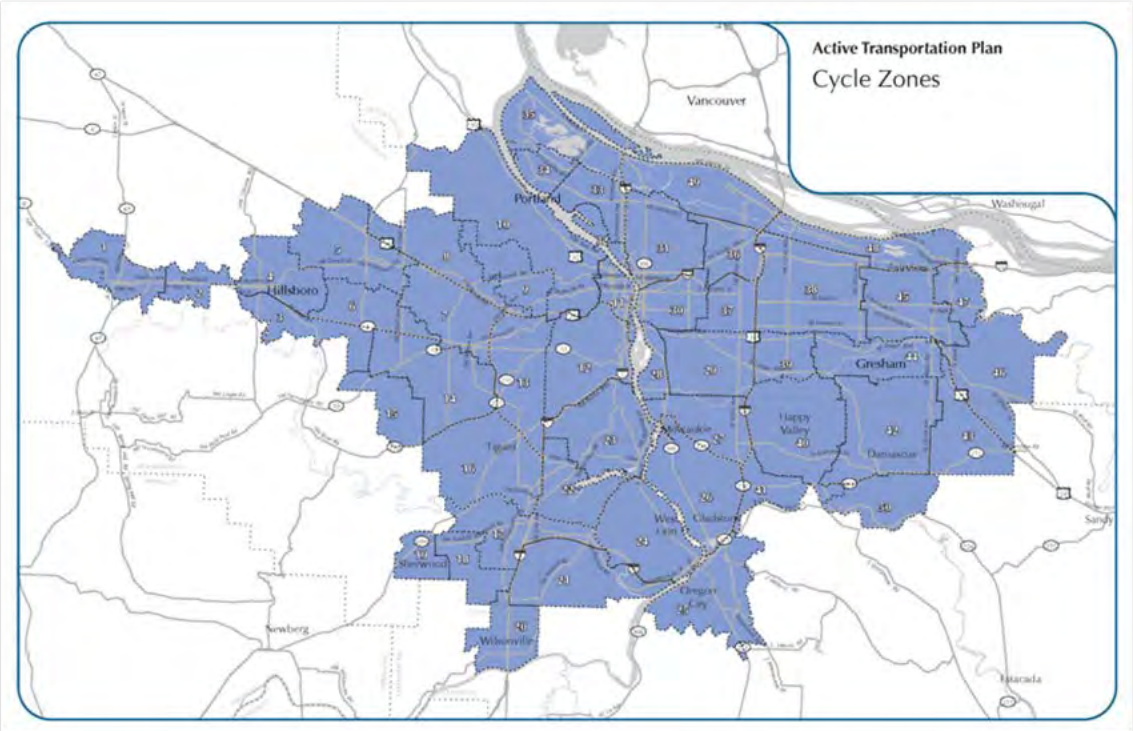
Analysis of the bicycle networks was limited to the area within the Metro UGB. A set of sub-areas were developed by Metro to provide a greater level of detail for the analysis. The area within the UGB is divided into thirteen sub-areas, which are groupings of TAZs. Sub-areas for urban Clark County and non-urban areas are identified on the sub-area map but are not included in the evaluation (sub areas 14, 15, 16). Sub-areas were defined based on general jurisdictional boundaries of counties and cities.



Subarea Name	#
Portland Central City	1
Portland SW	2
Portland NW	3
Portland North	4
Portland NE to I-205	5
Portland SE to I-205	6
Portland E of I-205	7
North Washington Suburbs	8
Central Washington Suburbs	9
South Suburbs	10
Clackamas Eastside Suburbs	11
South Multnomah Suburbs	12
North Multnomah Suburbs	13
Urban Clark County	14

Metro and the Stakeholder Advisory Committee developed the CAZs using a set of regional data sources in order to identify CAZs with homogenous characteristics in household and employment density, density of intersections and sidewalks, elevation, and density of existing bicycle infrastructure. Location of highways, freeways, major arterials, rivers and railroads (all potential barriers to bicycle travel) were further used to identify boundaries of the CAZs.

Fifty CAZs within the UGB were defined. The CAZs provide a smaller geographic area than the sub-areas, providing greater level of detail. A list and map of the CAZs is provided in Appendix 3.



See Appendix 3 for larger map.

TECHNICAL CONSIDERATIONS

Transportation models for auto and transit networks have been developed and refined over several decades. Metro's bicycle modeling tool was developed in 2011-12 and modeling for the ATP represents the one of the first utilizations of the tool for planning purposes. Taking into account the newness of the tool, this section describes considerations that should be kept in mind while exploring the data and analysis.

- This report contains results from modeled data. The bicycle modeling tool and the transportation model are calibrated to survey data. However, modeled data will not mirror survey or other data exactly. See Appendix 4 for examples of model calibration using bicycle counts across Willamette River bridges.
- Outputs are useful for showing rough demand for bicycle routes. The tool may be less useful for predicting bicycle mode share in very specific locations or the precise number of users on a specific route. The bicycle modeling tool cannot capture social change, such as the potential rise

in popularity in bicycling, or the impact of encouragement programs and education. Other influences, such as the potential rise in gas prices can be tested, but were not in this analysis.

- The attractiveness of bicycle facilities in the bicycle model tool was developed applying the results of a GPS survey conducted by Portland State University. The PSU survey found that trails are the most attractive facility, then bicycle boulevards and then bicycle lanes. At the time of the survey no cycle tracks had been built in the region, and therefore did not have a "level of attractiveness" associated with them. For purposes of modeling cycle tracks for this evaluation, staff and PSU researchers agreed to give cycle tracks the same level of attractiveness as bicycle boulevards
- Loop trips, where the origin and destination of the trip (usually home) are the same, are not captured in the model. This may impact recreational bicycle trips and the number of trips on trails such as the Columbia Slough or outer Springwater Trail, or routes such as HWY 30 connecting to Sauvie Island. The Oregon Household Activity Survey estimates that loop trips comprise about 1% of all spring/fall weekday bike trips. See Table 15 in Appendix 4 for an example of the difference.
- Bike to transit trips are not captured in the modeled data. The Oregon Household Activity Survey estimates that bike-access to transit was used for about 3% of transit trips. About 2.5% were Bike Onboard and 0.5% were Bike and Ride. The average bike trips are approximately 2.5 miles in length and the average bike and transit trip is approximately 10 miles.
- Modeled data is based on surveys conducted in spring/fall months. This likely undercounts bike trips for summer months. Data from the Hawthorne Bridge bicycle counter shows the Spring and Fall months are similar to the annual average daily counts, while Summer is about 46% higher than average. See Table 15 in Appendix 4 for a comparison of bridge counts taken in July and September compared to the model results which reflect May and October ("average") conditions. The difference between modeled results and the July counts show a relatively similar seasonal adjustment rate found by the Hawthorne counter: 41% more users in the July count compared to the modeled result.
- User experience and preference is captured by the bicycle model, but bicycle lanes within the model are all treated equally regardless of traffic volumes and speeds (auto speeds and volumes are counted for streets without any bicycle infrastructure).
- In addition to the mileage added to the bicycle network in 2035 investments to the auto and transit networks were also added. These projects increase the desirability of those modes in the future as well. Some of the larger projects include:

  Freeways: I-5 Bridge replacement over Columbia River, I-205 / Airport Way interchange, Sunrise Highway project from I-205 to 172nd, US 26 widening from Cornell Rd to Cornelius Pass Rd, Us 26/, OR 217, I-205 and I-84/I-5 interchange improvements, I-5/217 interchange configurations

  Transit: Lake Oswego Streetcar, Milwaukie light rail, Columbia River crossing light rail, Eastside streetcar loop , Burnside/Couch streetcar to Hollywood Transit Center, Barbur light rail, WES service improvements, BRT on I-205 from Clackamas TC to Tualatin, On-street BRT Division/Powell, Broadway/Wielder Streetcar, NE MLK Streetcar, NW 19th/20th Streetcar

- The model shows a much larger jump in the number of bicycle trips between 2010 and the 2035 scenario than between 2035 and each of the three bicycle network concept scenarios. There are several reasons for this.
    - The increase in miles of bicycle facilities between 2010 and 2035 is far greater than between the 2035 scenario and the three bike network concept scenarios.
    - There are assumptions that change between the 2010 and 2035 scenarios, but are held constant between 2035 scenario and the three bike network concept scenarios:
        - Population and employment level (this changes drastically between 2010 and 2035 and is the primary reason for the large difference between 2010 and 2035, in addition to the substantial amount of bicycle facilities added by 2035)
        - Parking cost (Central City, Regional Centers, Station communities, Town Centers)
        - Denser and more mixed land uses
    - If bike parkway coding is added to a route that already has a bike lane (or no facility) in the 2010 scenario or the 2035 scenario it will receive a boost in attractiveness in the model (to replicate a cycle track/buffered bike lane). However routes that already have a trail or bicycle boulevard in 2010 or the 2035 scenario don't receive a boost in attractiveness when given the bike parkway coding, even though we expect those routes will be designed at a higher level than the average trail or bicycle boulevard.
    - The three bicycle network concept scenarios did not address policy changes (such as additional parking costs, cost of transportation, tolling) or social changes (increased cultural cache of bicycling) that would potentially have a large impact on the number of trips made by bicycle in the future. Future use of the bicycle model analysis should consider testing these types of variables.

Using the bicycle modeling tools for the ATP has provided valuable data that will help guide the development and implementation of the plan. The process also provided lessons that should be helpful for future efforts

BICYCLE NETWORK EVALUATION MEASURES, OUTPUTS & FINDINGS

The following criteria and evaluation measures were identified by the ATP Stakeholder Advisory Committee to evaluate the bicycle network concepts.

Table 1: Evaluation Criteria and Measures

Evaluation Criteria	Evaluation Measures
Access. How well does the network improve access to destinations? Measures the increase in miles, density and connectivity of bikeways overall for each network scenario and by cycle analysis zone. Cycle analysis zones include town centers and regional destinations.	Miles of bicycle facilities
	Density of bicycle network
	Connectivity of bicycle network
Equity. How well does the network increase access low income, minority, disabled, non-English speaking, youth and elderly populations?	Density of bicycle network in areas with underserved populations
	Level of bicycle activity in areas with underserved populations
Safety. How well does the network make it safer to ride a bike for all users, regardless of age and ability?	Bicycle miles traveled on bikeways separated from traffic
	Miles of bicycle facilities separated from traffic
	Proximity of separated bikeways to locations of serious and fatal bicycle crashes
Increased Activity. By how much does the network increase the number of trips made by walking and bicycling?	Bicycle mode share
	Number of bicycle trips
	Average bicycle trip length
	Bicycle volumes

Table 2: Summary Table, Bicycle Network Concepts

Measure	Network Concept		
	Spiderweb	**Mobility Corridor**	**Grid**
Sub-areas that see the highest growth in bicycle trips compared to 2035	South Suburbs, N. Washington County, Portland SE to I-205, Portland SW, Clackamas Eastside, Portland Central City	N. Washington County, Portland Central City, Portland SW	N. Washington County, South Suburbs
Miles of bicycle facilities	1409	1387	1406
Miles of new bicycle parkways	51	30	49
% increase in bike trips over the 2010 scneario	65%	64%	64%
% increase bike trips over 2035 scenario	1.5%	0.09%	1.1%
% increase in bicycle miles traveled over 2035 scenario	4%	2%	3%
Miles of facilities separated from traffic	444	344	407
% Bicycle miles traveled on protected bike facilities	45%	38%	43%
% bicycle miles traveled on bike lanes	25%	30%	26%
Bike mode share in 2035 for trips within the urban growth boundary	3.7%	3.6%	3.6%
New bike trips/day over 2035 scenario	4,383	2,525	3,223
Planning level cost of bicycle parkways[1]	$577 million $27 million/yr[2] $14/capita/year $1.8 million/mile of bike parkway	$301 million $14million/yr. $7/capita/year $1.9 million/mile of bike parkway	$474 million $23 million/yr $11/capita/year $1.7 million/mile of bike parkway

[1] Bicycle parkways costs include upgrades/improvements to existing facilities (in 2035) and cost of added bicycle parkways. Costs are planning level costs for the purpose of analysis. These costs are in addition to the 2035 RTP project costs. The RTP includes approximates $550 million in stand-alone bicycle projects, $283 million in regional trail projects. An additional $1.6 billion dollars of roadway projects include bicycle as a secondary mode. See Appendix 5 for details on costs.

[2] Annual and per capita costs are based on a regional population estimate of 2 million people and an implementation timeline of 21 years.

Table 2, above, provides a summary of some of the evaluation measure outputs for the three network concepts. The Spiderweb Concept is the most expensive network concept and also sees the most increase in bicycle trips, mode share, and bicycle trips on protected bikeways. The Grid Concept is slightly less expensive on a per mile basis and sees increases similar to the Spiderweb. The Mobility Corridor Concept is the least expensive overall.

Access

Access is measured by the increase in density and connectivity of bikeways. Increasing the density and the connectivity of the regional bicycle network allows for increased access to employment areas, urban centers and key regional destinations. See Appendix 10 for a map of regional destinations.

Findings for Access

- Miles of bicycle facilities within the urban growth boundary increase 57%, from 866 to 1359 miles, from the 2010 scenario to the 2035 scenario.
- In the Spiderweb scenario miles of bicycle facilities increase 3.7% over the 2035 scenario, in the Mobility Corridor by 2.1% and in the Grid by 3.5%. These increases are fairly small because the increase in the investments, compared to the 2035 RTP scenario is fairly small.
- The Spiderweb Concept is the densest of the three network concepts, with the most miles of bicycle parkways and the most increase in new bikeways over 2035.
- In all of the networks, bike lanes account for the most miles of any facility type. Trails are the next most prevalent facility type, followed by bicycle boulevards, cycle tracks and finally advisory bicycle lanes.
- Miles of bike lanes decrease from the 2010 and 2035 scenarios to the three network concepts because bike lanes are converted to protected in-roadway bikeways. Bike lanes comprise nearly 80% of the network in 2010 and as low as 55% in the Spiderweb Concept.
- The density of the regional bicycle network increases overall in the 2035 scenario compared to the 2010 scenario, reflecting investments programmed in the 2035 RTP. However, density does not increase equally across the region. In 2035 there are several areas of the region that continue to have a low level of density in the regional bicycle network because fewer projects are planned in those areas. Since several zones see an increase in their density score, the density score for some zones (those with less planned projects) goes down relative to other zones that see an increase.

Miles of bicycle facilities

Miles of bicycle facilities are calculated for each of the network scenarios and by facility type, provide in Table 3 below.

Table 3: One-Way Mileage for Bicycle Networks, within UGB[3]

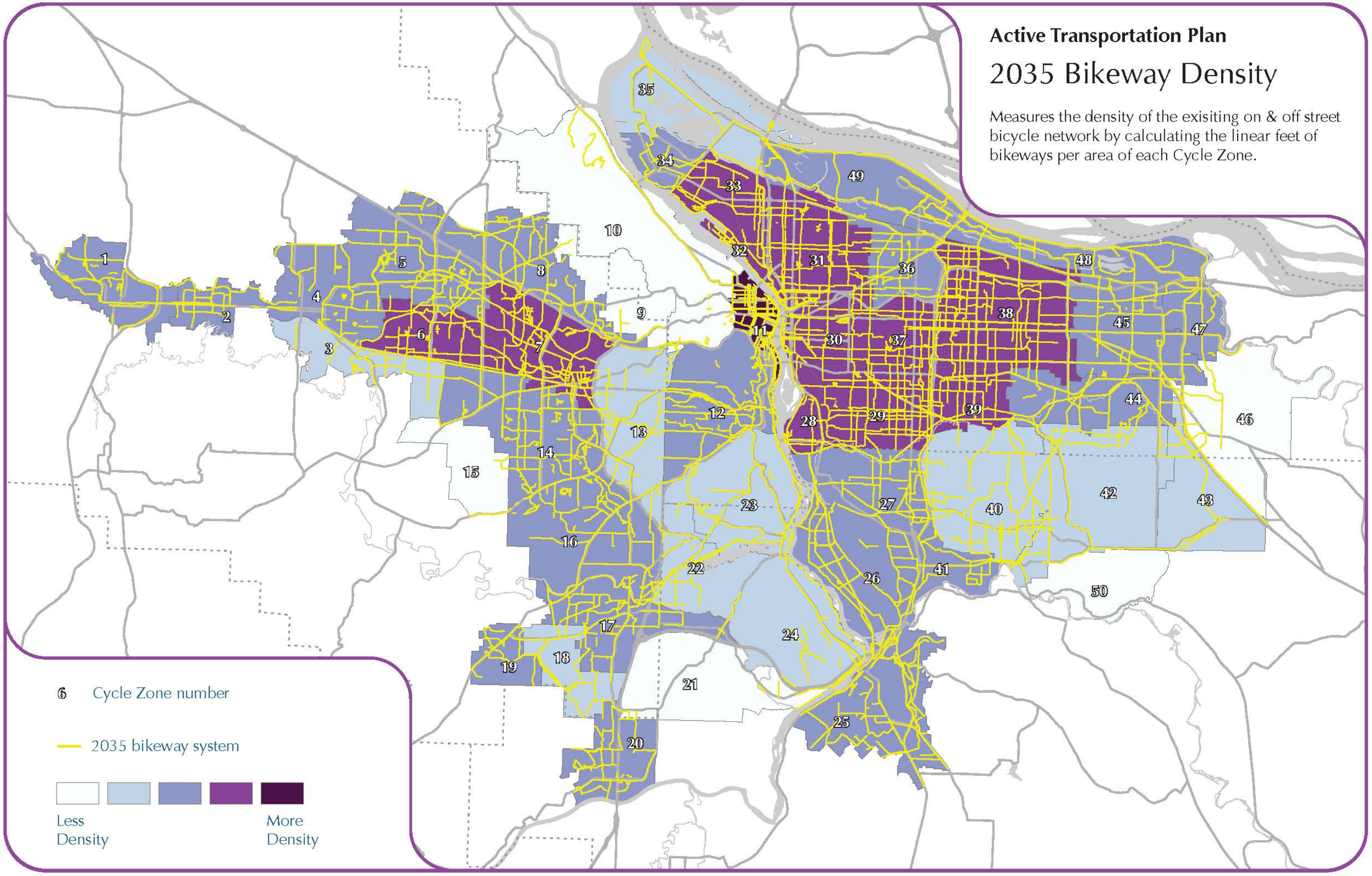
BICYCLE FACILITY	BICYCLE NETWORK				
	2010	2035 Scenario	Spiderweb	Mobility Corridor	Grid
Advisory Bike Lane	0	24	24	24	24
% of total bike network	*0%*	*2%*	*2%*	*2%*	*2%*
Cycle Track	0	2	161	76	129
% of total bike network	*0%*	*0%*	*11%*	*5%*	*9%*
Bicycle Boulevard	65	165	170	166	175
% of total bike network	8%	12%	12%	12%	12%
Trail	109	248	283	268	278
% of total bike network	*13%*	*18%*	*20%*	*19%*	*20%*
Bicycle Lane	691	921	771	853	800
% of total bike network	*80%*	*68%*	*55%*	*61%*	*57%*
Total Bicycle Network	866	1359	1409	1387	1406
Miles Regional Bicycle Parkway included in total miles			314	157	266
Increase in facilities over 2035 scenario			3.7%	2.1%	3.5%

**Bicycle parkway total miles do not include parkway miles that extend beyond the UGB. Miles of parkway including mileage outside of the UGB are: Spiderweb (342), Mobility Corridor (183), and Grid (281).*

Density of bicycle network

The attached 2035 Bicycle Density map illustrates the level of density for each cycle analysis zone. The table in Appendix 8 gives the bikeway density and connectivity scores for 2010 and the 2035 scenarios and the 2010 Bikeway Density Map is provided for comparison. The level of density for each zone is measured relative to the other zones. Zones that are ranked with "more density" have not necessarily achieved the preferred level of density; a higher score merely indicates that the zone has more density relative to other zones. Density levels were identified in GIS by calculating the linear feet of on and off street bikeways per each area of cycle analysis zone. Density is not shown for each of the three network concepts.

[3] Network miles for the 2010 network includes all bicycle facilities built by 2010 and identified in Metro's bicycle network data. Mileage for 2035 state scenario includes all facilities built after 2010 and identified in Metro's bicycle network data and all bicycle projects listed in the 2035 State RTP project list, including bicycle projects that are part of roadway projects. The three network concepts – Spiderweb, Mobility Corridor and Grid – include the 2035 State RTP projects and additional new projects.


Active Transportation Plan
2035 Bikeway Density
Measures the density of the exisiting on & off street bicycle network by calculating the linear feet of bikeways per area of each Cycle Zone.
6 Cycle Zone number
2035 bikeway system
Less Density
More Density

Zones that have a high bikeway density score in 2010 and continue to have a high bikeway density score in the 2035 scenario

- Downtown Portland #11, this is the only CAZ with a density score of 5 in 2010 and 2035
- Beaverton - North #7
- SE Portland – Eastmoreland/Woodstock/Foster #29
- Inner SE Portland #30
- NE Portland – Inner #31
- Swan Island #32
- N. Portland –Central #33
- Outer East Portland/W. Gresham #38

Zones that see an increase in their density score from 2010 to 2035, relative to other zones

- Forest Grove, #1
- Cornelius #2
- Hillsboro South #3
- Central Hillsboro#4
- Aloha- North #6
- Sherwood – Industrial/Tualatin – Industrial #18
- Sherwood –Central #19
- Wilsonville #20
- West Linn #24
- Oregon City # 25
- SE Portland – Brooklyn/Sellwood-Moreland#28
- N. Portland – St. Johns #34
- NE Portland – Cully/Rose City Park/Rocky Butte #36
- SE Portland Mt. Tabor/Montavilla # 37
- SE Portland – Lents/Powellhurst-Gilbert # 39
- Damascus # 42
- Boring #43
- Damascus South #50

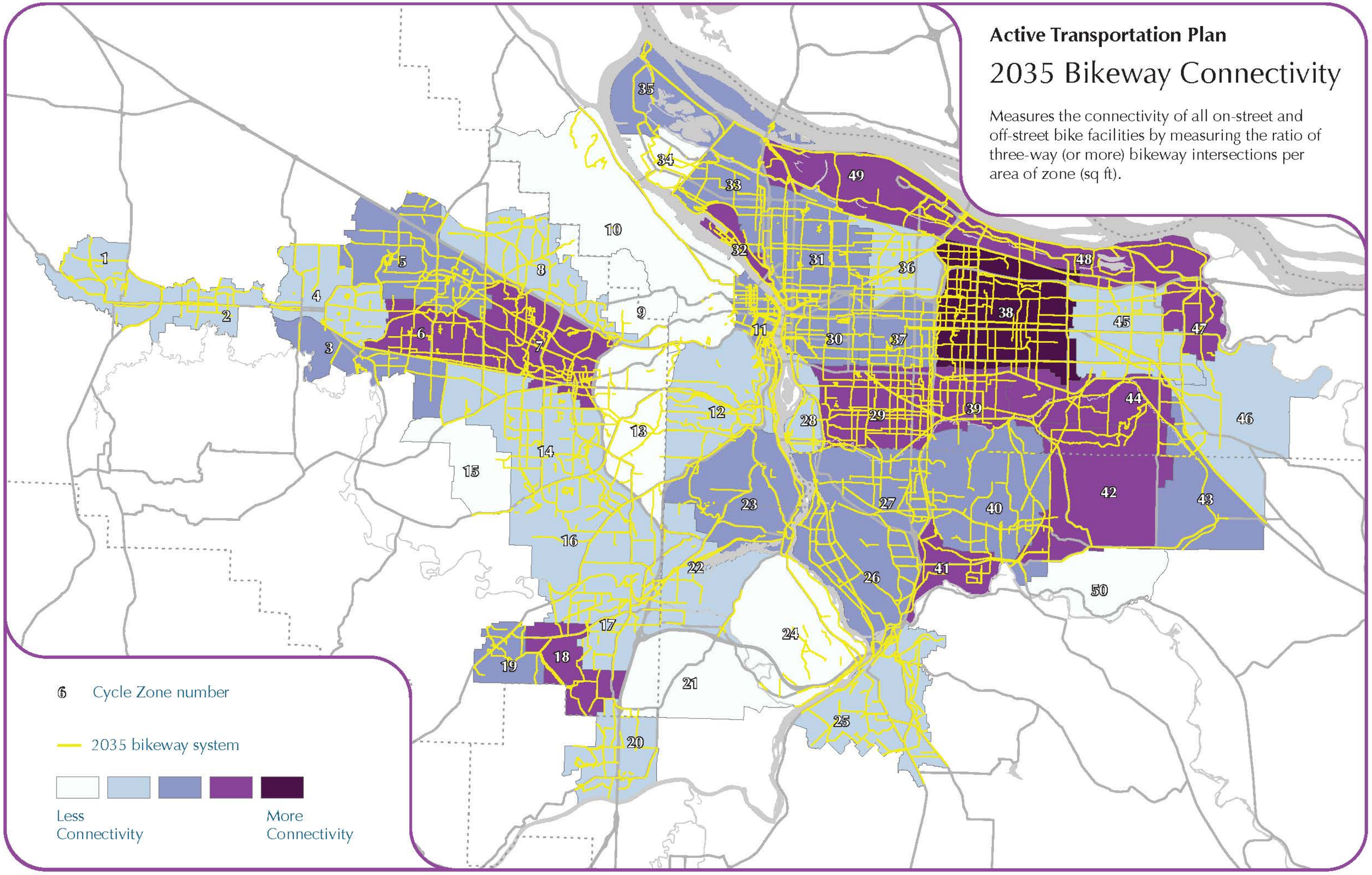
Due to investments in other zones, the density level for some zones goes down on the density scale, relative to the other zones, in 2035

- Tualatin #17
- Milwaukie – Downtown/Oak Grove/Gladstone #26

- Central Gresham/Wood Village/Fairview #45
- Columbia Corridor Industrial #48
- Portland Airport #49

Connectivity of bicycle network

The attached 2035 Bicycle Connectivity map illustrates the level of connectivity for each cycle analysis zone. The 2010 Bikeway Connectivity Map is provided in Appendix 7 for comparison. Connectivity of the 2035 bicycle network is measured in GIS by calculating the number of bikeway intersections in each CAZ that have three or more connections. Cycle analysis zones that have low bikeway density can still have a high level of bikeway connectivity if the bikeways connect; only bikeway connectivity is measured – not roadway connectivity. This measure is not useful for comparing zones to one another since a high level of connectivity without a high level of bikeway density does not necessarily provide a high quality bike network. Connectivity was not measured for each of the three network concepts. These maps are provided for informational purposes but no findings were derived from this measure.


Active Transportation Plan
2035 Bikeway Connectivity
Measures the connectivity of all on-street and off-street bike facilities by measuring the ratio of three-way (or more) bikeway intersections per area of zone (sq ft).
6 Cycle Zone number
2035 bikeway system
Less Connectivity
More Connectivity

Equity

The attached Underserved Populations maps show U.S. Census block groups in the region that have higher than average low income, low-English proficiency, non-white, elderly and young populations within each cycle analysis zone for the 2010 and 2035 scenarios and each of the three bicycle network concept scenarios. The equity criteria measure the access of underserved populations to bikeways and bicycle parkways. Table 4, below, shows level of bikeway density for cycle analysis zones that include U.S. Census block groups that have above average and higher than above average underserved populations. The attached map shows the overlap of levels of bicycling activity and areas with above average underserved populations.

Table 4: Cycle Analysis Zones with US Census Block Groups with Higher than Above Average Underserved Populations and 2035 Scenario Bike Network Metrics

CAZ's with above average and higher than above average underserved populations	2010 Bikeway Density (Score)	2035 Bikeway Density (Score)
1 – Forest Grove	Low (2)	Med (3)
2 - Cornelius	Low (2)	Med (3)
3 – Hillsboro South	Low (1)	Low (2)
4 –Hillsboro Central	Low (2)	Med (3)
6 – Aloha North	Med (3)	High (4)
7 – Beaverton - North	High (4)	High (4)
13 – Beaverton – East/Raleigh Hills/Washington Square	Low (2)	Low (2)
14 – Beaverton- South /Aloha South	Med (3)	Med (3)
16 - Tigard	Med (3)	Med (3)
29 – SE Portland – Eastmoreland/Woodstock/ Foster	High (4)	High (4)
26 – Milwaukie – Downtown/Oak Grove/Gladstone	High (4)*	Med (3)
27 – Milwaukie – North/ Clackamas Regional Center	Med (3)	Med (3)
31- NE Portland Inner	High (4)	High (4)
33 - N. Portland Central	High (4)	High (4)
34 – N. Portland – St. Johns	Low (2)	Med (3)
36 – NE Portland – Cully/Rose City Park/Rocky Butte	Low (2)	Med (3)
37 – SE Portland – Mt. Tabor/Montavilla	Med (3)	High (4)
38 – Outer east Portland / W. Gresham	High (4)	High (4)
39 – SE Portland – Lents/Powellhurst-Gilbert	Med (3)	High (4)
40 – Happy Valley	Low (2)	Low (2)
45 – Central Gresham/Wood Village/Fairview	High (4)*	Med (3)

** Due to investments in other zones, the density level for some zones goes down on the density scale, relative to the other zones, in 2035.*

Findings for Equity

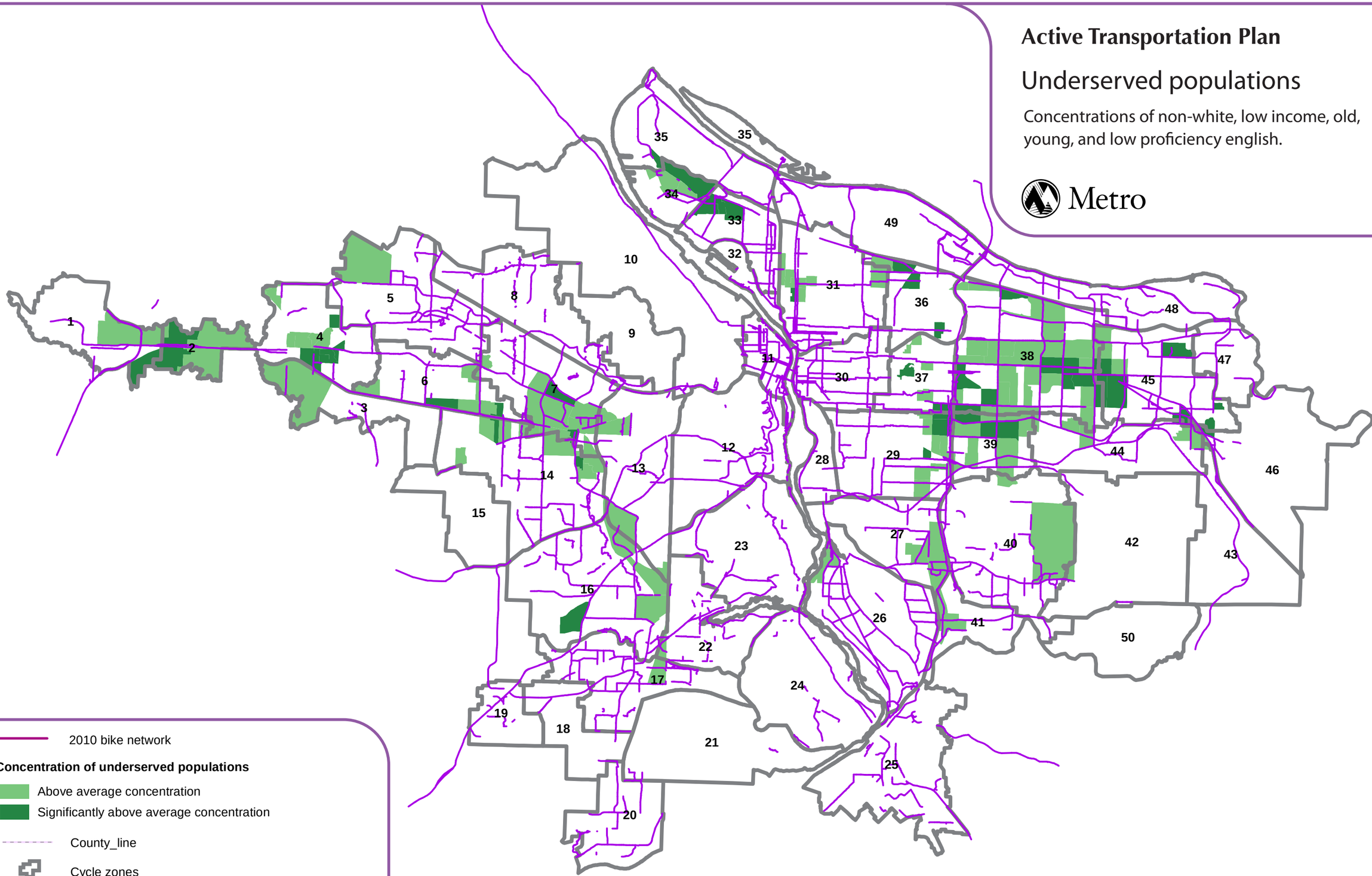
In general, areas with above average underserved populations (2010 data) have medium to high levels of bikeway density Some CAZ's bikeway density scores go down in 2035, relative to other CAZs. This could reflect less investment in bikeways in those CAZs compared to others. There are 3 areas in the region with underserved populations that have a low bicycle density score in 2035.

Active Transportation Plan

Underserved populations

Concentrations of non-white, low income, old, young, and low proficiency english.

Metro



2010 bike network

Concentration of underserved populations

Above average concentration

Significantly above average concentration

County_line

Cycle zones

0 2 4 8 Miles

Data sources: 2010 US Census, 2004-2009 ACS

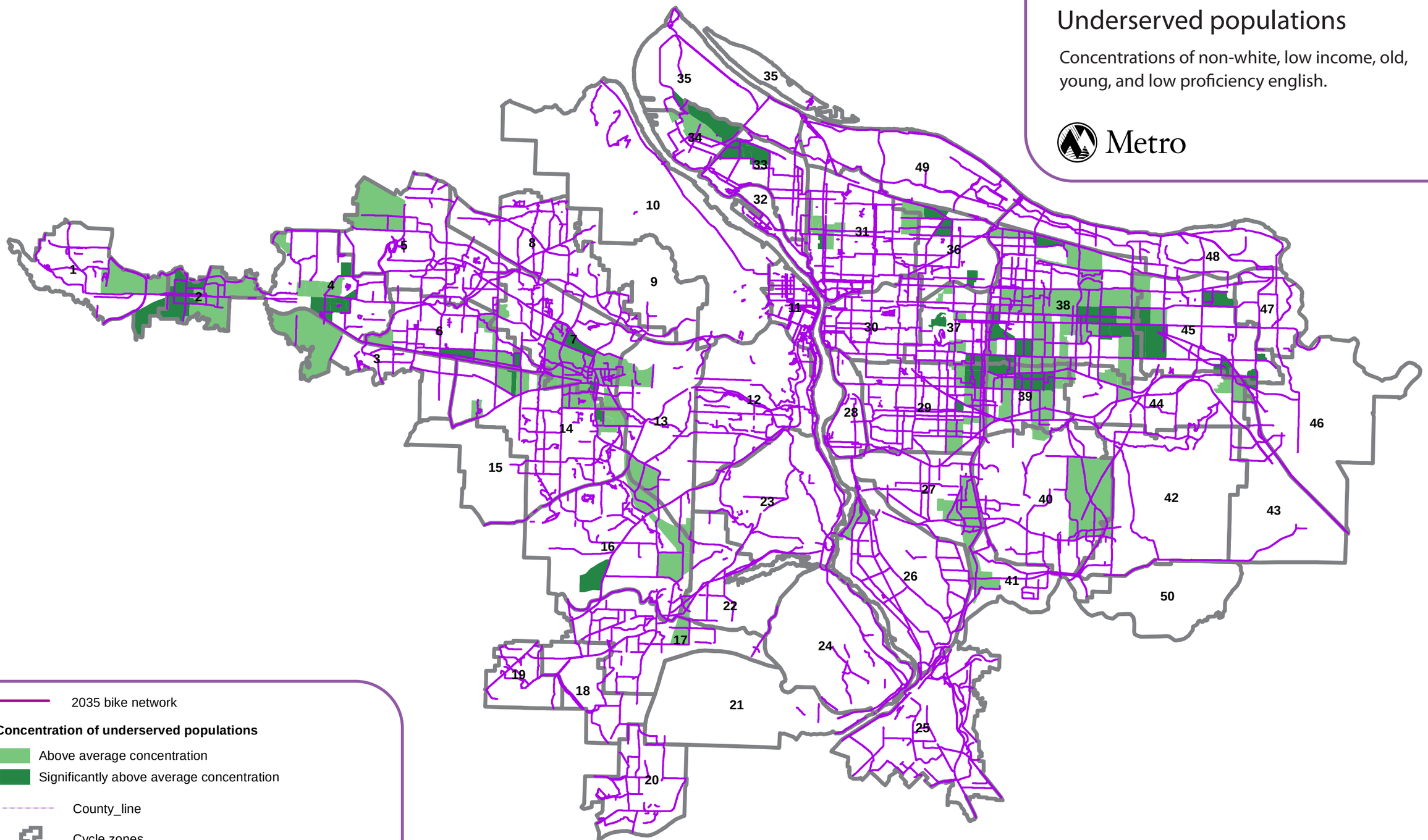
matthew.hampton@oregonmetro.gov

Active Transportation Plan

Underserved populations

Concentrations of non-white, low income, old, young, and low proficiency english.

Metro



2035 bike network

Concentration of underserved populations

Above average concentration

Significantly above average concentration

County_line

Cycle zones

0 2 4 8 Miles

Data sources: 2010 US Census, 2004-2009 ACS

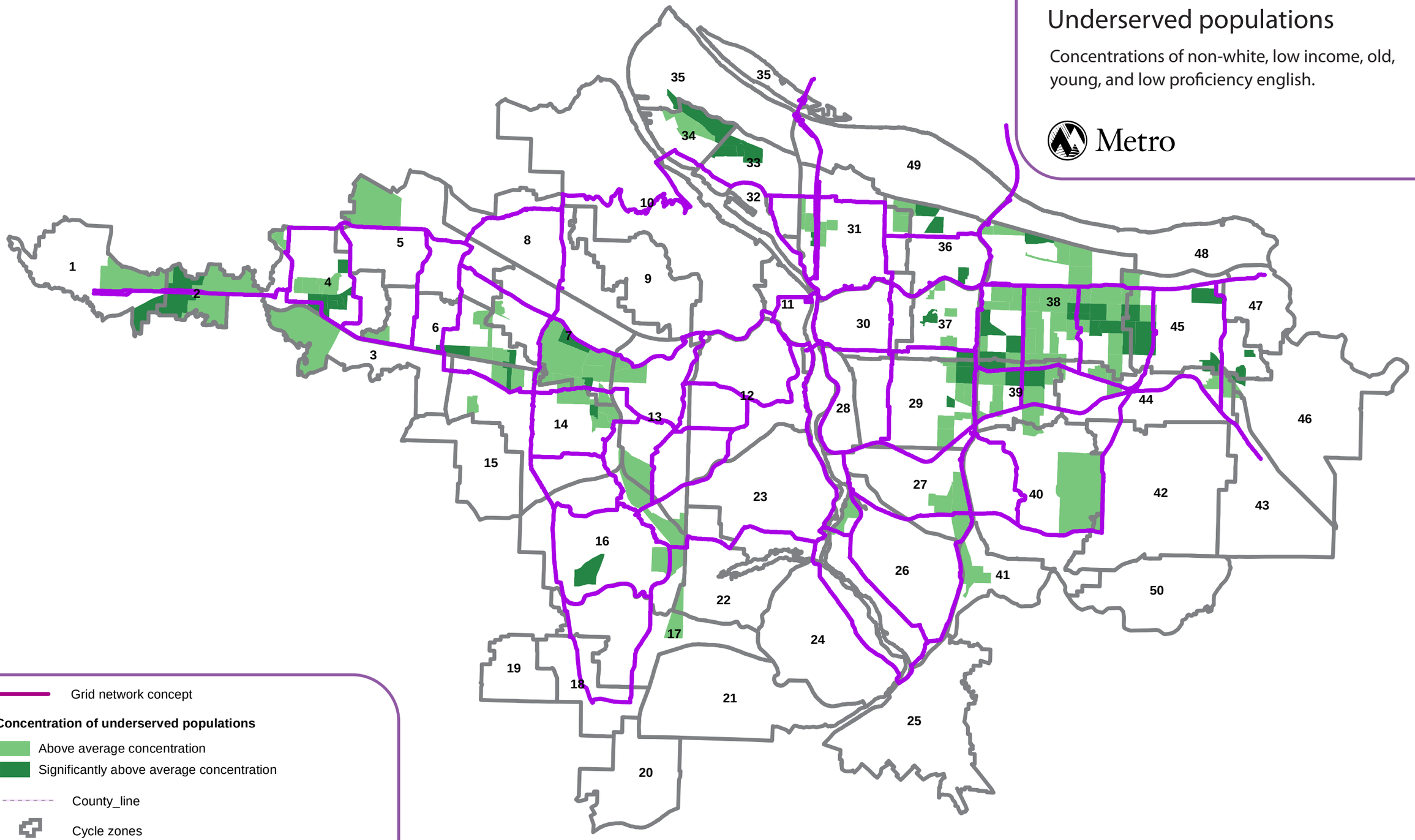
matthew.hampton@oregonmetro.gov

Active Transportation Plan

Underserved populations

Concentrations of non-white, low income, old, young, and low proficiency english.

Metro



Grid network concept

Concentration of underserved populations

Above average concentration

Significantly above average concentration

County_line

Cycle zones

0 2 4 8 Miles

Data sources: 2010 US Census, 2004-2009 ACS

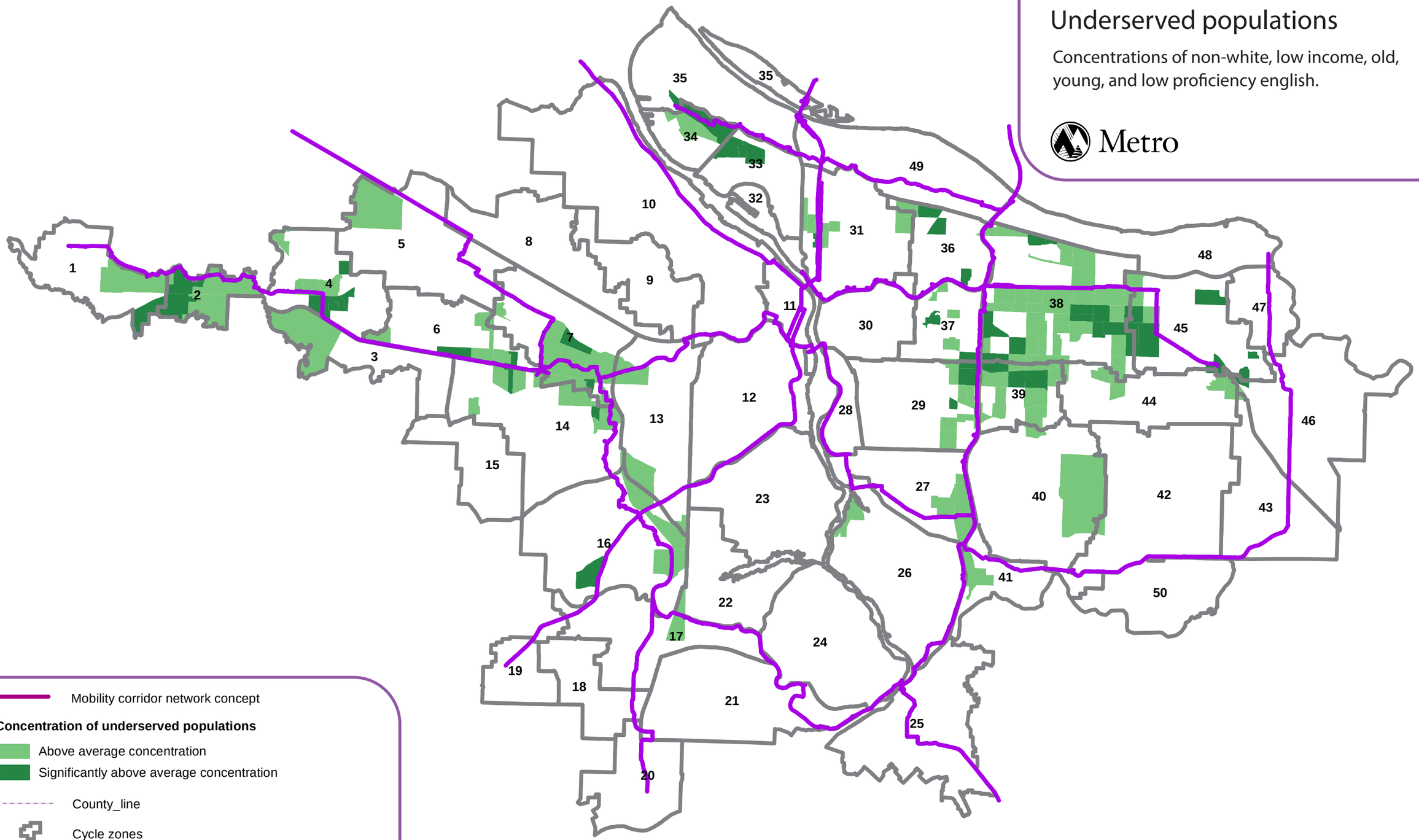
matthew.hampton@oregonmetro.gov

Active Transportation Plan

Underserved populations

Concentrations of non-white, low income, old, young, and low proficiency english.

Metro



Mobility corridor network concept

Concentration of underserved populations

Above average concentration

Significantly above average concentration

County_line

Cycle zones

0 2 4 8 Miles

Data sources: 2010 US Census, 2004-2009 ACS

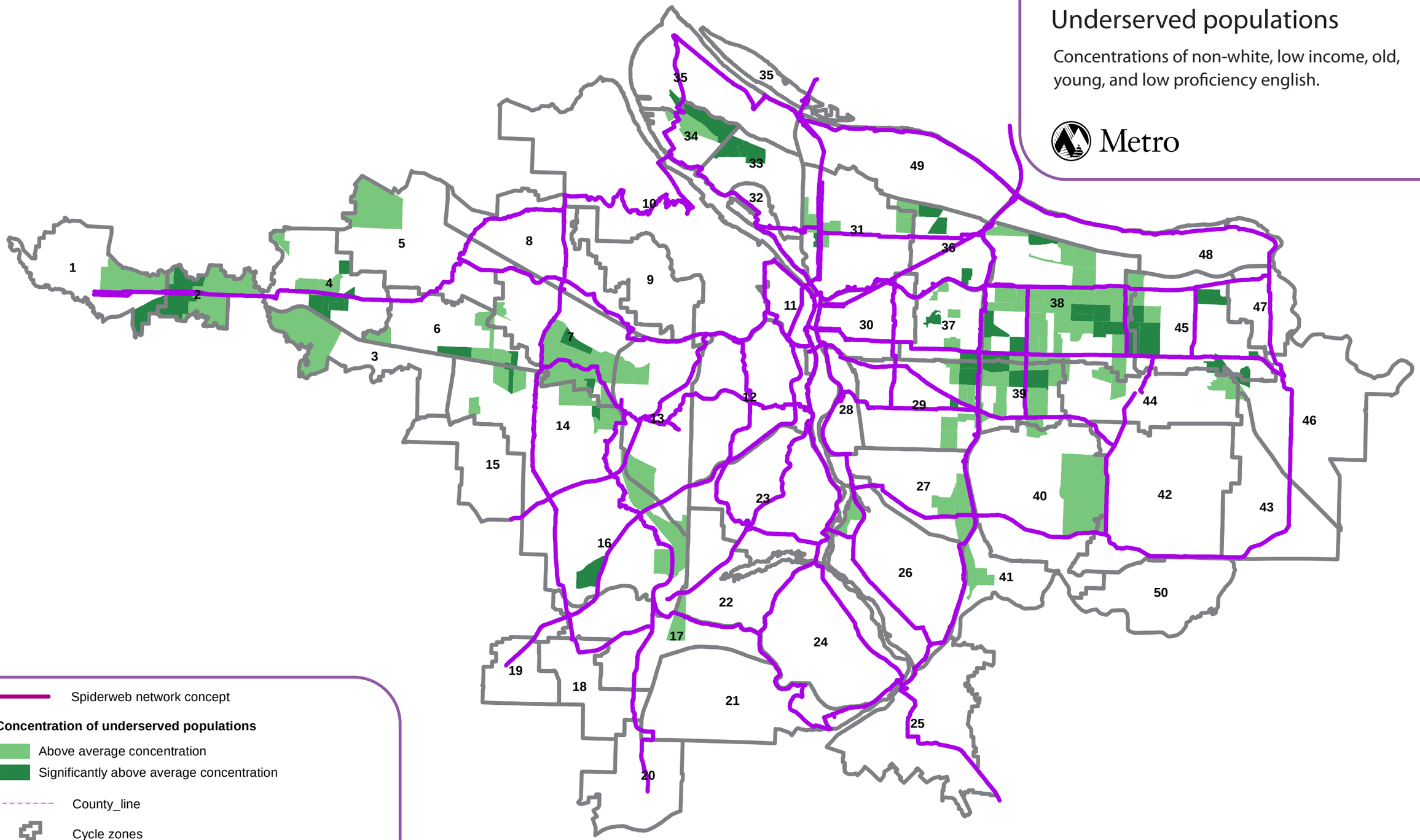
matthew.hampton@oregonmetro.gov

Active Transportation Plan

Underserved populations

Concentrations of non-white, low income, old, young, and low proficiency english.

Metro



Spiderweb network concept

Concentration of underserved populations

Above average concentration

Significantly above average concentration

County_line

Cycle zones

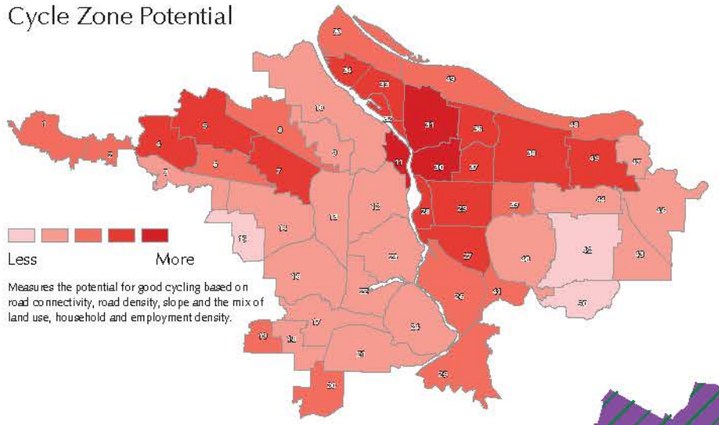
0 2 4 8 Miles

Data sources: 2010 US Census, 2004-2009 ACS

matthew.hampton@oregonmetro.gov

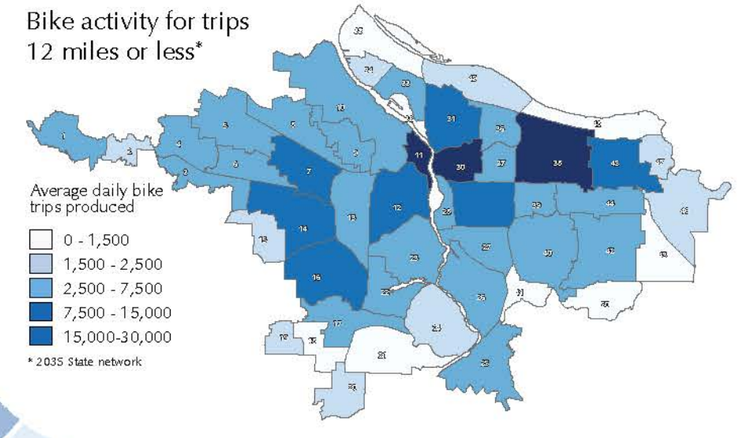
Bike Potential and Activity

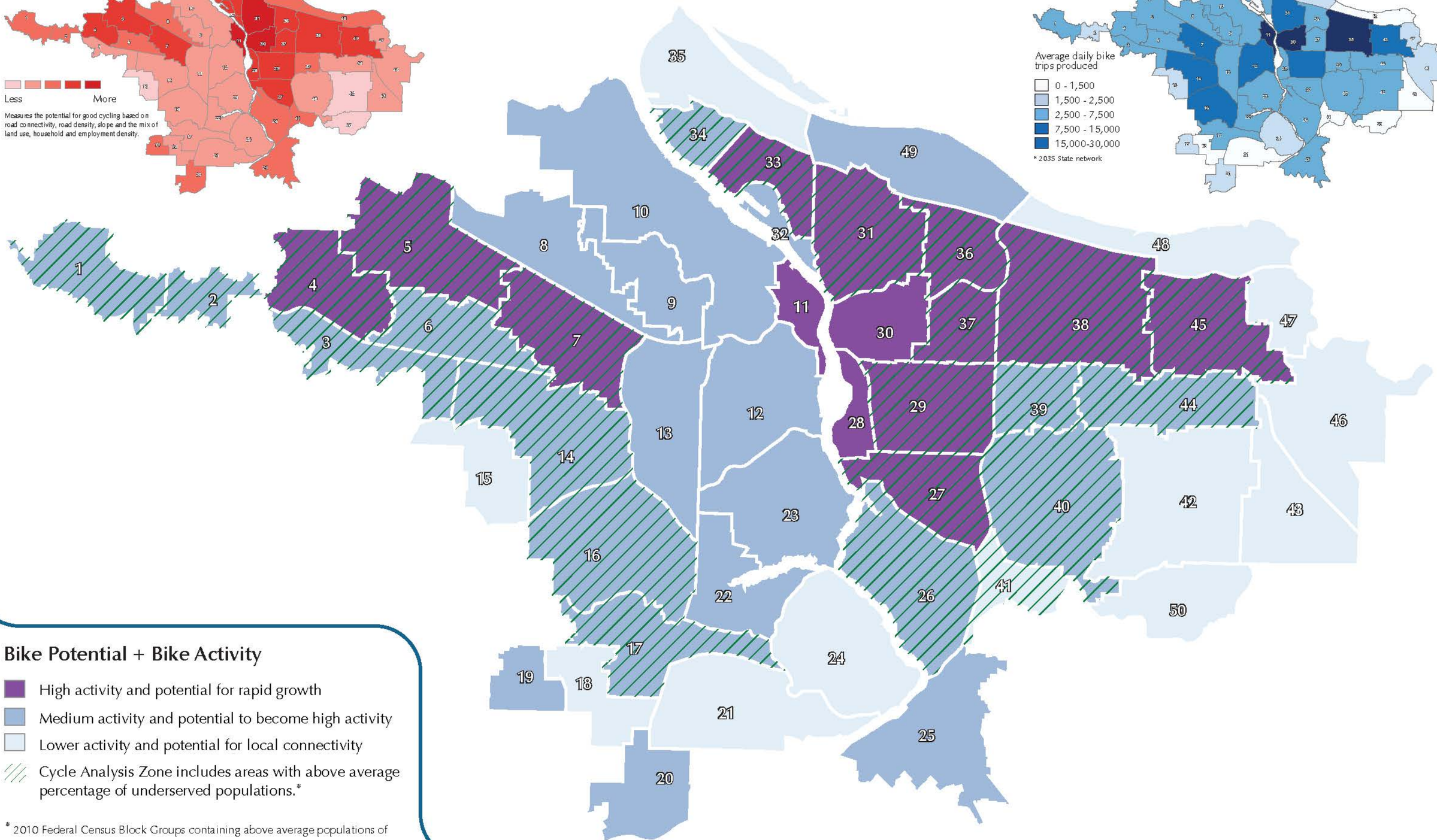
Cycle Zone Potential



Measures the potential for good cycling based on road connectivity, road density, slope and the mix of land use, household and employment density.

Bike activity for trips 12 miles or less*





Bike Potential + Bike Activity

- High activity and potential for rapid growth
- Medium activity and potential to become high activity
- Lower activity and potential for local connectivity
- Cycle Analysis Zone includes areas with above average percentage of underserved populations.*

* 2010 Federal Census Block Groups containing above average populations of low income, low-English proficiency, non-white, elderly (65+) ,young (under 18)

Safety

Safety is measured by the increase in bicycle miles traveled on protected bikeways.

Bicycle miles traveled (BMT) on bikeways separated from traffic

Increased bicycle travel on bikeways that provide physical separation from vehicle traffic are used as one measure of increased safety for people riding bicycles. Recent research has linked reduced crashes with the use of separated paths and cycle tracks. Metro's 2011 Safety Report found that nearly 53% of all fatal and serious bicycle crashes occurred on arterial roadways. Providing safer facilities on these types of roadways can reduce serious bicycle crashes and lower the cost of crashes within the region.

The number of bicycle miles traveled by bicycle facility type was calculated for each of the scenarios. Table 5 below provides information showing that as the number of miles of protected facilities increases, the number of bicycle miles traveled on protected facilities also increases, suggesting that people will use protected bicycle facilities if they are available. Though bike lanes make up more than 50% of the bike network in all of the scenarios (see Table 3, above), the model indicates that protected facilities are preferred for travel. On the 2010 network, 41% of all bicycle miles traveled are on bike lanes. This decrease slightly in the 2035 scenario where 39% of bicycle miles traveled is on bike lanes. The Spiderweb scenario has the least bicycle miles traveled on bike lanes—25%.

Findings for Safety

- Safer, higher quality facilities attract a higher number of bikes per mile of bicycle facility. Addition of bicycle facilities separated from auto traffic increases the opportunity for safe travel by bicycle. Bicycle miles traveled on bike lanes decreases up to 39% from the 2035 scenario to the three bicycle network concept scenarios. Bicycle parkways have about 2.5 times more bike traffic than the average bike facility.
- The three network concepts show a substantial increase in bicycle miles traveled on facilities protected from traffic – trails and cycle tracks. On the 2035 scenario, 25% of bicycle miles traveled are on trails and cycle tracks combined - Spiderweb 45%, Mobility Corridor 38% and Grid 43%.
- After trails, more bicycle miles are traveled per mile of cycle track than any other facility type. including bicycle boulevards on low stress streets. The reason could be the access to destinations and directness of route that cycle tracks provide.
- The number of bicycle miles traveled on roadways with no bicycle facilities also decreases in the three network concept scenarios, from 39% to 22% in the Spiderweb and Grid concepts.
- The Spiderwb Concept has the highest percentage of miles of bikeways that are protected from auto traffic.
- The Mobility Corridor concept has the highest number of bicycle miles traveled per mile of bicycle parkway. This indicates a high level of attractiveness for the bicycle parkways and the potential to increase the number of trips made by bicycle by adding these facilities. (Table 7)

- Bicycle miles traveled on bicycle boulevards decrease from 2010 to 2035 and in each of the scenarios (see Table 6). One reason may be the provision of trails and protected cycle tracks which provide greater access to destinations.

Table 5: Average Daily Bicycle Miles Traveled (BMT) by Facility Type, within UGB

	BICYCLE NETWORK				
	2010	2035 State RTP	Spiderweb	Mobility Corridor	Grid
Total Daily Average BMT on Network	443,372	754,477	782,813	771,621	780,505
Miles of Trails	109	248	283	268	278
BMT on Trails	50,560	190,448	265,134	245,164	258,620
Percent BMT on Trails	11%	25%	34%	32%	33%
Miles of Cycle Tracks	0	2	161	76	129
BMT on Cycle Tracks	0	N/A	87,020	49,816	73,689
Percent BMT on Cycle Tracks	N/A	N/A	11%	6%	9%
Miles of Bicycle Boulevards	65	156	170	166	175
BMT on Bicycle Boulevards	39,953	74,875	61,129	64,114	67,038
Percent BMT on Bike Boulevards	9%	10%	8%	8%	9%
Miles of Advisory Bicycle Lanes	0	24	24	24	24
BMT on Advisory Bicycle Lanes	N/A	4,578	4,431	4,573	4,432
Percent BMT on Advisory Lanes	N/A	1%	1%	1%	1%
Miles of Bicycle Lanes	691	921	771	853	800
BMT on Bicycle Lanes	181,476	291,477	192,149	233,109	205,188
Percent BMT on Bicycle Lanes	41%	39%	25%	30%	26%
BMT on Major River Bridges	4,748	8,081	8,060	6,210	7,837
Percent BMT on Major River Bridges	1%	1%	1%	1%	1%
Miles of All Bicycle Facilities	866	1,359	1,409	1,387	1,406
BMT on All Bicycle Facilities	276,737	569,459	617,923	602,986	616,804
Percent BMT on Network With Bicycle Facitlities	62%	75%	79%	78%	79%
BMT on Roadways with No Bicycle Facility	171,383	193,099	172,950	174,844	171,537
Percent BMT on Roadways with No Bicycle Facility	39%	26%	22%	23%	22%
Miles Bicycle Parkway	N/A	N/A	314	157	266
BMT on Bicycle Parkways	N/A	N/A	293,591	174,945	264,899
PercentBMT on Bicycle Parkways	N/A	N/A	38%	23%	34%

Table 6, below, gives the number of bicycle miles traveled per mile of bicycle facility for each scenario. The average number of bicycle miles traveled for all facilities in the 2010 scenario is 320. The average for all bike facilities increases in the 2035 scenario and the three network concept scenarios. Bicycle parkways in the network concepts have over double the number of bikes per mile of facility compared to the average for all bicycle facilities, suggesting that the location and attractiveness of the facilities increases use. The Mobility Corridor concept has the

least miles of Bicycle Parkways but has the highest number of bicycle miles traveled per mile of bicycle parkway.

Table 6: Number of Bicycle Miles Traveled per Mile of Bicycle Facility, within UGB

Bicycle Miles Traveled (BMT) per Bicycle Facility Type	BICYCLE NETWORK				
	2010	2035 Scenario	Spiderweb	Mobility Corridor	Grid
BMT on trails /mile of trails	464	768	937	915	930
BMT on cycle tracks/mile of cycle tracks			540	655	571
BMT on bike boulevards/mile of bike boulevards	615	480	360	386	383
BMT on bike lanes /mile of bike lanes	263	316	249	273	256
BMT on all bike facilities /mile of all bike facilities	320	419	439	435	439
BMT on bike parkways /mile of bicycle parkway			934	1113	996

Table 7: Bicycle Miles Traveled per miles of bicycle parkways, within UGB

	Bicycle Concept		
	Spiderweb	Mobility corridor	Grid
Total daily average bicycle miles traveled on all network (with or without facilities)	783,000	772,000	781,000
Miles of bike parkways	314	157	266
BMT / miles of bike parkways	**2500**	**4900**	**2900**

Table 8: Miles of Separated Facilities per Network, within UGB

	BICYCLE NETWORK				
	2010	2035 Scenario	Spiderweb	Mobility Corridor	Grid
Miles of Protected Facilities - Cycle Tracks and Trails	109	250	444	344	407

Network improvements and serious and fatal bicycle crash locations

The maps in Appendix 6 illustrate the locations of serious and fatal bicycle crashes in proximity to the three bicycle network concepts. Location of the crashes does not indicate whether the crashes occurred *along* the bicycle parkway corridor or when crossing the corridor. However, the maps do illustrate the proximity of the corridors with crashes that have occurred. The maps are provided for information; no conclusions have been drawn based on a visual analysis of the maps.

Increased Activity

Increased bicycling activity is measured by bicycle mode share, average bicycle trip length, number of daily bicycle trips and number of bicycle miles traveled.

Trips and mode share data are counted as originating trips, so trips are attributed to the zone or sub-area a trip originates in. This is different than the method that associates all trips with the place of residence of the person making the trips. U.S. Census data, for instance, uses the place of residence method. Trip Tables in Appendix 7 provide bicycle mode share and number of bicycle trips for each of the scenarios by sub-area and broken down by trip type.

Findings for Increased Activity

- All three bicycle network concept scenarios observe an increase in bicycle trips over the 2035 scenario. As miles of bicycle facilities increase so does the number of bicycle trips and the number of bicycle miles traveled. In general, areas of the region that see an increase in the density of the bicycle network in 2035 (represented by projects in the RTP) also see an increase in the number of trips made by bicycle. Refer to the bicycle network density map. CAZ #38, Outer East Portland/West Gresham is an example of this. The level of new bicycle projects, along with high density and bicycling potential may be the reason the area sees such an increase in bicycling activity in 2035.
- Bicycle parkway facilities attract more than double the amount of bike trips compared to all bicycle facilities in all three of the network concepts.
- The number of bicycle trips increases 63% from nearly 180,000 daily trips in 2010 to nearly 290,000 daily trips in 2035. There are 112,490 new originating bike trips from the 2010 scenario to the 2035 scenario. Of the three concepts, the Spiderweb has the highest increase in trips over the 2035 scenario, increasing the number of trips by 4,380 or 1.5%.
- Bicycle miles traveled increase 41% from 2010 to the 2035 scenario, an increase of 311,110. The Spiderweb concept sees the most increase in bicycle miles traveled from 2035 of the three bicycle network concepts.
- Of the three concepts, the Spiderweb concept shows the most growth in bicycle mode share compared to the 2035 scenario, for all areas.
- Bicycle mode share is higher for trips under three miles. Looking at mode share for trips under three miles is crucial for understanding the potential impact of bicycling to reduce driving trips. The 2011 Oregon Household Activity Survey shows that over 33% of all trips made in the 4-County region are made by auto, representing a huge potential to transfer some of those trips to bicycling.
- The Mobility Corridor concept has the least added miles of new bikeways and shows more growth in traditional areas of Portland than the scenarios with more investments, the Grid and Spiderweb concepts, which show more growth in the suburban areas, along with growth in Portland. Nearly all of the sub-areas within the UGB show the most increase in mode share in the Spiderweb concept, especially the South Suburbs (sub-area 10).
- Portland's central city and inner SE and NE neighborhoods have the highest bicycle mode shares in the 2010 and 2035 scenarios. In 2010, sub-area 6, Portland SE to I-205 has the highest bicycle mode share, 4.12%. This shifts in the 2035 scenario and the three bicycle network

concept scenarios to sub-area 1, Portland Central City, 5.41%, generating over 34,000 trips. North Washington County suburbs, sub-area 8 have a bicycle mode share of 3.29% in the 2035 scenario, but generate over 44,000 daily trips.

- The length of bicycle trips increases slightly, attributed to diversion to more attractive facilities such as paths.
- Downtown Portland has a much higher number of bicycle trips, over 29,000/day, than any other cycle analysis zone. Inner NE Portland has the next highest number of daily bicycle trips, over 13,000, in 2035.
- Some areas/CAZs that generate fewer bicycle trips can serve as key connections between zones and show high bicycle volumes on facilities in the zone. Examples of this are SE Portland – Brooklyn/Sellwood-Moreland (#28) and Beaverton – East/Raleigh Hills/Washington Square (#13).
- On all three of the concepts, the Sullivan's Gulch Trail and a connection from downtown Portland through the West Hills attracted a large number of trips.
- Diagonal routes such as Sandy Blvd, Foster Road, and Barbur Blvd, are in high demand for bicycle travel in all of the scenarios, even with no facilities or only bike lanes.
- Routes on the perimeter of the UGB have substantially lower volumes of bike travel in all of the concepts.
- Overall, trails are the most attractive bicycle facility type and attract trips from other facilities, especially parallel routes. Adding the Sullivan's Gulch Trail and a connection from downtown Portland through the West Hills attracted a large number of trips. Trails see more bicycle miles traveled per mile of facility than any other facility.
- Land use is important. Bike routes in dense areas with a lot of destinations show higher volumes of trips even without the addition of improvements other than bike lanes. For example, Burnside east of I-205 showed a higher volume of trips even though Halsey, east of I-205, a parallel route, was improved to a bicycle parkway in all three of the concept scenarios.
- The two new bridge crossings, the new light rail bridge in downtown Portland and the Lake Oswego to Portland Bridge, added to the Willamette River saw a relatively large volume of trips, indicating the value of bridge crossings.

Bicycle Trips

The attached map shows bicycle activity in 2035 and the change from 2010. The number of daily bicycle trips are grouped into five bins. In the 2035 scenario, areas generating the highest levels of bicycling activity, over 15,000 average daily trip productions are:

- Downtown Portland#11
- SE Portland – Inner #30
- Outer East Portland/West Gresham #38

Areas with over 7,500 daily bicycle trips are:

- SW Portland #12

- Beaverton - South/Aloha-South #14
- Tigard #16
- SE Portland – Eastmoreland/Woodstock/Foster #29
- NE Portland – Inner #31

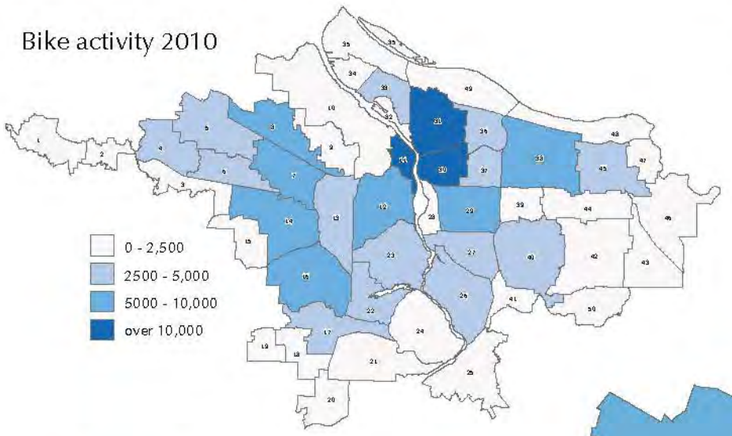
The following CAZs produced more than 1,000 daily bicycle trips to another CAZ in the 2035 scenario. The following map illustrates the major travel patterns for bicycle travel between CAZs.

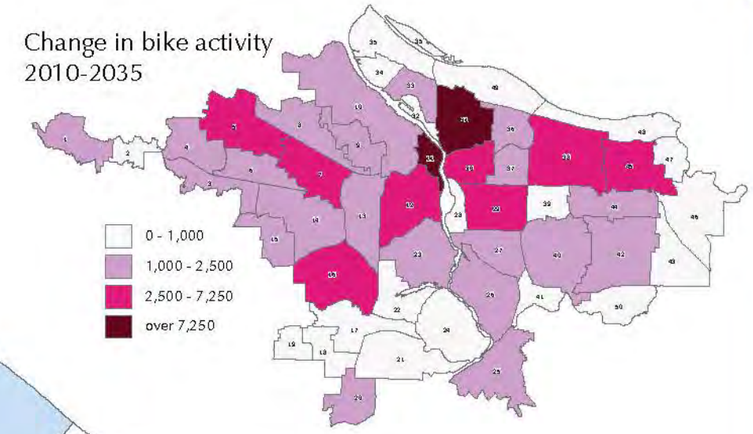
- CAZs 10, 12, 29, 30, 31, and 33 each generate over 1,000 daily bicycle trips to CAZ 11 (Downtown Portland).
- to 5 (Hillsboro North): 6 to 5 (1,360), 4 to 5 (1,040), 8 to 5 (1,460), 7 to 5 (1,010),
- to 7 (Beaverton North): 8 to 7 (1,400), 14 to 7 (2,380)
- To 31 (NE Portland Inner): 30 to 31 (3,520), 11 to 31 (2,120), 33 to 31 (1,540), 36 to 31 (1,100),
- To 30 (SE Portland Inner): 31 to 30 (3,310), 37 to 30 (1,140)
- To 27: (Milwaukie – North / Clackamas Regional Center) 26 to 27 (1,070), 40 to 27 (1,250)
- To 45: (Pleasant Valley / Powell Butte / Gresham Butte) 38 TO 45 (1,250), 44 TO 45 (1,220)
- To 13: (Beaverton – East / Raleigh Hills / Washington Square RC) 14 to 13(1,210), 17 to 13 (1,600), 16 to 13 (1,600)
- From 11: 11 to 12 (SW Portland – Hillsdale/ Multnomah Village) (2,000), 11 to 30 (1,520), 11 to 31 (2,120)

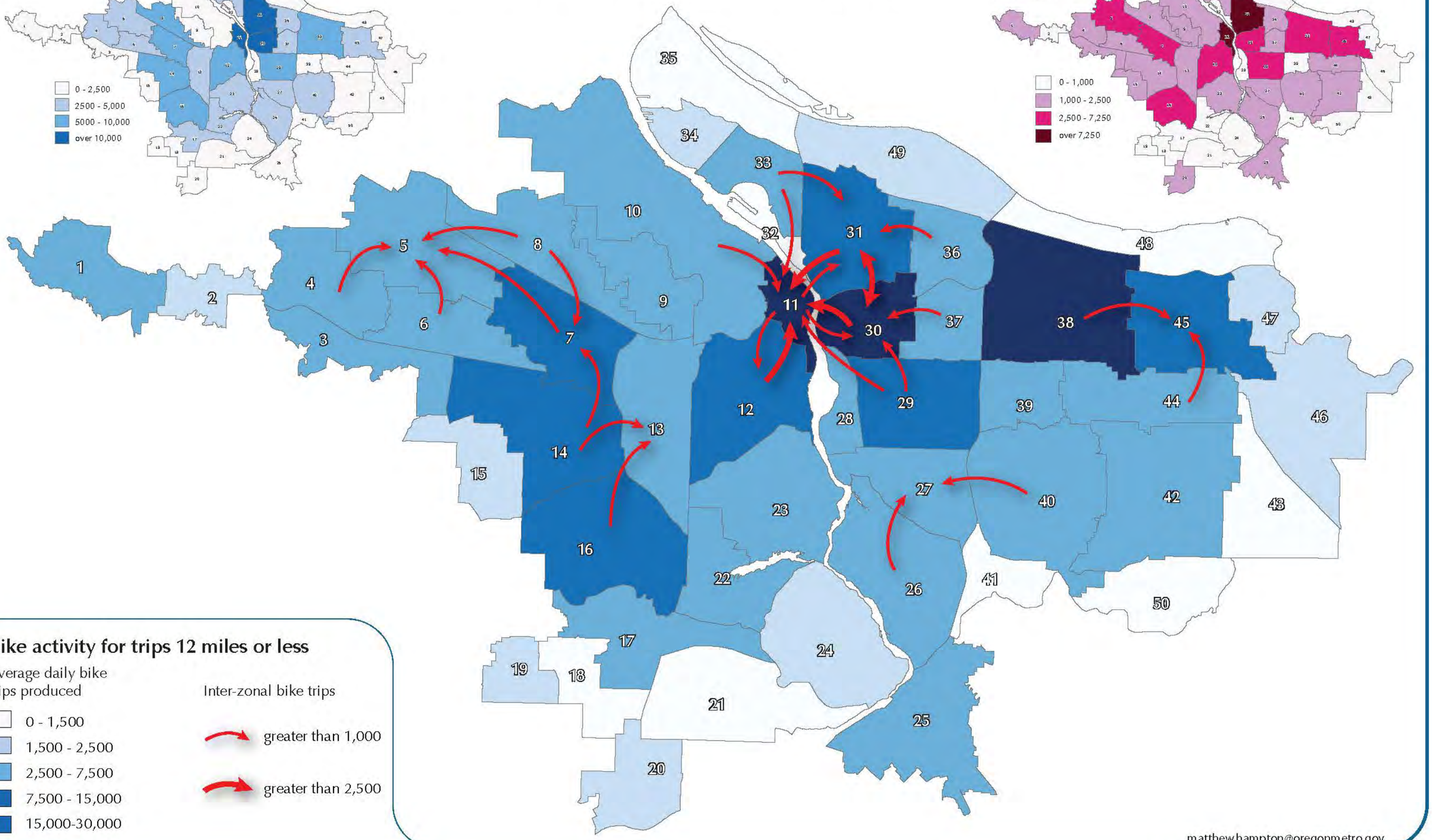
Numbers of daily bicycle trips were calculated for the region within the UGB, by sub-area for each of the scenarios broken out by trip purpose, and by cycle analysis zone for all trips under 12 and 3 miles for the 2010 and 2035 scenarios only. Number of trips between cycle analysis zones for trips under 12 and 3 miles was also calculated. Daily bicycle miles traveled was calculated for each of the scenarios. Table 9, below, provides the number of new daily bicycle trips for each of the three network concepts.

The model shows a much larger jump in the number of bicycle trips between 2010 and the 2035 scenario than between 2035 scenario and each of the three bicycle network concept scenarios. Refer to the considerations section for reasons why the change in number of trips between the three concepts and the 2035 scenario is smaller. Because the difference in the number of trips is relatively low, between the concepts, the most pertinent information comes from the change from the 2010 to the 2035 scenario.

Bike Activity and flow 2035







Bike activity for trips 12 miles or less

Average daily bike trips produced

- 0 - 1,500
- 1,500 - 2,500
- 2,500 - 7,500
- 7,500 - 15,000
- 15,000-30,000

Inter-zonal bike trips

- greater than 1,000
- greater than 2,500

matthew.hampton@oregonmetro.gov

Table 9: New Trips for Network Concepts, within UGB

	BICYCLE NETWORK				
	2010	2035 Scenario	Spiderweb	Mobility Corridor	Grid
Total Originating Bicycle Trips	179,500	292,000	296,400	294,500	295,200
New Bicycle Trips per day over 2035 State			4,380	2,520	3,220
New Bicycle Trips per day over 2010			116,880	115,020	115,720
Percent Increase in Bicycle Trips over 2035			1.5%	0.9%	1.1%

Table 10, below shows the increase in bicycle miles traveled between 2010 and 2035 and between 2035 and each of the three bicycle network concepts.

Table 10: Bicycle Miles Traveled per Day (BMT) Network Totals, within UGB

	BICYCLE NETWORK				
	2010	2035 Scenario	Spiderweb	Mobility Corridor	Grid
Total Daily Average BMT	443,370	754,480	782,810	771,620	780,510
BMT Increase Over 2035 State			28,340	17,140	26,030
BMT % Increase Over 2035 Ssenario			4%	2%	3%

Mode Share

Mode share was calculated for the region within the UGB by sub-area for each of the scenarios broken out by trip purpose and by cycle analysis zone for all trips under 12 and 3 miles (for the 2010 and 2035 scenarios only). Mode share for trips *between* cycle analysis zones for trips under 12 and 3 miles was also calculated. Average bicycle trip length is provided for each of the scenarios for all bicycle trips made within the UGB.

Mode share reported by the bicycle modeling tools is helpful to show trends. Modeled mode share data should not be compared to actual survey data, such as the 2011 Oregon Household Activity Survey or U.S. Census data, due to the way mode share is calculated—origin based versus residence based. Bicycle mode share within the UGB is higher when looking at trips under three miles in length. In the 2035 scenario, regional bicycle mode share for all trips under three miles is 5.6% for all trips within the UGB.

Table 11: Bicycle Mode Share by Trip Distance within UGB and 4-county area

All Trips Mode Share		
	2010 Bike	**2035 Bike**
Within UGB	3.1%	3.6%
4-County area	2.8%	3.1%
Trips Under 3 Miles Originating Mode Share		
	2010 Bike	**2035 Bike**
Within UGB	5.1%	5.6%
4-County area	4.8%	5.1%
Trips Under 12 Miles Originating Mode Share		
	2010 Bike	**2035 Bike**
Within UGB	3.5%	4.0%
4-County area	3.2%	3.6%

Since the differences in mode share were so minimal, mode share by cycle analysis zone was not calculated for each of the three network concepts. Table 12, below, provides mode share for CAZs with mode share over 9% for trips to adjacent zones.

Table 12: Bicycle Mode Share for all trips under three miles to Adjacent Cycle Analysis Zones, 2035 Scenario

CAZs with originating mode share over 9%
10.9% - SE Portland(Brooklyn/Sellwood-Moreland) to Downtown Portland - CAZ 28 to 11
10.7% - Inner SE Portland to Downtown Portland - CAZ 30 to 11
10.6% - SE Portland (Eastmoreland/Woodstock/Foster Powell) to Downtown - CAZ 29 to 11
10.6% - N. Portland (St. John's) to Rivergate Industrial Area/Smith and Bybee Lakes - CAZ 34 to 35
10.3% - SW Portland (Hillsdale/Multnomah Village) to Downtown Portland - CAZ 12 to 11
10.2% - Inner NE Portland to Downtown Portland - CAZ 31 to 11
9.7% - Gresham (Powell Valley/Kelly Creek) to Troutdale - CAZ 46 to 47
9.6% - SE Portland (Mt. Tabor/Montavilla) to SE Portland(Brooklyn/Sellwood-Moreland) CAZ 37 to 28
9.4% - Boring to Troutdale - CAZ 43 to 47
9.4% - Pleasant Valley/Powell Butte/Gresham Butte to Troutdale - CAZ 44 to 47
9.0% -Central North Portland to Downtown Portland - CAZ 33 to 11

Average Trip Length

Modeled data has the average 2010 bicycle trip length in the region at approximately 2.5 miles. Average bicycle trip lengths are slightly longer in the 2035 scenario and the three network concepts. A higher number of trips are diverted to trails and cycle tracks indicating that if those facilities are available some people will choose to go out of their way to use the facility to make their trip. Trip length increases as the miles of protected bicycle facilities increases.

Table 13: Average Length of Bicycle Trips, within UGB

	BICYCLE NETWORK				
	2010	2035 Scenario	Spiderweb	Mobility Corridor	Grid
Average Bicycle Trip Length (miles)	2.47	2.58	2.64	2.62	2.64

Bicycle Volumes and Volume Differences

Volume plots show the relative volume of daily bicycle trips on the transportation network. Difference plots illustrate the impact of new facilities added to the bicycle network compared to the base case scenario. Appendix 9 includes volume plots for the 2010, 2035 and each of the three bicycle network concepts and difference plots. On the difference plots green shows an increase in daily trips, red shows a decrease in daily trips. An increase in trips can be attributed

to trips moving from one facility to another and potentially new trips being created. Width of the lines indicates volume of the increase or decrease. The following observations are based on a visual analysis of the volume and difference plots.

Heavy to moderate usage routes in 2035 scenario (existing routes/ programmed in RTP)

- Sullivan's Gulch trail sees a very large volume of usage in 2035 scenario (assumes trail built from Esplanade to 21st).
- All of Downtown Portland shows a high volume of use and routes leading into/out of downtown Portland, including Hawthorne Blvd., Harrison, Couch, North-South routes.
- Diagonal routes see a lot of growth in usage from the 2010 scenario to the 2035 scenario. On-street routes such as Sandy Blvd., Foster and Barbur/99 W showed higher volumes of trips in 2035 than nearby, less direct routes, even if the diagonal routes had only bike lanes. Trails show a similar pattern. The Bronson Creek Greenway shows a higher volume of trips than the Rock Creek Trail and the MAX Path in Gresham shows high volumes of trips even though it is a relatively short trail.

  -Foster Rd (RTP includes a bike lane has been built from 50th to I-205 trail). Changing Foster to a bike parkway in the Spiderweb concept, coded as bike boulevard, did not result in difference in volume from the 2035 scenario.

  -Sandy Blvd (RTP assumes a bike lane has been built from Hollywood to I-205 trail). Changing Sandy to a bike parkway in the Spiderweb concept, coded as bike boulevard, did not result in an increase in volume from the 2035 scenario (likely due to many riders that would potentially use Sandy diverting to the Sullivan's Gulch trail).

  -Barbur Blvd./99 W (RTP assumes gaps in existing bike lane have been filled in). Barbur has a greater usage in 2010 than Foster or Sandy, but does not grow was much between 2010 and 2035.

  - Gresham MAX path trips are attracted from Burnside.
- Beaverton-Creek trail sees a large volume of usage in the 2035 scenario and in each of the three network concepts.
- Burnside in East Multnomah County shows greater usage than NE Halsey, even though Halsey has been coded as a bike parkway. This may be due to the land uses along the Max Stations in Burnside creating more population density. This may suggest that Burnside is a better candidate to be a bicycle parkway route than Halsey. Halsey still shows use
- Bronson Creek Greenway, in the North Hillsboro/Bethany areas shows that a diagonal/key connection is in demand in the area. The greenway however, may not be appropriate for transportation purposes. The somewhat parallel Rock Creek Greenway may be able to serve the purpose with the addition of local street connectivity.
- Lake Oswego to Portland Trail sees high volumes in 2035, higher than the Southern part of the West Willamette Greenway.
- Surf to Turf Trail, which parallels Iron Mountain Road and connects Lake Oswego and Tualatin shows a high volume of bicycle trips. This route was not included in any of the network concept scenarios.
- Westside Trail (RTP assumes build out to Scholls Ferry), shows high volumes.

- Clinton Bike Boulevard in inner SE Portland shows high volumes on all three network concepts and 2035. Powell Blvd is added as bicycle parkway in the Spiderweb concept and reduces trips on Clinton in that scenario.
- East –West routes in Portland/East Multnomah County including Going Street, SE Lincoln, SE Market, SE Mill, Division Street (Portland to Gresham)
- North-South routes in inner Portland and East Multnomah County show heavy volumes in all of the scenarios, including Williams/Vancouver, Cully, 40's and 50's Bikeways, , SE 122nd Ave,
- Gresham MAX and Gresham-Fairview trail shows heavy volumes in the 2035 scenario.
- The trail along McLoughlin Blvd and the future Portland to Milwaukie Light rail shows high volumes in all of the three bicycle network concepts and 2035.
- Sunrise Corridor Trail in Clackamas shows moderate bicycle volumes on the 2035 scenario and all three network concepts.
- Powerline Trail in Clackamas, connecting to the Gresham Fairview Trail shows moderate volumes in 2035 and all of the scenarios.
- Trolley Trail shows moderate volumes in all of the scenarios; 17th Ave. connection between Trolley Trail and Springwater Corridor shows high volumes
- Lake Road in Milwaukie shows moderate volumes in all of the scenarios.
- North Portland Greenway, volumes increase along portion of trail built along the river.
- NE 15th Ave and 20's Bikeway, Portland
- SW Multnomah Blvd. Portland/Washington County
- NE Airport Way, connecting to SE 122nd Ave, Portland/Multnomah
- SE Stark St., I-205 to SW 257th, Multnomah County
- North/South routes in Multnomah County including Hogan Road, SW 257th, SE 181st Ave, SE 162nd, SE 136th, SE 148th Ave
- Downtown Hillsboro, especially Main Street; SW Baseline and Tualatin Valley Highway, Washington County
- Scholls Ferry Road, SW Canyon Road
- Downtown Beaverton, especially SW 5th and 6th Avenues, and Hall Blvd. Beaverton to Fanno Creek Trail
- SW Western Ave., Beaverton
- Capitol Highway/Red Electric Trail and Kerr Parkway, Portland and Washington County
- SW Boones ferry Road, Fanno Creek to Wilsonville
- SW Tualatin Sherwood Hwy.
- SW Beaverton Hillsdale Hwy., SW Dosch Road, and SW Oleson Road, Washington County
- SW Brockman St, SW McDonald, SW Gaard St.,
- NW Evergreen Rd. and SW Cedar Hills Blvd., Washington County
- Kruse Way, Washington County (assumed crossing over I-5)

- SW 72nd, Washington County, between SW Bonita and 99W
- SE Sunnyside Road, Monroe Blvd., SE Thiessen Rd., SE Linwood Ave. Clackamas County
- SE Johnson Creek Road, connecting to I-205 Path, Clackamas County
- Pacific Hwy/Willamette Falls Drive, West Linn/ Clackamas County
- Pimlico Drive, West Linn
- Lake Road in Milwaukie
- Warner Milne Road, Linn Ave, Central Point Road, Oregon City
- Iron Mountain Road (parallel Surf to Turf Trail), Lake Oswego

Routes added in concept scenarios that show an increase in volume from 2035

- Sullivan's Gulch trail sees a very large volume of usage in 2035 scenario (assumes trail built from Esplanade to 21st) and in all three concept scenarios (assume built from Esplanade to I-205 trail). Attracts trips from Glisan, Ankeny, Sandy.
- I-405 trail in Portland sees a very large volume trips. It is in all three scenarios.
- The US 26 trail draws a very large volume of trips when a bike parkway is added to it creating a connection into downtown Portland via SW Jefferson. This makes sense given that the few existing routes connecting to downtown from the other sides of the West hills have steep topography and not much separation from traffic. The model shows that the trips using this connection are coming from areas such as Raleigh Hills (via Scholls Ferry Rd), Cedar Hills, Cedar Mill and the area around the Sunset transit center and connecting to several areas downtown as well as the new I-405 bike parkway trail which connects to South Waterfront and the Milwaukie light rail/bike/ped bridge over the Willamette River.
- Powell Blvd. bike parkway west of intersection with Foster, in Portland (Spiderweb) – appears to draw trips from Clinton bike blvd.
- Addition of the southern leg of the Westside Trail (South of Scholls Ferry Rd) appears to decrease trips on the parallel Roy Rogers Rd. and nearby smaller side streets, and north of Hwy 26 volumes increase when trail gaps are filled.
- Addition of the Fanno Creek Trail South of 99W appears to decrease trips on the parallel on-street routes.
- Gaps in I-205 trail completed in all three of the three network concepts appear to attract trips from parallel on-road facilities.

*Routes added in concept scenarios that do **not** show significant volume increases*

- Connection of Westside Trail to and through Forest Park to Hwy 30.
- Columbia Slough Trail along the length of the Columbia River (the model does not count recreational "loop" trips).
- River to River Trail connecting West Linn and the Fanno Creek Trail.
- Sandy River to Springwater Corridor Connection in Multnomah County.
- Hwy 217 east of 135th in Clackamas County.
- Halsey west of I-205 in Portland and Multnomah County (Burnside shows more volume).

- Stafford Road in Clackamas County, connecting Lake Oswego to Wilsonville; much of the road travels outside the UGB.
- On street route in St. John's area, Portland, connecting to Pier Point Park
- Hwy 8 connecting Forest Grove and Hillsboro (Council Creek Trail shows more volume).
- Foster Rd. east of I-205. Springwater Trail shows more volume.
- Sandy NW of 57th in Portland. Shows more volumes in the 2035 scenario. Sullivan's Gulch may attract trips. Serves as a key route in absence of Sullivan's Gulch.
- Skidmore/Prescott, I-205 to Interstate.
- Railroad Road from Harmony to Monroe in Clackamas County. Lake Road, which runs parallel attracts more trips.
- Loop around northern edge of Portland's downtown, from Front Street to Nikolai from Fremont Bridge.
- Highway 30 connecting downtown to Sauvie Island.
- In Wilsonville, loop and street along I-5 and Boones Ferry Rd.
- Route through Oregon City, 5th and Linn. Oregon City Trail sees more volumes.
- Beavercreek Road south of intersection with Oregon City Loop Trail in Oregon City.
- 122nd south of Powell to Foster in Portland.

Bicycle volumes on bridges

Daily volumes of bicycle traffic across Willamette River Bridges are provided in table 14 below. In all of the network concepts the Steele Bridge has the highest volume of trips. In the 2035 scenario the Milwaukie LRT Bridge is a major bike crossing on par with the Hawthorne and Steel Bridges, supporting thousands of bike trips per day.

Daily volumes on the Milwaukie LRT Bridge decrease in the Mobility Corridor concept, perhaps because there are less east-west bike parkways than in the other concepts and trips originating east of the bridge trips divert to take advantage of the Sullivan's Gulch trail; bridge volumes across the Steel Bridge are higher for the Mobility Corridor concept.

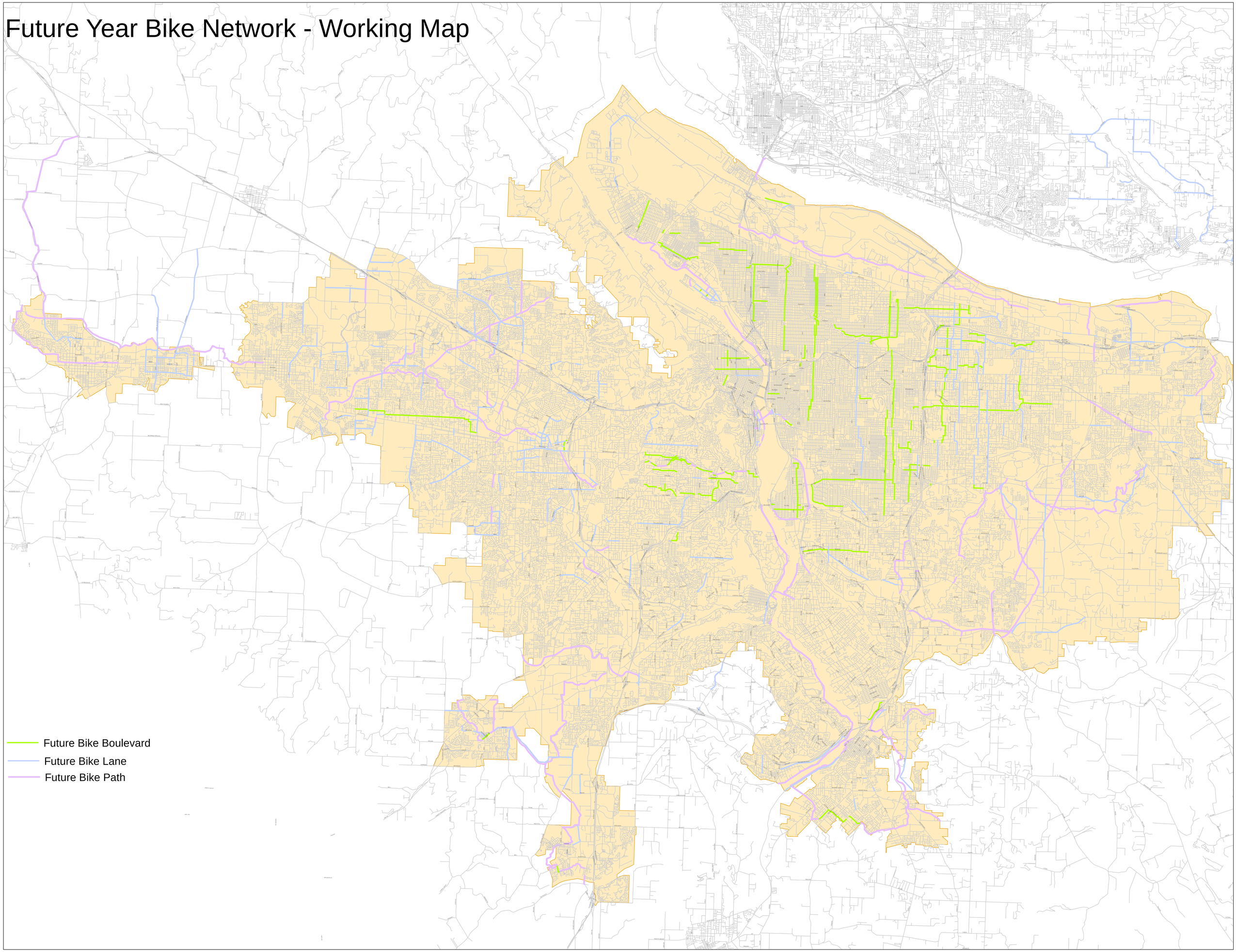
Table 14: Modeled Daily Bicycle Volumes on Willamette River Bridges

	Bicycle Network				
	2010	**2035 State**	**Grid**	**Mob Cor**	**Spider**
Steel Bridge	3,149	8,242	10,634	11,682	10,216
Milwaukie LRT Bridge	0	5,862	5,924	5,401	6,321
Broadway Bridge	4,913	5,775	4,992	4,550	5,267
Hawthorne Bridge	5,063	3,792	3,166	3,340	3,208
Morrison Bridge	1,403	2,256	2,029	1,951	2,026
Burnside Bridge	1,307	1,729	1,322	1,149	1,203
Lake Oswego to Milwaukie Bike Bridge	0	1,304	1,910	1,278	1,889
Sellwood Bridge	796	821	703	794	766
St. John's Bridge	217	347	358	325	350
Ross Island Bridge	659	15	6	9	3

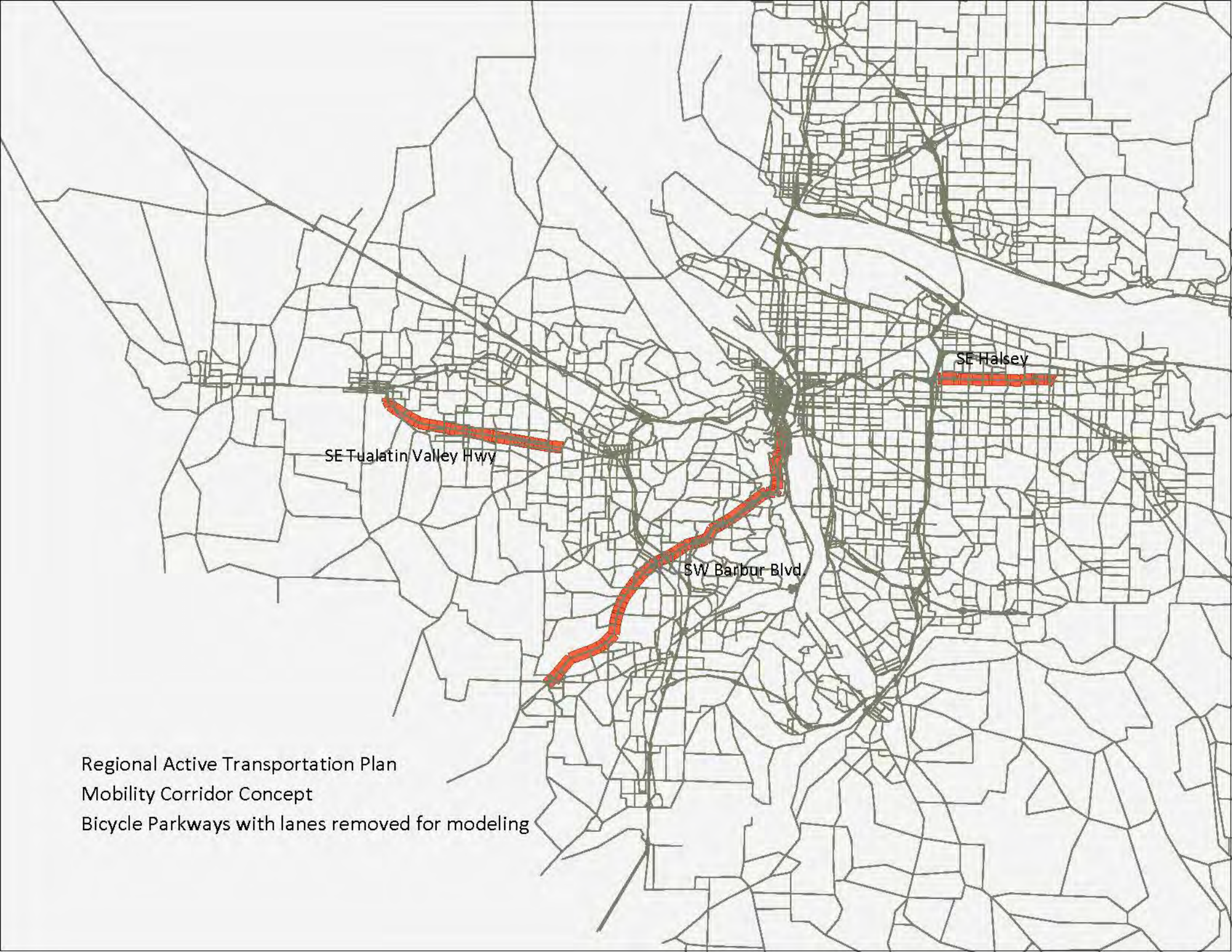
APPENDIX

Appendix 1: 2035 State RTP Bicycle Network

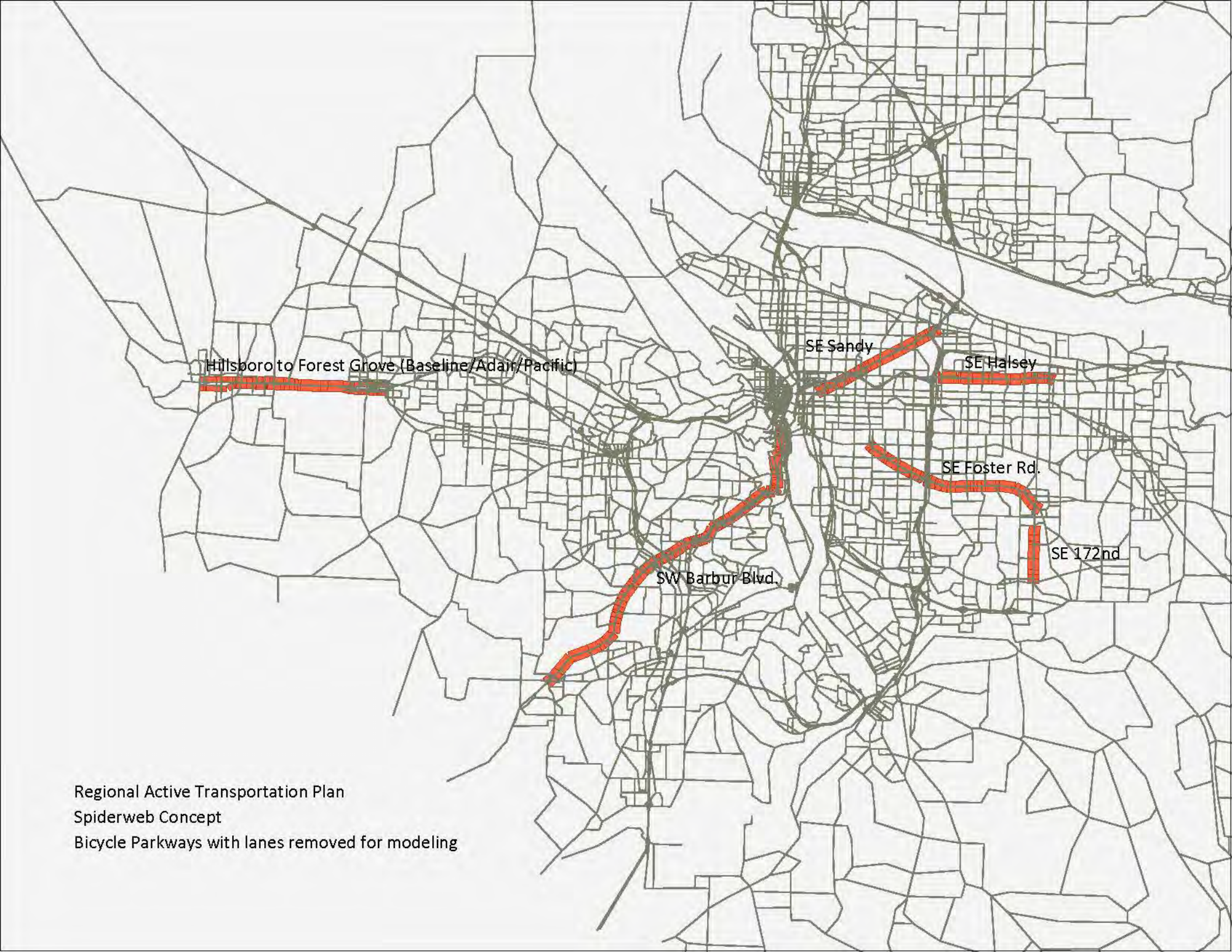
Future Year Bike Network - Working Map



Appendix 2: Lanes Removed Maps



Regional Active Transportation Plan
Mobility Corridor Concept
Bicycle Parkways with lanes removed for modeling



Regional Active Transportation Plan
Spiderweb Concept
Bicycle Parkways with lanes removed for modeling

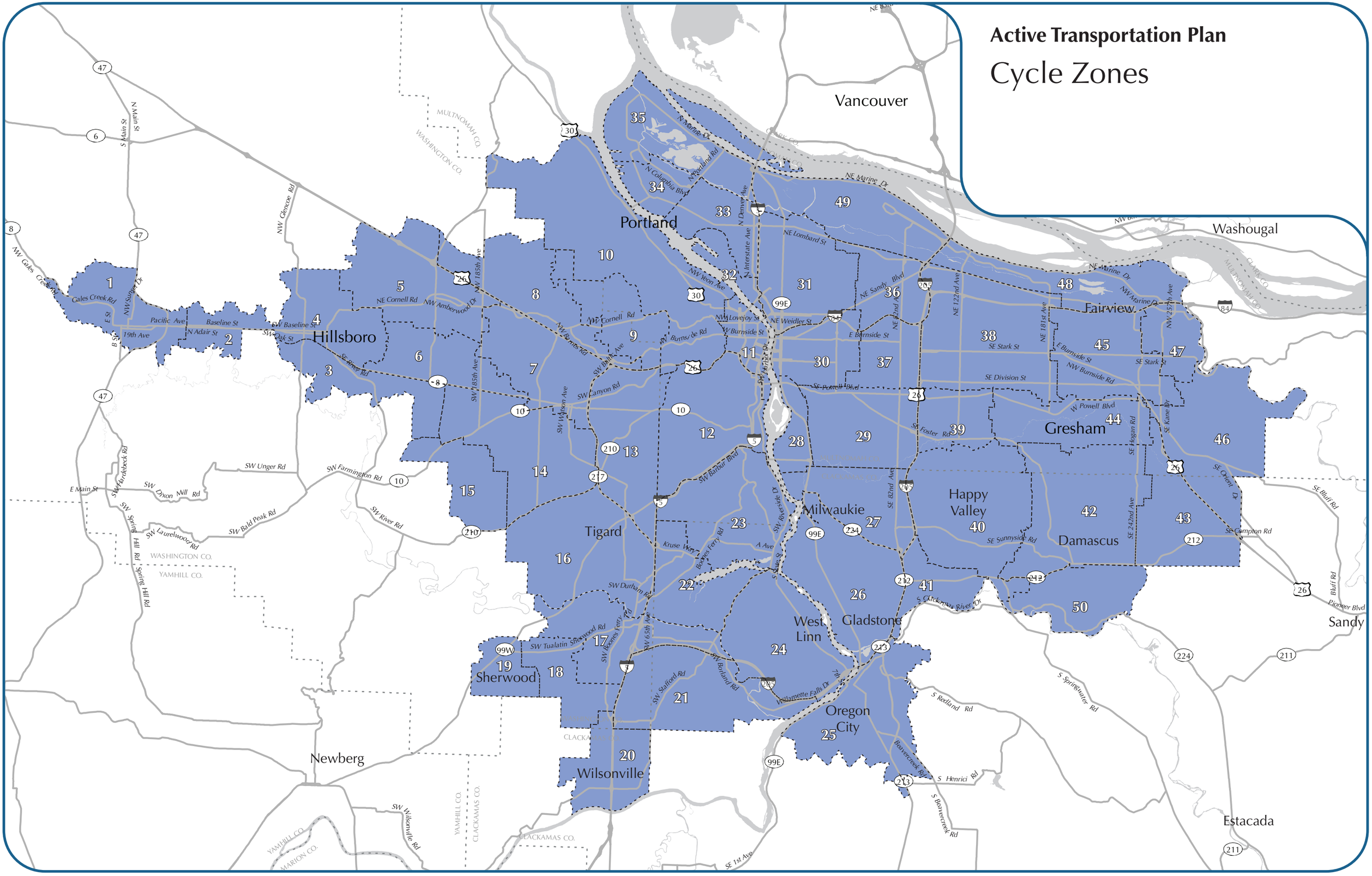
Appendix 3: Cycle Analysis Zones

Cycle Zone #	Cycle Analysis Zone Name
1.	Forest Grove
2.	Cornelius
3.	Hillsboro –South
4.	Hillsboro - Central
5.	Hillsboro - North
6.	Aloha - North
7.	Beaverton - North
8.	Bethany
9.	Northwest Heights / W.Sylvan
10.	Forest Park
11.	Portland – Downtown / Nob Hill / S.Waterfont
12.	SW Portland – Hillsdale/ Multnomah Village
13.	Beaverton – East / Raleigh Hills / Washington Square RC
14.	Beaverton – South / Aloha - South
15.	Cooper Mt
16.	Tigard
17.	Tualatin
18.	Sherwood – Industrial / Tualatin - Industrial
19.	Sherwood - Central
20.	Wilsonville
21.	Stafford
22.	Lake Oswego / Rivergrove
23.	Lake Oswego – North / Downtown / Dunthorpe
24.	West Linn
25.	Oregon City
26.	Milwaukie – Downtown / Oak Grove / Gladstone
27.	Milwaukie – North / Clackamas Regional Center

28.	SE Portland – Brooklyn / Sellwood-Moreland
29.	SE Portland – Eastmoreland / Woodstock / Foster-Powell
30.	SE Portland - Inner
31.	NE Portland - Inner
32.	Swan Island
33.	N. Portland - Central
34.	N. Portland – St Johns
35.	Rivergate Industrial Area /Smith & Bybee Lakes
36.	NE Portland – Cully / Rose City Park / Rocky Butte
37.	SE Portland – Mt Tabor / Montavilla
38.	Outer East Portland / W. Gresham
39.	SE Portland – Lents/ Powellhurst-Gilbert
40.	Happy Valley
41.	Clackamas Industrial Area
42.	Damascus
43.	Boring
44.	Pleasant Valley / Powell Butte / Gresham Butte
45.	Central Gresham / Wood Village / Fairview
46.	Gresham – Powell Valley / Kelly Creek
47.	Troutdale
48.	Columbia Corridor Industrial Area - East
49.	PDX Airport
50.	Damascus - South

Active Transportation Plan

Cycle Zones

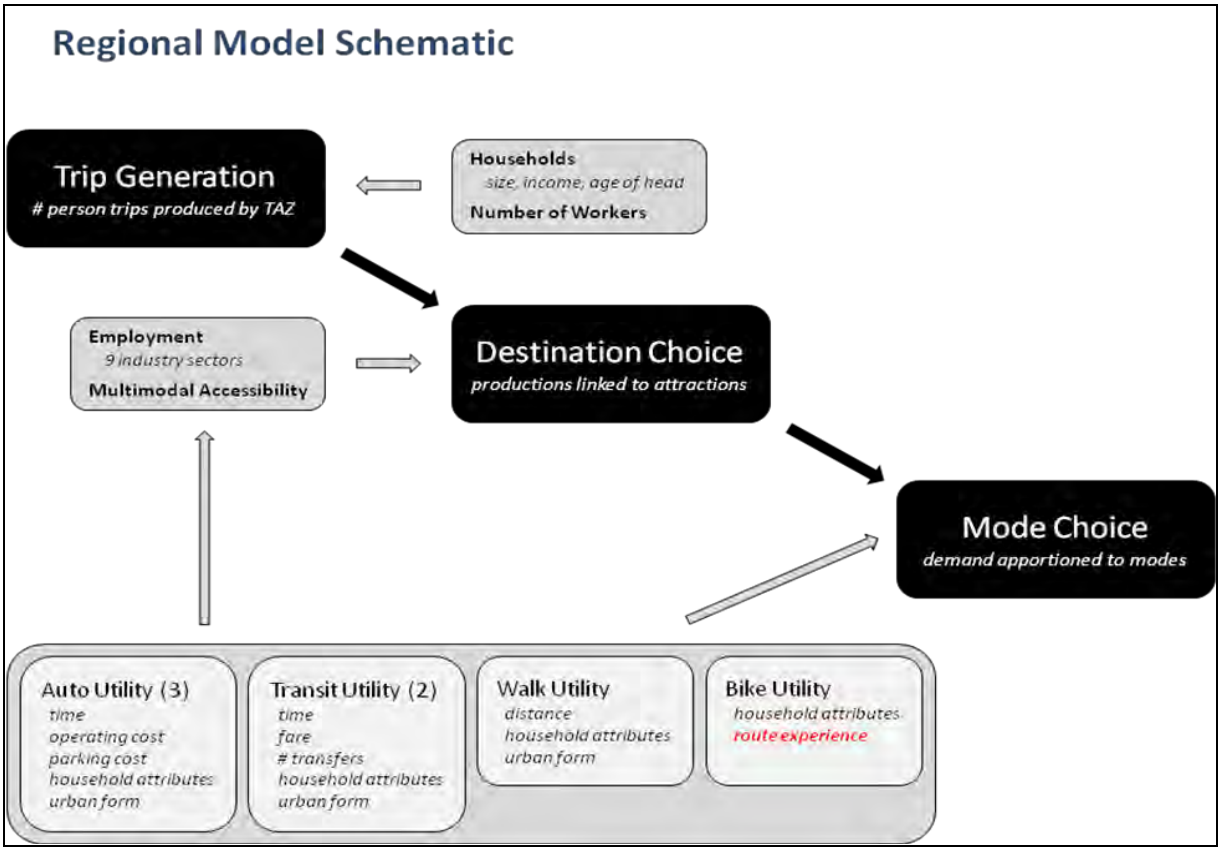


Appendix 4: Bicycle Model Tool Characteristics

The bicycle modeling tool is calibrated to 2011 Oregon Household Activity Survey data. Conditions are average weekday in May and October. The model years are for 2010 and 2035 transportation networks and demographic conditions. The bicycle model captures both commute and non-commuting trips. Loop trips, where the origin and destination are the same, are not captured. The bicycle model network includes the entirety of Clackamas, Multnomah, and Washington counties and Clark County in Washington. The network uses all streets and trails in the transportation network. Transportation Analysis Zones (TAZs) are used as the basis for origins and destinations of trips.

The bicycle model is a routable network and is fully integrated into the regional transportation model, which includes the auto and transit networks. Pedestrian trips are counted in the regional transportation model, but a routable pedestrian network has not yet been developed.

The model determines the most attractive zone-to-zone (TAZ) paths for each trip (for all modes). A network utility, or route experience, is calculated for the chosen paths (route experience). The network utility is then passed into mode choice utility. The model estimates the desirability of bicycling as mode in competition with other modes. If the utility for bicycling is higher than other modes the trip is made by bicycle.



Model Calibration

Census (ACS): City of Portland journey to work bike mode share

- Model: 9%, direct trips from home to workplace
- ACS: 7%, may include intermediate stops

Table 15: City of Portland Willamette Bridge Counts

Bridge	2010 model	2010 count	difference	
Broadway	4,909	5,291	+382	+7.2%
Steel	3,149	3,287	+138	+4.4%
Burnside	1,307	1,865	+558	+42.7%
Hawthorne	5,060	7,133	+2,073	+41%
sum	14,424	17,576	+3,152	+21.9%

*notes:
(1) counts taken in July-September, model results reflect May/October conditions
(2) counts capture all cyclists, model results exclude purely recreational bike trips

Appendix 5: Cost of Networks

	Cost per mile	Spiderweb	MobCorr	Grid	Spiderweb	MobCorr	Grid
			Miles of Bicycle Parkways				
New Bicycle Blvd.	$250,000	5	1	10	$1,208,750	$344,625	$2,476,750
Improved Bicycle Blvd.	$100,000	16	1	16	$1,561,500	$131,050	$1,580,650
New Trail	$3,000,000	35	21	30	$105,645,000	$61,692,000	$90,723,000
Improved Trail	$1,500,000	98	58	81	$146,302,500	$86,908,500	$121,906,500
New Cycle Track*	$2,000,000	11	8	8	$22,900,000	$ 15,622,000	$16,889,001
Improved Cycle Track*	$2,000,000	150	68	120	$299,400,000	$136,250,000	$240,551,999
Total miles bike parkway		314	157	266			
Total cost of new bike parkways:					$ 447,264,000	$223,289,550	$364,039,149
Total cost of improved bike parkways:					$129,753,750	$77,658,625	$110,088,751
Total					$577,017,750	$300,948,175	$474,127,900
			per year		$ 27,477,036	$14,330,865	$22,577,519
			per capita/year		$ 14	$7	$11
			per mile bike parkway		$ 1,835,590	$1,915,306	$1,782,798

* Cost is $1 million per side per mile

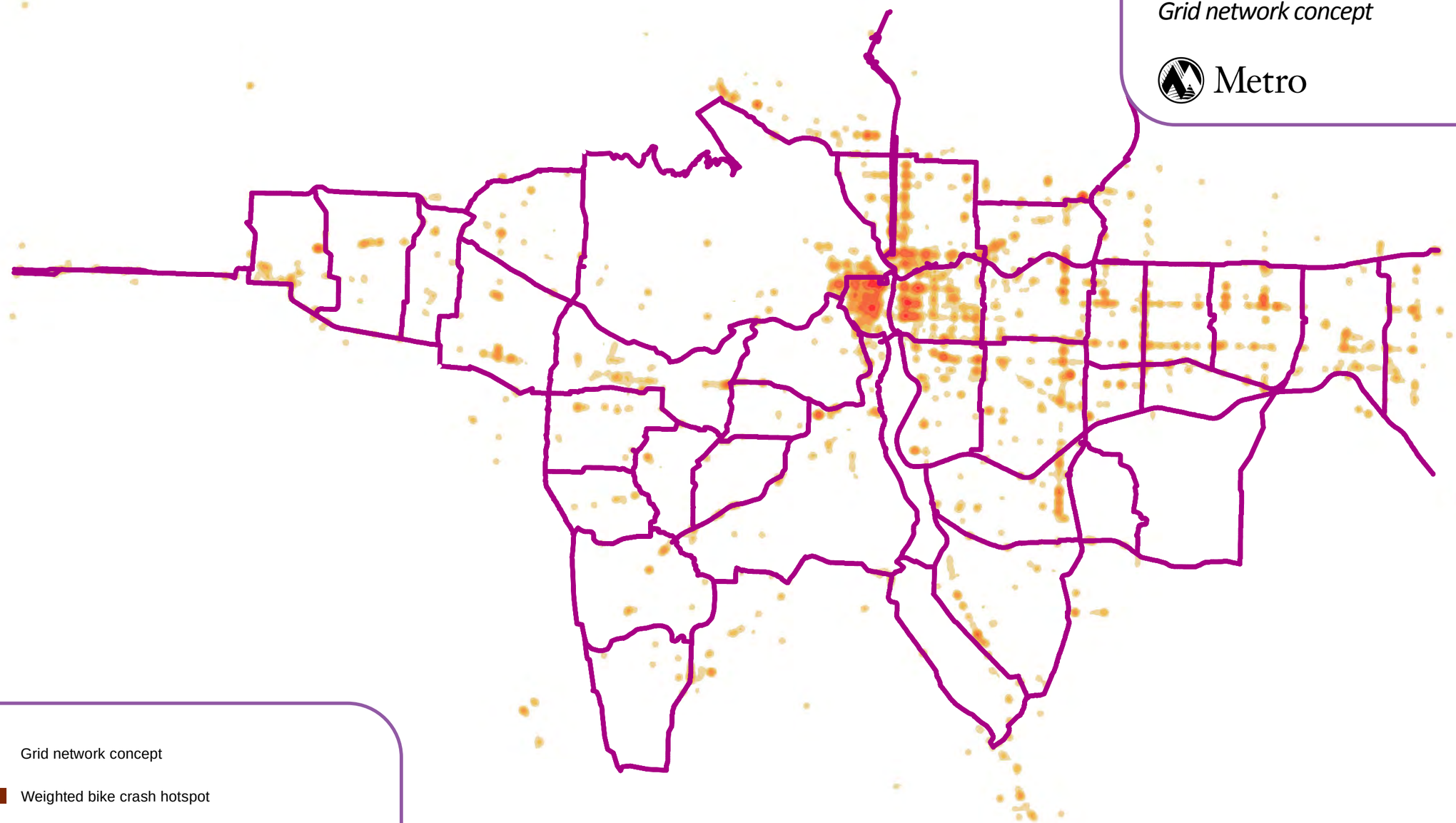
Appendix 6: Bicycle Crash Maps

2007-2011 Fatal/near fatal crashes

Bike crashes

Grid network concept

Metro



Grid network concept

Weighted bike crash hotspot

county_line

ugb

0 2.5 5 10 Miles

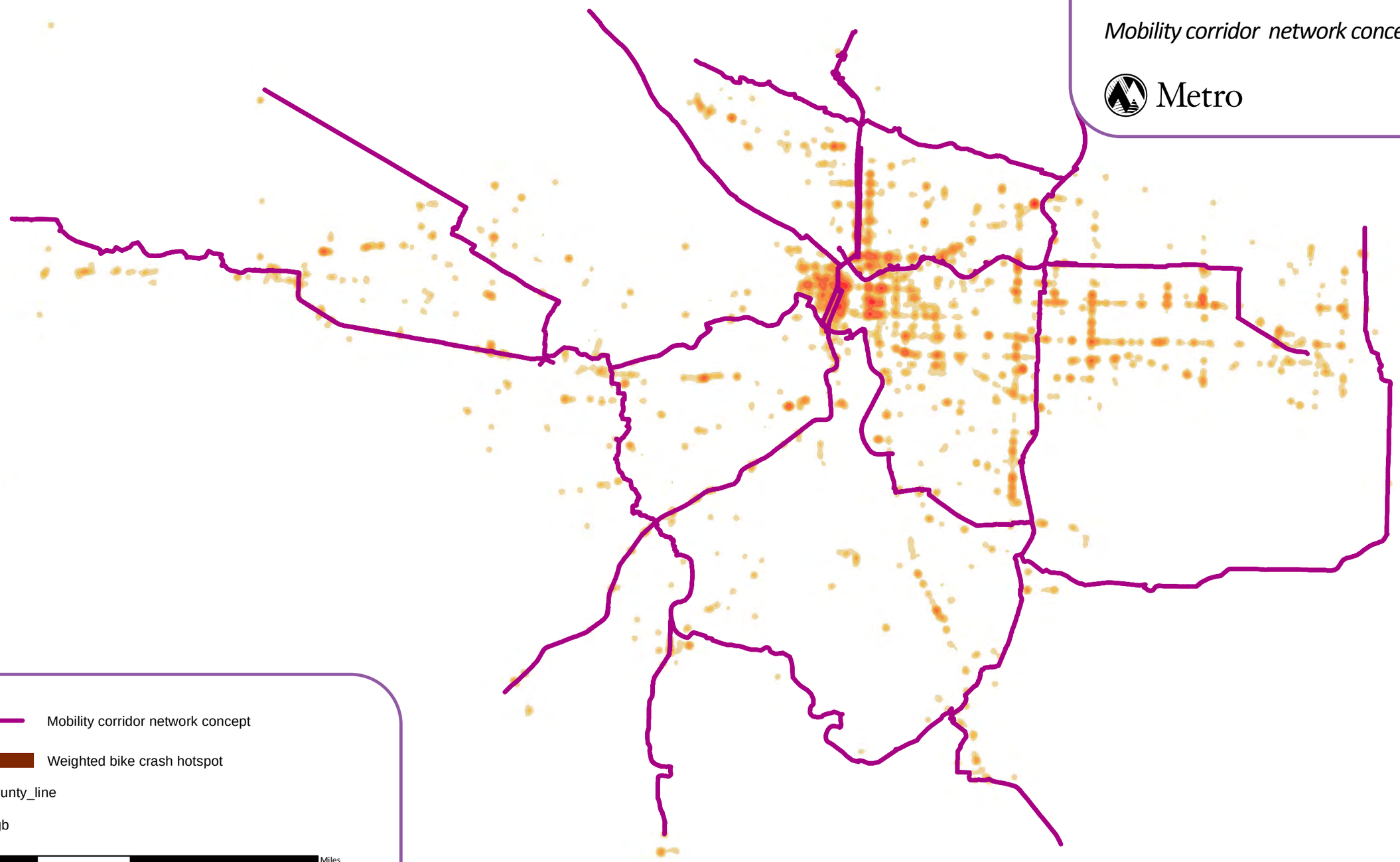
Data sources: 2007-2011 ODOT crash data, 2012 Metro RLIS.
Data processing: Crash hotspot data weights - Fatal=100, Injury A=50, Injury B=10, Injury C=5

2007-2011 Fatal/near fatal crashes

Bike crashes

Mobility corridor network concept

Metro



Mobility corridor network concept

Weighted bike crash hotspot

county_line

ugb

0 2.5 5 10 Miles

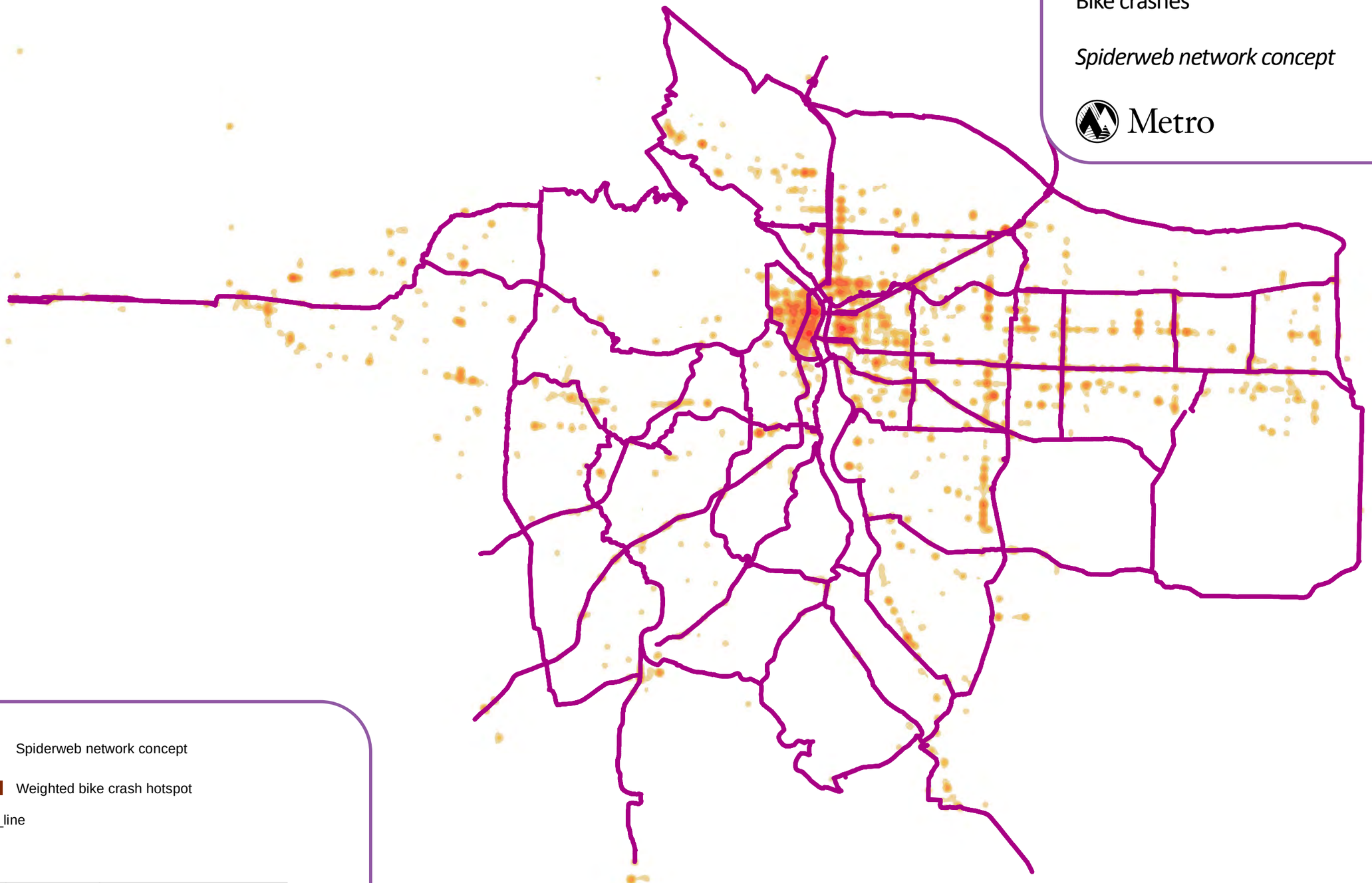
Data sources: 2007-2011 ODOT crash data, 2012 Metro RLIS.
Data processing: Crash hotspot data weights - Fatal=100, Injury A=50, Injury B=10, Injury C=5

2007-2011 Fatal/near fatal crashes

Bike crashes

Spiderweb network concept

Metro



Spiderweb network concept

Weighted bike crash hotspot

county_line

ugb

0 2.5 5 10 Miles

Data sources: 2007-2011 ODOT crash data, 2012 Metro RLIS.
Data processing: Crash hotspot data weights - Fatal=100, Injury A=50, Injury B=10, Injury C=5

Appendix 7: Trip Tables

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea

2010	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total Trips	Total
Portland Central City	7.18%	6.43%	8.40%	4.90%	6.86%	5.04%	2.52%	15,951	**4.12%**
Portland SW	9.04%	2.12%	3.45%	1.61%	7.03%	3.32%	1.10%	11,503	**3.76%**
Portland NW	7.75%	3.62%	4.58%	2.39%	4.42%	3.07%	1.48%	5,930	**3.81%**
Portland North	5.69%	2.11%	3.69%	1.44%	6.45%	1.33%	0.70%	5,084	**2.81%**
Portland NE to I-205	9.73%	3.69%	5.30%	2.44%	5.22%	2.66%	1.21%	19,919	**4.25%**
Portland SE to I-205	9.42%	3.68%	5.63%	2.51%	3.68%	2.63%	1.07%	25,442	**4.53%**
Portland E of I-205	4.67%	2.83%	4.61%	1.95%	1.45%	2.16%	0.87%	11,136	**2.82%**
North Washington Suburbs	4.44%	2.66%	3.98%	1.78%	4.84%	2.43%	1.05%	27,886	**2.80%**
Central Washington Suburbs	4.68%	2.69%	3.99%	1.75%	1.24%	2.43%	1.08%	15,632	**2.76%**
South Suburbs	3.19%	2.02%	2.82%	1.31%	2.42%	1.91%	0.88%	14,146	**2.14%**
Clackamas Eastside Suburbs	3.38%	2.35%	3.06%	1.40%	2.48%	2.18%	1.18%	14,694	**2.32%**
South Multnomah Suburbs	2.97%	3.18%	4.36%	2.01%	7.92%	2.58%	1.26%	7,550	**2.90%**
North Multnomah Suburbs	3.26%	2.95%	4.31%	1.87%	3.47%	1.67%	0.74%	3,789	**2.52%**
Urban Clark County	3.19%	2.24%	3.28%	1.54%	1.95%	2.80%	1.16%	30,668	**2.46%**
UGB Total	5.48%	2.86%	4.15%	1.89%	3.86%	2.82%	1.32%	179,477	**3.11%**
Regional Total	**4.58%**	**2.50%**	**3.62%**	**1.66%**	**3.17%**	**2.70%**	**1.25%**	**216,425**	**2.80%**

Total Trip Production by Scenario with Difference

2010	2010 Total Trips	State Total Trips	2010/State DIFF	Grid Total Trips	State/Grid DIFF	MC Total Trips	State/MC DIFF	SW Total Trips	State/SW DIFF
Portland Central City	15,951	34,889	18,938	35,189	300	35,297	408	35,275	386
Portland SW	11,503	17,186	5,683	17,519	333	17,566	380	17,670	484
Portland NW	5,930	9,043	3,113	9,174	131	9,192	150	9,244	201
Portland North	5,084	8,288	3,204	8,343	54	8,317	28	8,337	49
Portland NE to I-205	19,919	29,684	9,765	29,842	157	29,874	189	29,939	255
Portland SE to I-205	25,442	37,505	12,063	37,715	210	37,659	155	38,018	513
Portland E of I-205	11,136	19,363	8,227	19,472	109	19,455	91	19,548	185
North Washington Suburbs	27,886	44,657	16,772	45,340	683	45,103	446	45,270	613
Central Washington Suburbs	15,632	25,013	9,381	25,329	316	25,273	260	25,404	391
South Suburbs	14,146	21,606	7,460	22,150	543	21,849	243	22,333	727
Clackamas Eastside Suburbs	14,694	24,571	9,877	24,882	311	24,698	127	24,968	397
South Multnomah Suburbs	7,550	13,262	5,712	13,292	30	13,278	16	13,353	91
North Multnomah Suburbs	3,789	5,707	1,918	5,734	26	5,725	18	5,756	49
Urban Clark County	30,668	49,757	19,089	49,772	15	49,776	19	49,779	22
UGB Total	179,477	291,972	112,494	295,194	3,222	294,495	2,523	296,354	4,383
Regional Total	**216,425**	**356,845**	**140,421**	**360,135**	**3,290**	**359,461**	**2,616**	**361,348**	**4,503**

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea

2035 State	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total Trips	Total
Portland Central City	9.99%	7.32%	9.62%	5.78%	7.76%	5.43%	2.66%	34,889	**5.41%**
Portland SW	10.49%	2.44%	4.09%	1.97%	7.27%	3.72%	1.28%	17,186	**4.41%**
Portland NW	8.73%	4.08%	5.29%	2.82%	4.54%	3.23%	1.56%	9,043	**4.30%**
Portland North	7.08%	2.72%	4.42%	1.89%	6.60%	1.46%	0.71%	8,288	**3.32%**
Portland NE to I-205	11.10%	4.28%	6.06%	2.92%	4.99%	2.79%	1.20%	29,684	**4.74%**
Portland SE to I-205	10.64%	4.19%	6.27%	2.96%	3.81%	2.74%	1.12%	37,505	**5.12%**
Portland E of I-205	5.84%	3.64%	5.54%	2.52%	1.66%	2.24%	0.92%	19,363	**3.43%**
North Washington Suburbs	5.72%	3.35%	4.68%	2.20%	4.94%	2.60%	1.15%	44,657	**3.29%**
Central Washington Suburbs	5.64%	3.00%	4.40%	2.01%	1.44%	2.59%	1.14%	25,013	**3.13%**
South Suburbs	4.37%	2.28%	3.19%	1.49%	2.66%	2.01%	0.90%	21,606	**2.48%**
Clackamas Eastside Suburbs	4.11%	2.53%	3.23%	1.53%	2.63%	2.18%	1.10%	24,571	**2.52%**
South Multnomah Suburbs	4.35%	3.70%	4.82%	2.29%	7.63%	2.78%	1.33%	13,262	**3.30%**
North Multnomah Suburbs	4.59%	3.73%	5.12%	2.39%	3.83%	2.01%	0.85%	5,707	**2.78%**
Urban Clark County	3.34%	2.32%	3.20%	1.51%	1.51%	2.53%	1.05%	49,757	**2.44%**
UGB Total	6.70%	3.46%	4.83%	2.33%	4.05%	2.95%	1.35%	291,972	**3.60%**
Regional Total	**5.37%**	**2.91%**	**4.04%**	**1.94%**	**3.12%**	**2.74%**	**1.24%**	**356,845**	**3.12%**

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea DIFFERENCE

2035-2010 Difference	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total
Portland Central City	2.80%	0.89%	1.22%	0.88%	0.91%	0.39%	0.14%	**1.30%**
Portland SW	1.44%	0.32%	0.64%	0.36%	0.25%	0.40%	0.18%	**0.65%**
Portland NW	0.97%	0.46%	0.71%	0.43%	0.12%	0.16%	0.08%	**0.49%**
Portland North	1.39%	0.61%	0.73%	0.45%	0.16%	0.13%	0.01%	**0.51%**
Portland NE to I-205	1.37%	0.58%	0.76%	0.48%	-0.23%	0.13%	-0.01%	**0.49%**
Portland SE to I-205	1.22%	0.51%	0.64%	0.44%	0.13%	0.11%	0.05%	**0.59%**
Portland E of I-205	1.18%	0.81%	0.93%	0.57%	0.21%	0.09%	0.05%	**0.60%**
North Washington Suburbs	1.29%	0.69%	0.70%	0.42%	0.10%	0.17%	0.10%	**0.49%**
Central Washington Suburbs	0.96%	0.31%	0.41%	0.26%	0.20%	0.16%	0.05%	**0.37%**
South Suburbs	1.18%	0.27%	0.37%	0.18%	0.24%	0.10%	0.02%	**0.33%**
Clackamas Eastside Suburbs	0.72%	0.18%	0.16%	0.13%	0.15%	0.00%	-0.08%	**0.20%**
South Multnomah Suburbs	1.38%	0.52%	0.46%	0.28%	-0.29%	0.20%	0.06%	**0.39%**
North Multnomah Suburbs	1.33%	0.78%	0.81%	0.52%	0.36%	0.33%	0.11%	**0.26%**
Urban Clark County	0.15%	0.08%	-0.08%	-0.03%	-0.43%	-0.27%	-0.11%	**-0.02%**
UGB Total	1.21%	0.60%	0.68%	0.44%	0.19%	0.13%	0.03%	**0.49%**
Regional Total	**0.79%**	**0.42%**	**0.42%**	**0.28%**	**-0.05%**	**0.04%**	**-0.01%**	**0.32%**

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea

2035 GRID	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total Trips	Total
Portland Central City	10.12%	7.38%	9.74%	5.85%	8.11%	5.46%	2.66%	35,189	**5.46%**
Portland SW	10.71%	2.51%	4.19%	2.02%	7.61%	3.78%	1.30%	17,519	**4.50%**
Portland NW	8.98%	4.10%	5.35%	2.85%	4.83%	3.25%	1.56%	9,174	**4.36%**
Portland North	7.15%	2.74%	4.46%	1.91%	6.69%	1.46%	0.71%	8,343	**3.34%**
Portland NE to I-205	11.19%	4.30%	6.09%	2.93%	5.05%	2.80%	1.20%	29,842	**4.77%**
Portland SE to I-205	10.73%	4.20%	6.30%	2.97%	3.94%	2.74%	1.12%	37,715	**5.15%**
Portland E of I-205	5.91%	3.65%	5.57%	2.53%	1.66%	2.24%	0.93%	19,472	**3.45%**
North Washington Suburbs	5.88%	3.39%	4.74%	2.23%	5.11%	2.61%	1.15%	45,340	**3.34%**
Central Washington Suburbs	5.78%	3.02%	4.44%	2.02%	1.47%	2.59%	1.14%	25,329	**3.17%**
South Suburbs	4.56%	2.35%	3.27%	1.53%	2.73%	2.03%	0.91%	22,150	**2.54%**
Clackamas Eastside Suburbs	4.20%	2.56%	3.27%	1.55%	2.65%	2.19%	1.11%	24,882	**2.55%**
South Multnomah Suburbs	4.37%	3.71%	4.83%	2.30%	7.64%	2.78%	1.33%	13,292	**3.30%**
North Multnomah Suburbs	4.62%	3.75%	5.15%	2.40%	3.84%	2.01%	0.85%	5,734	**2.80%**
Urban Clark County	3.35%	2.32%	3.20%	1.51%	1.52%	2.53%	1.05%	49,772	**2.44%**
UGB Total	6.82%	3.49%	4.88%	2.36%	4.16%	2.97%	1.35%	295,194	**3.64%**
Regional Total	**5.46%**	**2.94%**	**4.07%**	**1.96%**	**3.19%**	**2.75%**	**1.25%**	**360,135**	**3.15%**

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea DIFFERENCE

GRID-STATE Difference	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total
Portland Central City	0.13%	0.05%	0.12%	0.07%	0.35%	0.02%	0.01%	**0.05%**
Portland SW	0.22%	0.07%	0.10%	0.05%	0.34%	0.06%	0.02%	**0.09%**
Portland NW	0.25%	0.02%	0.06%	0.03%	0.29%	0.02%	0.01%	**0.06%**
Portland North	0.07%	0.02%	0.03%	0.01%	0.08%	0.00%	0.00%	**0.02%**
Portland NE to I-205	0.09%	0.02%	0.03%	0.02%	0.05%	0.01%	0.00%	**0.03%**
Portland SE to I-205	0.09%	0.02%	0.03%	0.01%	0.13%	0.01%	0.00%	**0.03%**
Portland E of I-205	0.06%	0.02%	0.02%	0.01%	0.01%	0.00%	0.00%	**0.02%**
North Washington Suburbs	0.16%	0.04%	0.05%	0.03%	0.16%	0.01%	0.01%	**0.05%**
Central Washington Suburbs	0.14%	0.02%	0.04%	0.02%	0.03%	0.01%	0.00%	**0.04%**
South Suburbs	0.19%	0.06%	0.08%	0.04%	0.07%	0.02%	0.01%	**0.06%**
Clackamas Eastside Suburbs	0.10%	0.03%	0.04%	0.02%	0.02%	0.01%	0.01%	**0.03%**
South Multnomah Suburbs	0.02%	0.01%	0.01%	0.01%	0.01%	0.00%	0.00%	**0.01%**
North Multnomah Suburbs	0.03%	0.02%	0.03%	0.01%	0.02%	0.01%	0.00%	**0.01%**
Urban Clark County	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
UGB Total	0.12%	0.03%	0.05%	0.02%	0.10%	0.01%	0.01%	**0.04%**
Regional Total	**0.09%**	**0.02%**	**0.03%**	**0.02%**	**0.07%**	**0.01%**	**0.00%**	**0.03%**

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea

2035 MOBILITY CORRIDOR	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total Trips	Total
Portland Central City	10.17%	7.40%	9.77%	5.87%	8.14%	5.47%	2.67%	35,297	**5.48%**
Portland SW	10.76%	2.51%	4.19%	2.02%	7.62%	3.79%	1.31%	17,566	**4.51%**
Portland NW	9.01%	4.10%	5.36%	2.86%	4.82%	3.25%	1.57%	9,192	**4.37%**
Portland North	7.14%	2.72%	4.43%	1.90%	6.61%	1.46%	0.71%	8,317	**3.33%**
Portland NE to I-205	11.22%	4.30%	6.09%	2.93%	5.03%	2.80%	1.20%	29,874	**4.77%**
Portland SE to I-205	10.71%	4.20%	6.29%	2.97%	3.91%	2.74%	1.12%	37,659	**5.14%**
Portland E of I-205	5.90%	3.65%	5.56%	2.52%	1.66%	2.25%	0.93%	19,455	**3.44%**
North Washington Suburbs	5.83%	3.38%	4.72%	2.22%	4.96%	2.61%	1.15%	45,103	**3.32%**
Central Washington Suburbs	5.73%	3.02%	4.44%	2.02%	1.49%	2.61%	1.15%	25,273	**3.16%**
South Suburbs	4.44%	2.31%	3.23%	1.51%	2.68%	2.03%	0.91%	21,849	**2.51%**
Clackamas Eastside Suburbs	4.14%	2.55%	3.24%	1.54%	2.65%	2.18%	1.11%	24,698	**2.53%**
South Multnomah Suburbs	4.36%	3.70%	4.83%	2.29%	7.65%	2.78%	1.33%	13,278	**3.30%**
North Multnomah Suburbs	4.61%	3.74%	5.14%	2.40%	3.86%	2.01%	0.85%	5,725	**2.79%**
Urban Clark County	3.35%	2.32%	3.20%	1.51%	1.51%	2.53%	1.05%	49,776	**2.44%**
UGB Total	6.79%	3.48%	4.86%	2.35%	4.12%	2.97%	1.35%	294,495	**3.63%**
Regional Total	**5.44%**	**2.93%**	**4.06%**	**1.95%**	**3.17%**	**2.76%**	**1.25%**	**359,461**	**3.15%**

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea DIFFERENCE

MOB CORR-STATE Difference	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total
Portland Central City	0.18%	0.07%	0.15%	0.09%	0.38%	0.04%	0.02%	**0.06%**
Portland SW	0.28%	0.07%	0.10%	0.05%	0.35%	0.07%	0.03%	**0.10%**
Portland NW	0.28%	0.02%	0.06%	0.03%	0.28%	0.03%	0.01%	**0.07%**
Portland North	0.05%	0.00%	0.01%	0.00%	0.01%	0.00%	0.00%	**0.01%**
Portland NE to I-205	0.12%	0.02%	0.03%	0.02%	0.04%	0.01%	0.00%	**0.03%**
Portland SE to I-205	0.07%	0.01%	0.02%	0.01%	0.10%	0.00%	0.00%	**0.02%**
Portland E of I-205	0.06%	0.01%	0.02%	0.01%	0.01%	0.00%	0.00%	**0.02%**
North Washington Suburbs	0.11%	0.03%	0.04%	0.02%	0.02%	0.01%	0.01%	**0.03%**
Central Washington Suburbs	0.09%	0.02%	0.04%	0.02%	0.05%	0.02%	0.01%	**0.03%**
South Suburbs	0.07%	0.03%	0.04%	0.02%	0.01%	0.02%	0.01%	**0.03%**
Clackamas Eastside Suburbs	0.04%	0.02%	0.01%	0.01%	0.03%	0.01%	0.00%	**0.01%**
South Multnomah Suburbs	0.01%	0.00%	0.01%	0.00%	0.02%	0.00%	0.00%	**0.00%**
North Multnomah Suburbs	0.02%	0.01%	0.02%	0.01%	0.03%	0.00%	0.00%	**0.01%**
Urban Clark County	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
UGB Total	0.09%	0.02%	0.04%	0.02%	0.07%	0.02%	0.01%	**0.03%**
Regional Total	**0.07%**	**0.02%**	**0.03%**	**0.01%**	**0.05%**	**0.01%**	**0.01%**	**0.02%**

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea

2035 SPIDER WEB	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total Trips	Total
Portland Central City	10.17%	7.39%	9.77%	5.86%	8.14%	5.47%	2.67%	35,275	**5.47%**
Portland SW	10.84%	2.53%	4.24%	2.04%	7.68%	3.79%	1.31%	17,670	**4.54%**
Portland NW	9.08%	4.11%	5.38%	2.87%	4.97%	3.27%	1.58%	9,244	**4.39%**
Portland North	7.15%	2.73%	4.45%	1.90%	6.62%	1.48%	0.71%	8,337	**3.34%**
Portland NE to I-205	11.25%	4.31%	6.10%	2.94%	5.04%	2.80%	1.20%	29,939	**4.79%**
Portland SE to I-205	10.84%	4.24%	6.35%	3.00%	3.98%	2.76%	1.13%	38,018	**5.19%**
Portland E of I-205	5.94%	3.67%	5.59%	2.54%	1.69%	2.25%	0.93%	19,548	**3.46%**
North Washington Suburbs	5.87%	3.38%	4.73%	2.23%	5.11%	2.62%	1.15%	45,270	**3.33%**
Central Washington Suburbs	5.80%	3.03%	4.45%	2.03%	1.49%	2.60%	1.14%	25,404	**3.17%**
South Suburbs	4.60%	2.37%	3.29%	1.54%	2.76%	2.05%	0.92%	22,333	**2.56%**
Clackamas Eastside Suburbs	4.22%	2.57%	3.28%	1.56%	2.67%	2.20%	1.11%	24,968	**2.56%**
South Multnomah Suburbs	4.39%	3.73%	4.86%	2.31%	7.72%	2.79%	1.33%	13,353	**3.32%**
North Multnomah Suburbs	4.63%	3.76%	5.17%	2.41%	3.86%	2.02%	0.86%	5,756	**2.81%**
Urban Clark County	3.35%	2.32%	3.20%	1.51%	1.51%	2.53%	1.05%	49,779	**2.44%**
UGB Total	6.86%	3.50%	4.90%	2.37%	4.18%	2.98%	1.36%	296,354	**3.66%**
Regional Total	**5.49%**	**2.95%**	**4.09%**	**1.96%**	**3.21%**	**2.76%**	**1.25%**	**361,348**	**3.16%**

Mode Share Percent by Trip Purpose - Trips Produced in Each Subarea DIFFERENCE

SPIDER WEB-STATE Difference	Home Based Work	Home Based Shop	Home Based Recreation	Home Based Other	Home Based College	Non-Home Work	Non-Home Non-Work	Total
Portland Central City	0.19%	0.07%	0.14%	0.08%	0.38%	0.03%	0.01%	**0.06%**
Portland SW	0.35%	0.09%	0.14%	0.07%	0.41%	0.08%	0.03%	**0.12%**
Portland NW	0.35%	0.03%	0.09%	0.04%	0.43%	0.04%	0.02%	**0.10%**
Portland North	0.07%	0.01%	0.02%	0.01%	0.01%	0.02%	0.00%	**0.02%**
Portland NE to I-205	0.15%	0.03%	0.04%	0.02%	0.05%	0.01%	0.00%	**0.04%**
Portland SE to I-205	0.20%	0.05%	0.08%	0.04%	0.17%	0.02%	0.01%	**0.07%**
Portland E of I-205	0.09%	0.03%	0.04%	0.02%	0.03%	0.01%	0.00%	**0.03%**
North Washington Suburbs	0.15%	0.03%	0.05%	0.02%	0.17%	0.01%	0.01%	**0.05%**
Central Washington Suburbs	0.16%	0.03%	0.05%	0.02%	0.05%	0.02%	0.01%	**0.05%**
South Suburbs	0.24%	0.09%	0.10%	0.05%	0.10%	0.04%	0.02%	**0.08%**
Clackamas Eastside Suburbs	0.12%	0.04%	0.05%	0.03%	0.04%	0.02%	0.01%	**0.04%**
South Multnomah Suburbs	0.04%	0.03%	0.04%	0.02%	0.09%	0.01%	0.01%	**0.02%**
North Multnomah Suburbs	0.05%	0.04%	0.05%	0.03%	0.03%	0.01%	0.01%	**0.02%**
Urban Clark County	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
UGB Total	0.16%	0.04%	0.07%	0.03%	0.13%	0.02%	0.01%	**0.05%**
Regional Total	**0.12%**	**0.03%**	**0.05%**	**0.02%**	**0.09%**	**0.02%**	**0.01%**	**0.04%**

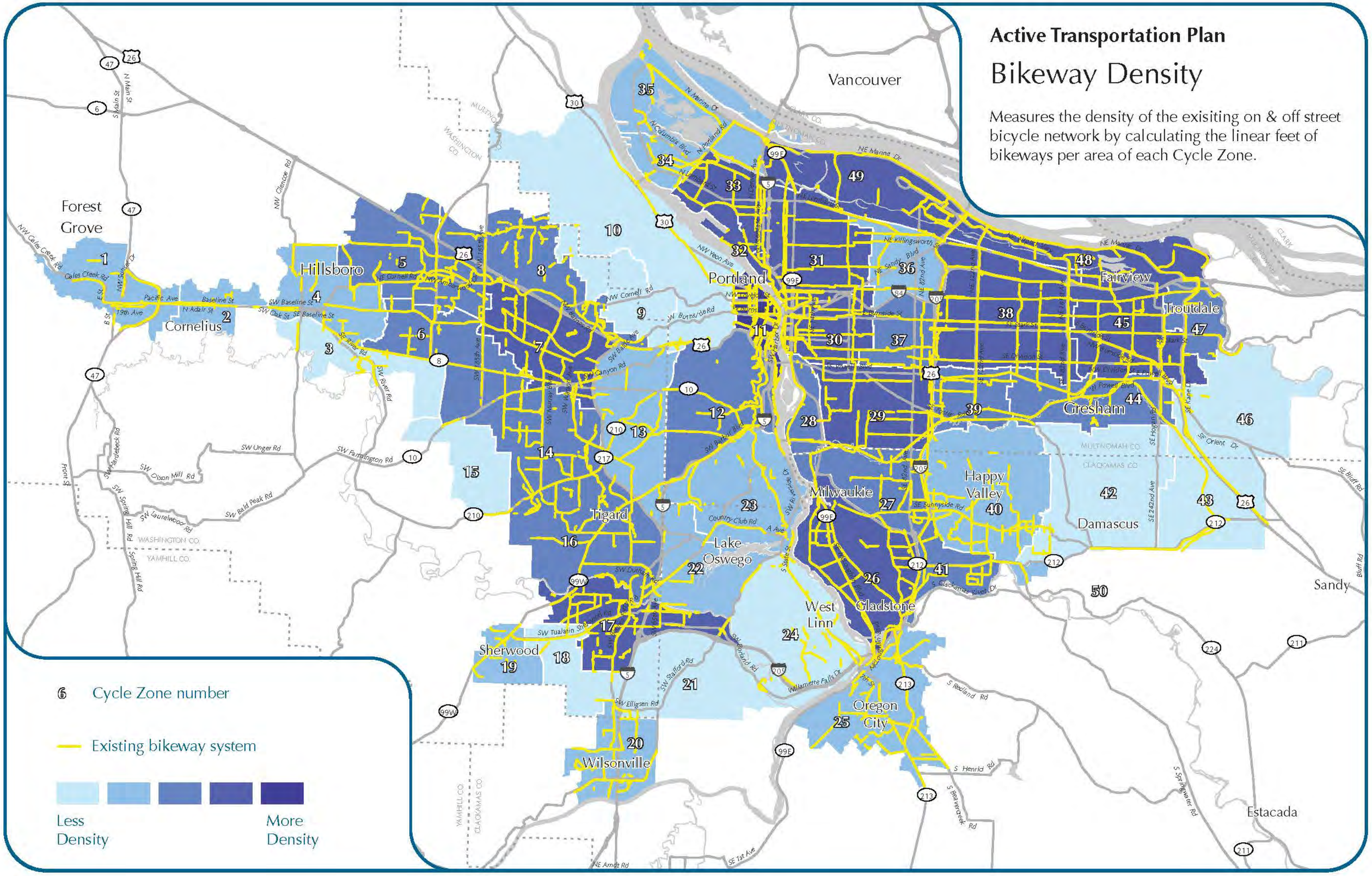
Appendix 8: Bikeway Density and Connectivity

CAZ #	2010 Density Score	2035 Density Score	2010 Connectivity Score	2035 Connectivity Score
1	2	3	1	2
2	2	3	1	2
3	1	2	2	3
4	2	3	1	2
5	3	3	3	3
6	3	4	2	4
7	4	4	3	4
8	3	3	3	2
9	1	1	0	1
10	1	1	1	1
11	5	5	5	3
12	3	3	2	2
13	2	2	1	1
14	3	3	3	2
15	1	1	1	1
16	3	3	2	2
17	4	3	3	2
18	1	2	1	4
19	2	3	2	3
20	2	3	2	2
21	1	1	1	1
22	2	2	2	2
23	2	2	2	3
24	1	2	1	1
25	2	3	2	2
26	4	3	3	3
27	3	3	3	3
28	3	4	2	2
29	4	4	3	4
30	4	4	4	3
31	4	4	3	3
32	4	4	4	4
33	4	4	4	3
34	2	3	2	1
35	2	2	2	3
36	2	3	2	2
37	3	4	2	3
38	4	4	2	5
39	3	4	2	4
40	2	2	2	3
41	3	3	2	4
42	1	2	1	4
43	1	2	2	3
44	3	3	3	4
45	4	3	3	2
46	1	1	1	2
47	3	3	2	4
48	4	3	2	4
49	4	3	3	4
50	0	1	0	1

Active Transportation Plan

Bikeway Density

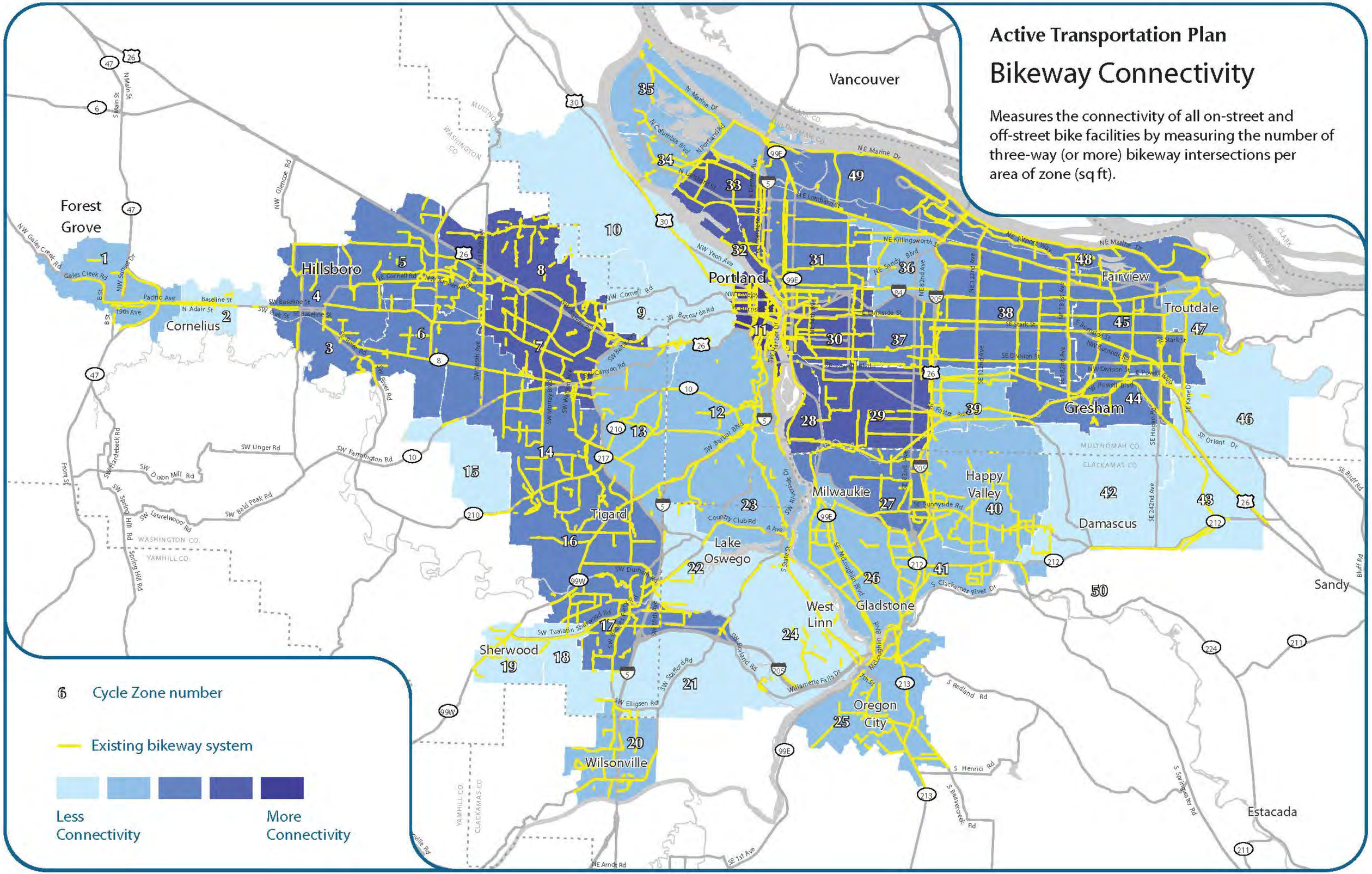
Measures the density of the exisiting on & off street bicycle network by calculating the linear feet of bikeways per area of each Cycle Zone.



Active Transportation Plan

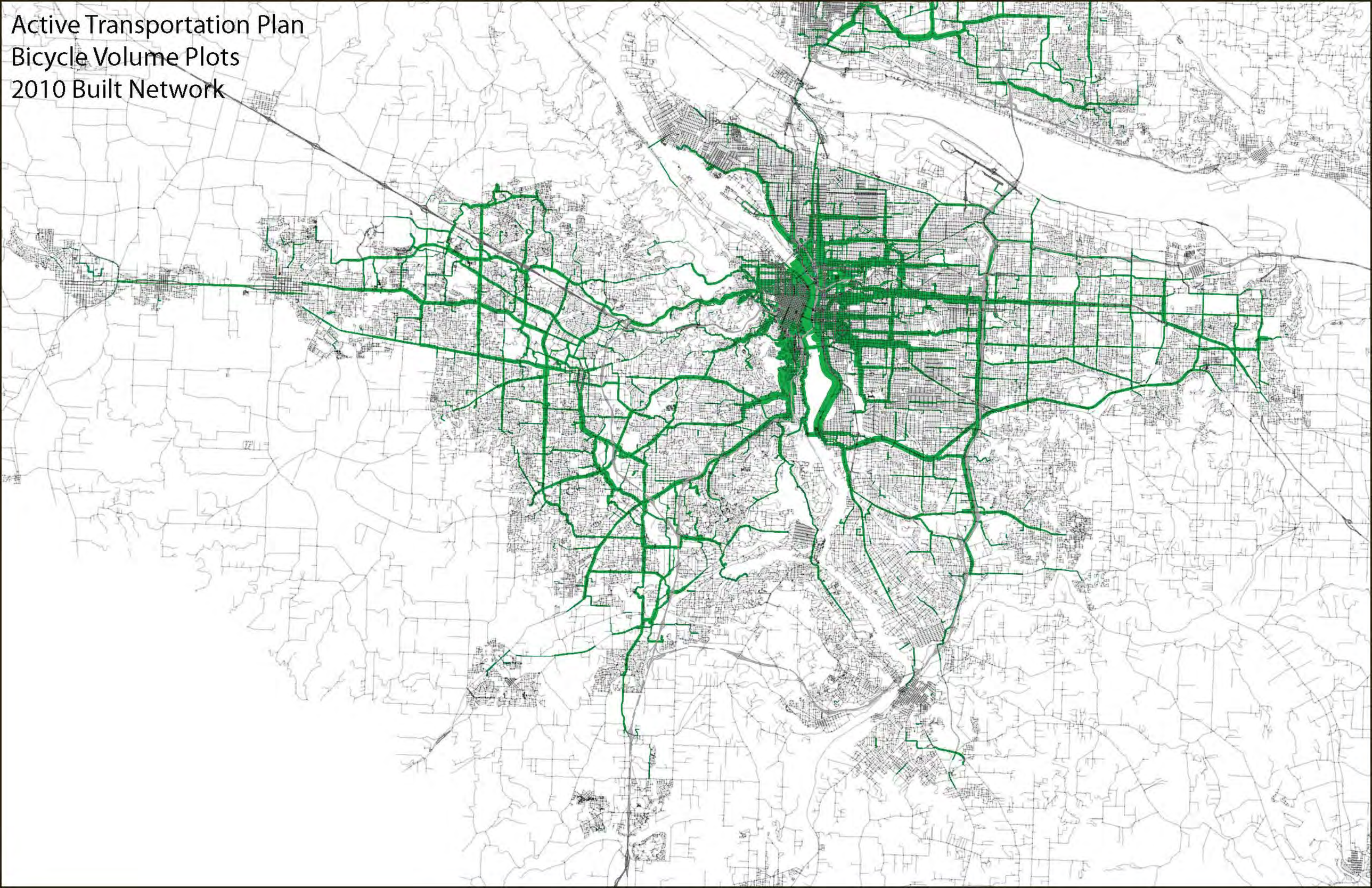
Bikeway Connectivity

Measures the connectivity of all on-street and off-street bike facilities by measuring the number of three-way (or more) bikeway intersections per area of zone (sq ft).

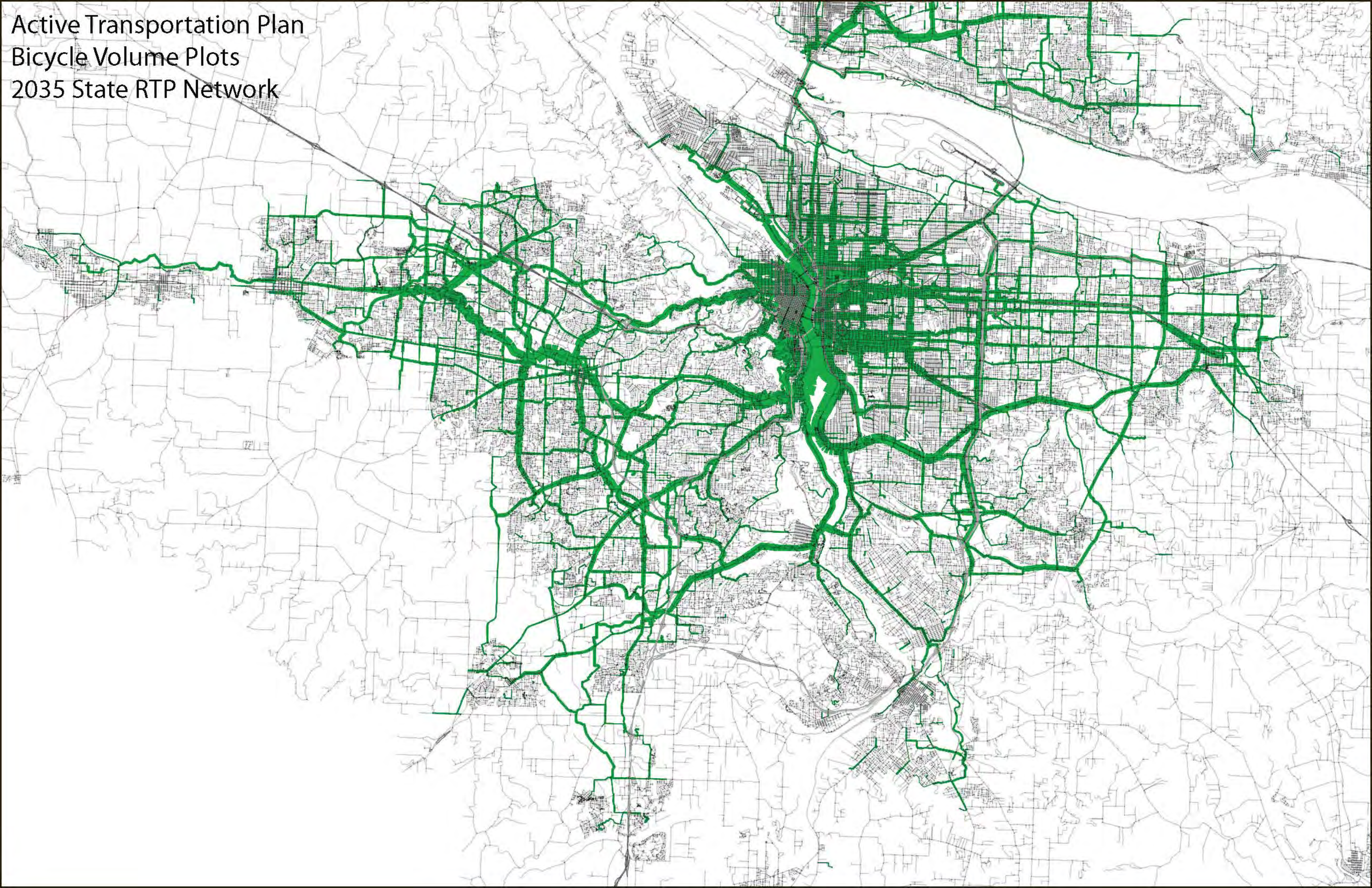


Appendix 9: Bicycle Volume Plots and Difference Plots

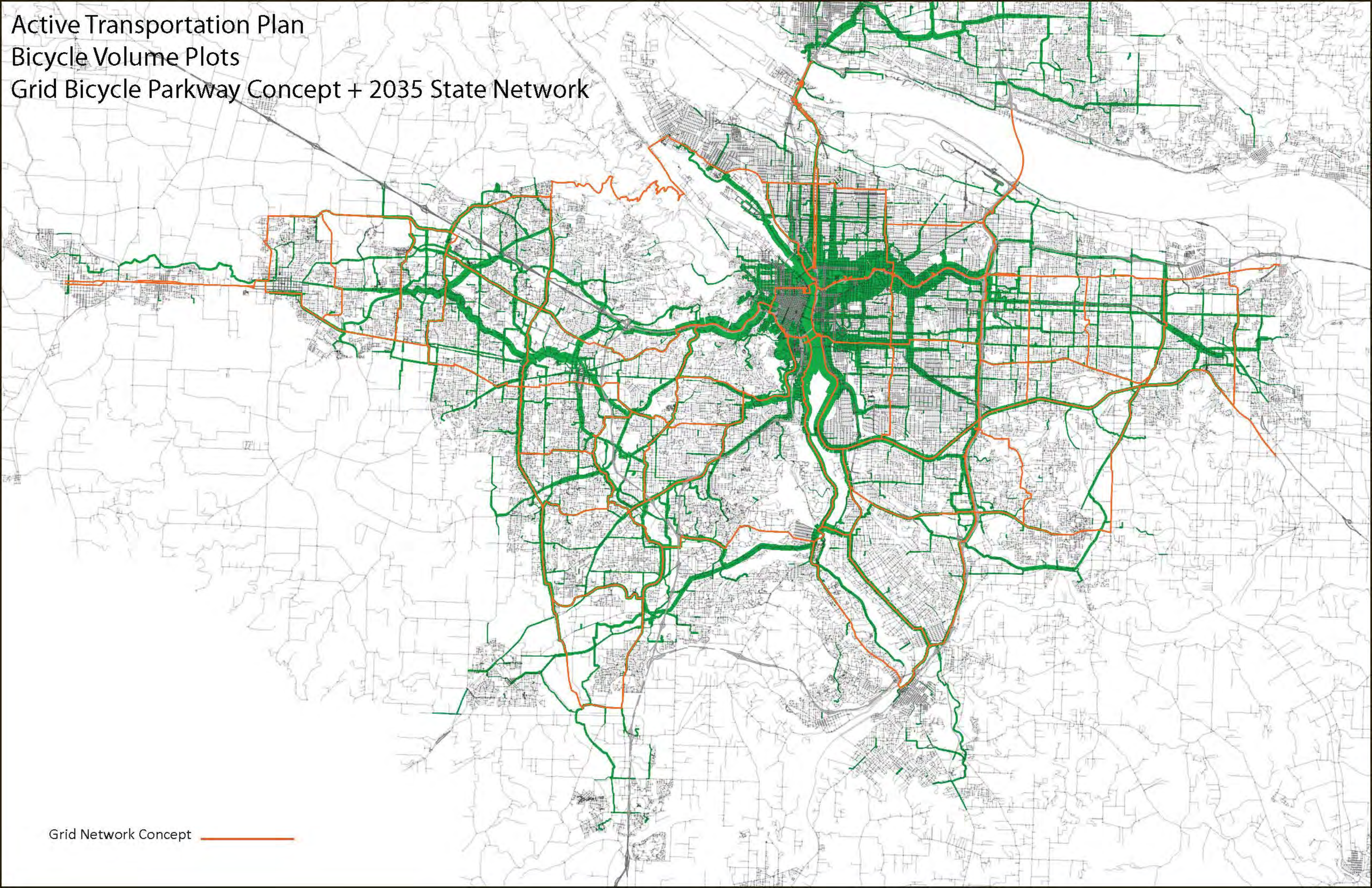
Active Transportation Plan
Bicycle Volume Plots
2010 Built Network



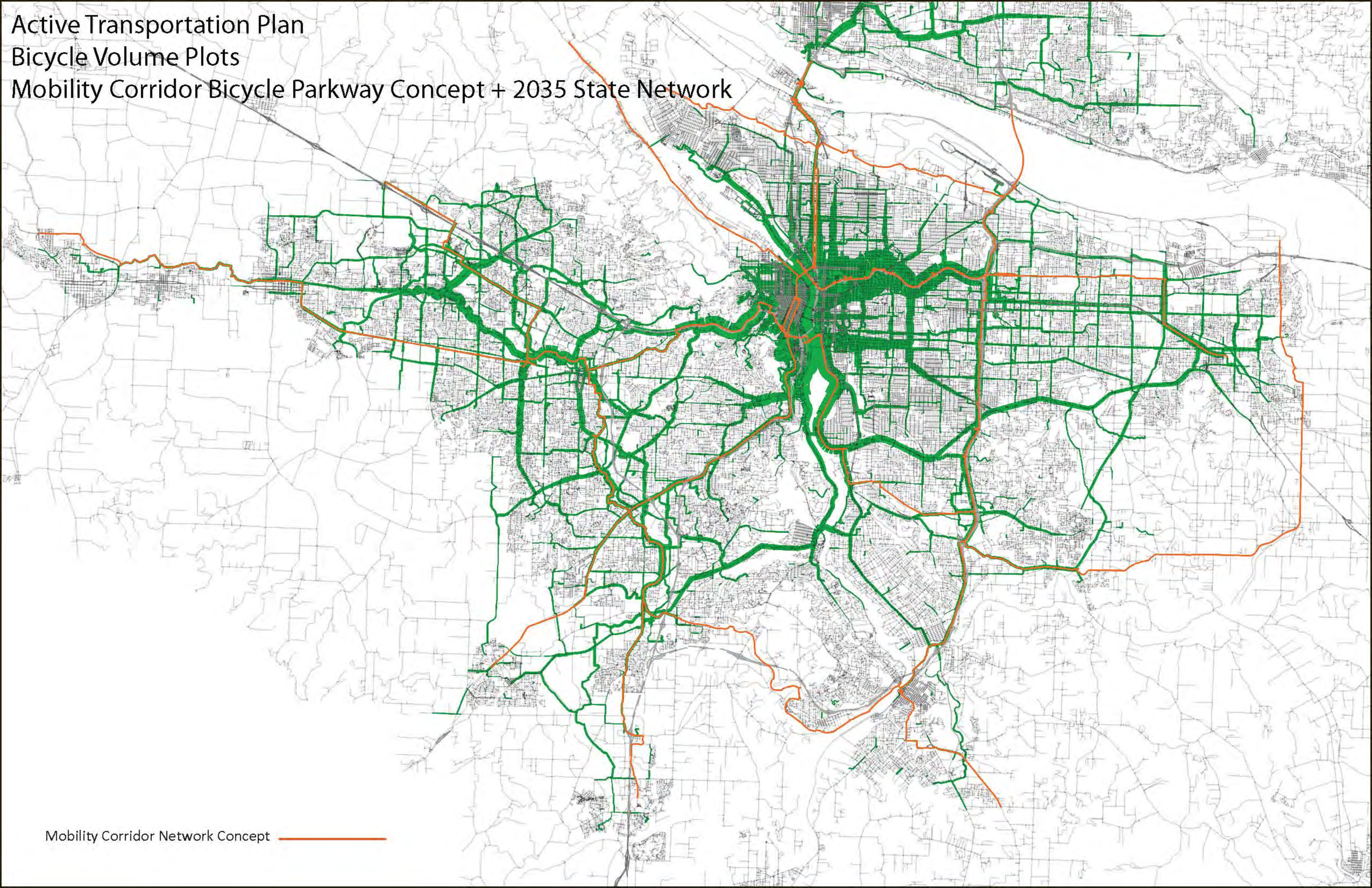
Active Transportation Plan
Bicycle Volume Plots
2035 State RTP Network



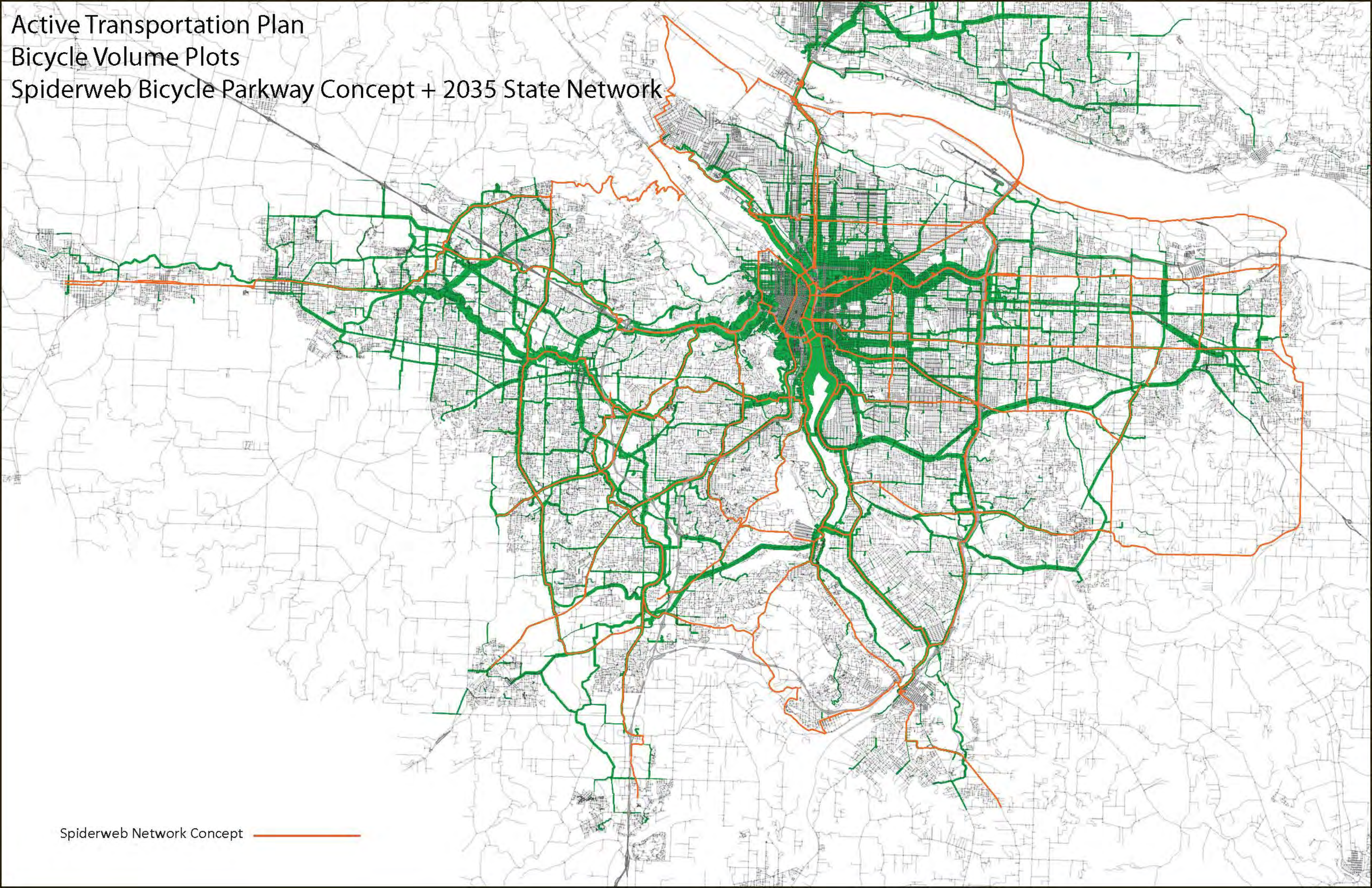
Active Transportation Plan
Bicycle Volume Plots
Grid Bicycle Parkway Concept + 2035 State Network



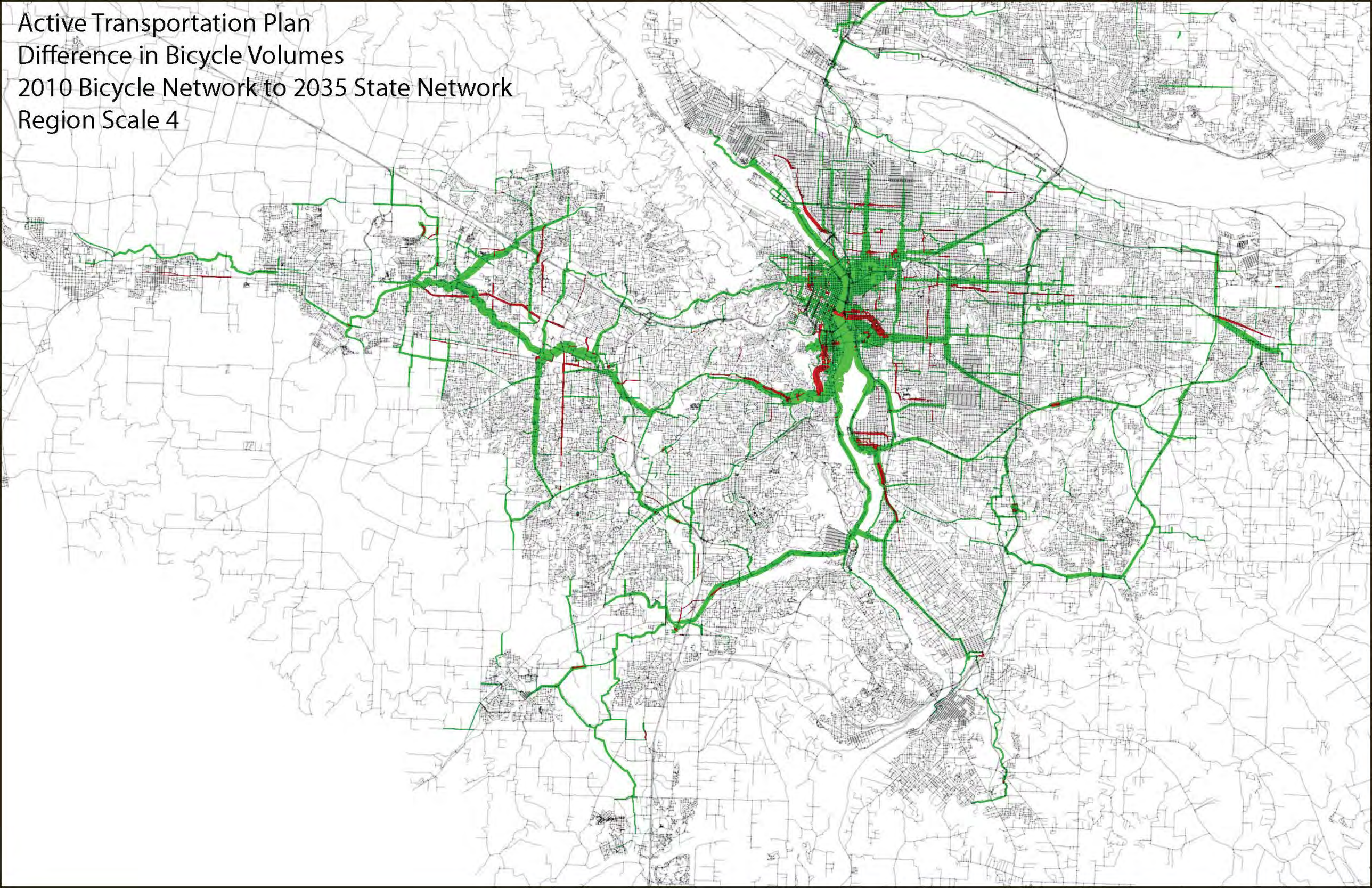
Active Transportation Plan
Bicycle Volume Plots
Mobility Corridor Bicycle Parkway Concept + 2035 State Network



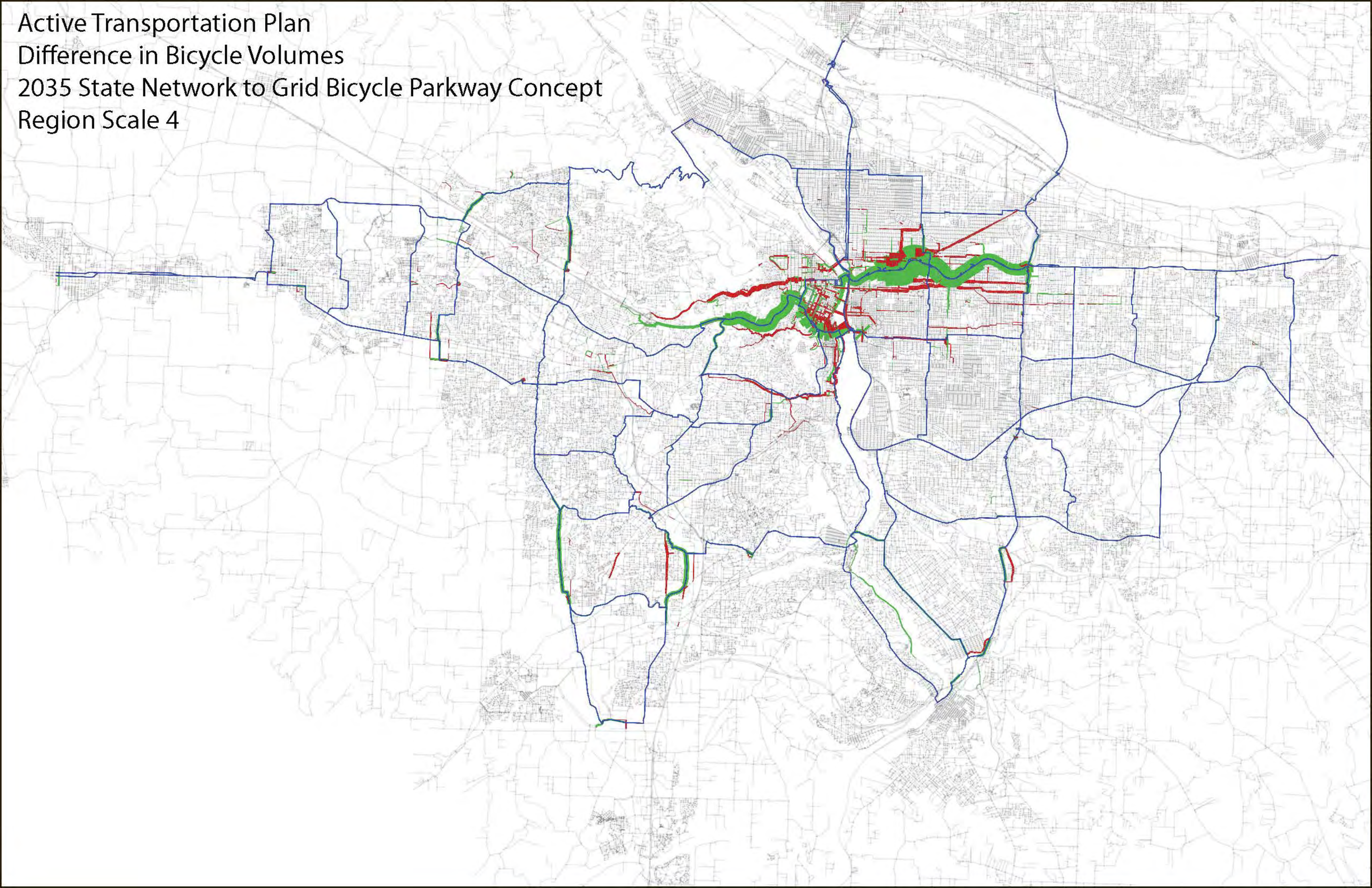
Active Transportation Plan
Bicycle Volume Plots
Spiderweb Bicycle Parkway Concept + 2035 State Network



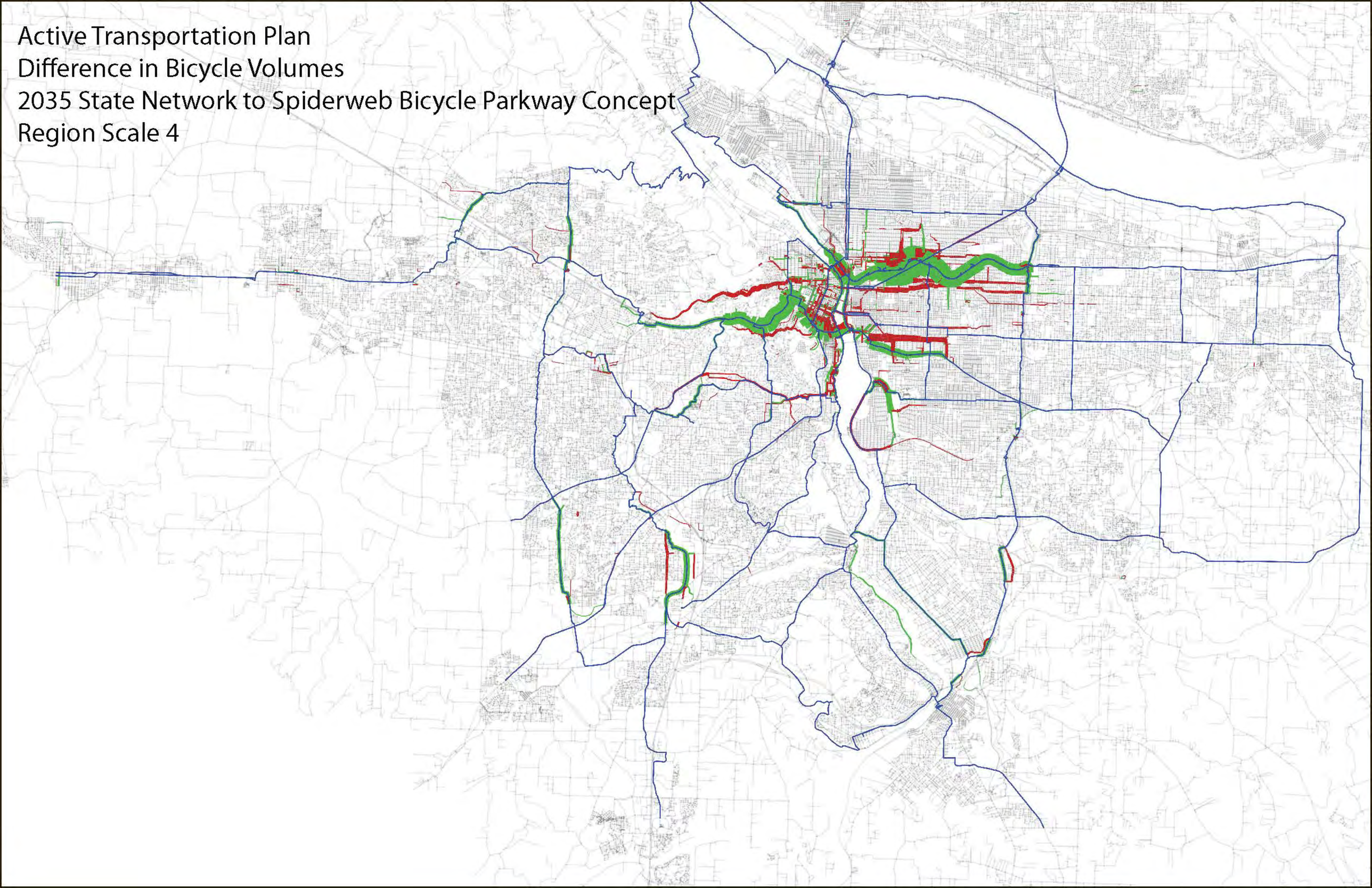
Active Transportation Plan
Difference in Bicycle Volumes
2010 Bicycle Network to 2035 State Network
Region Scale 4



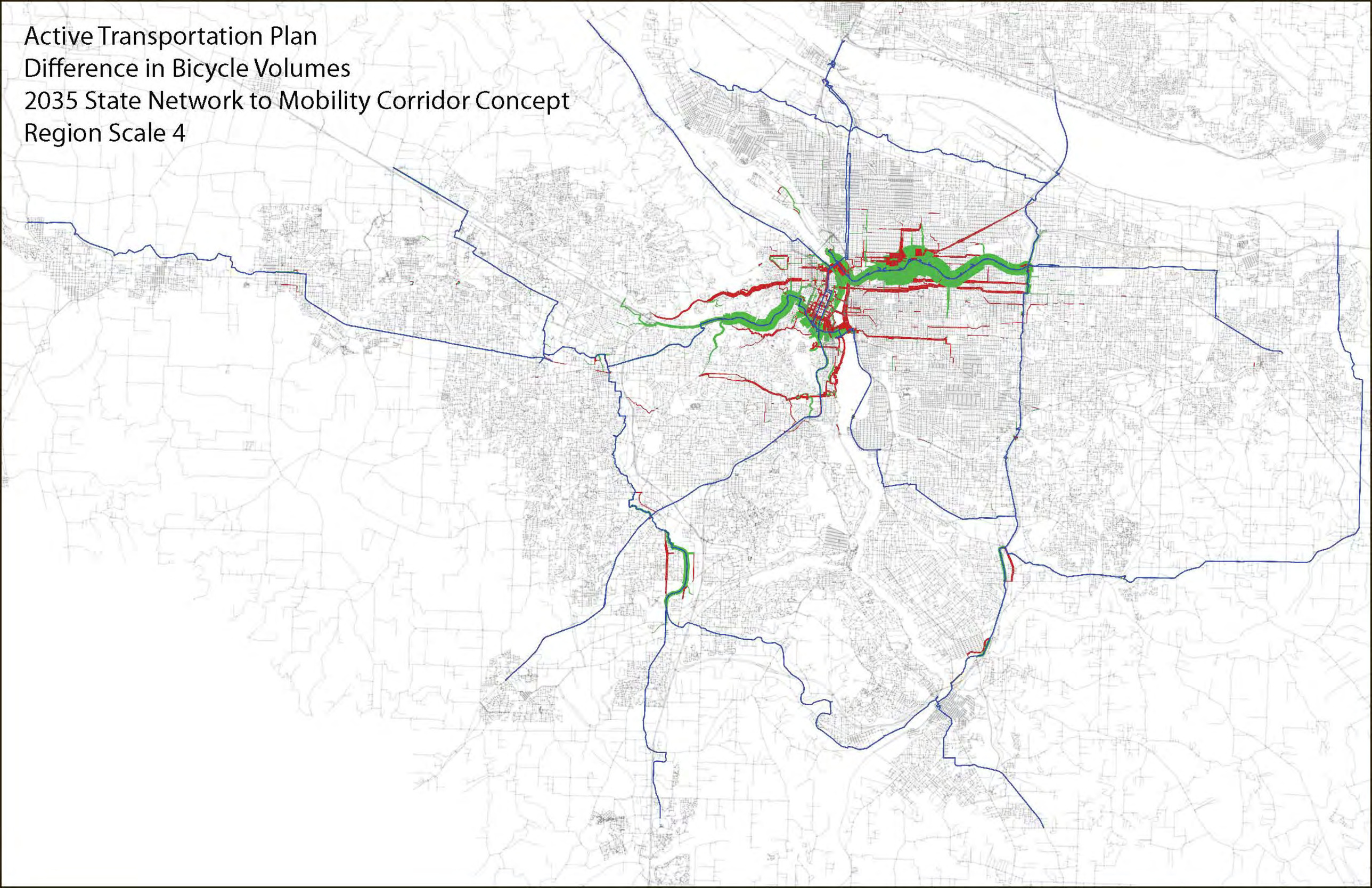
Active Transportation Plan
Difference in Bicycle Volumes
2035 State Network to Grid Bicycle Parkway Concept
Region Scale 4



Active Transportation Plan
Difference in Bicycle Volumes
2035 State Network to Spiderweb Bicycle Parkway Concept
Region Scale 4



Active Transportation Plan
Difference in Bicycle Volumes
2035 State Network to Mobility Corridor Concept
Region Scale 4

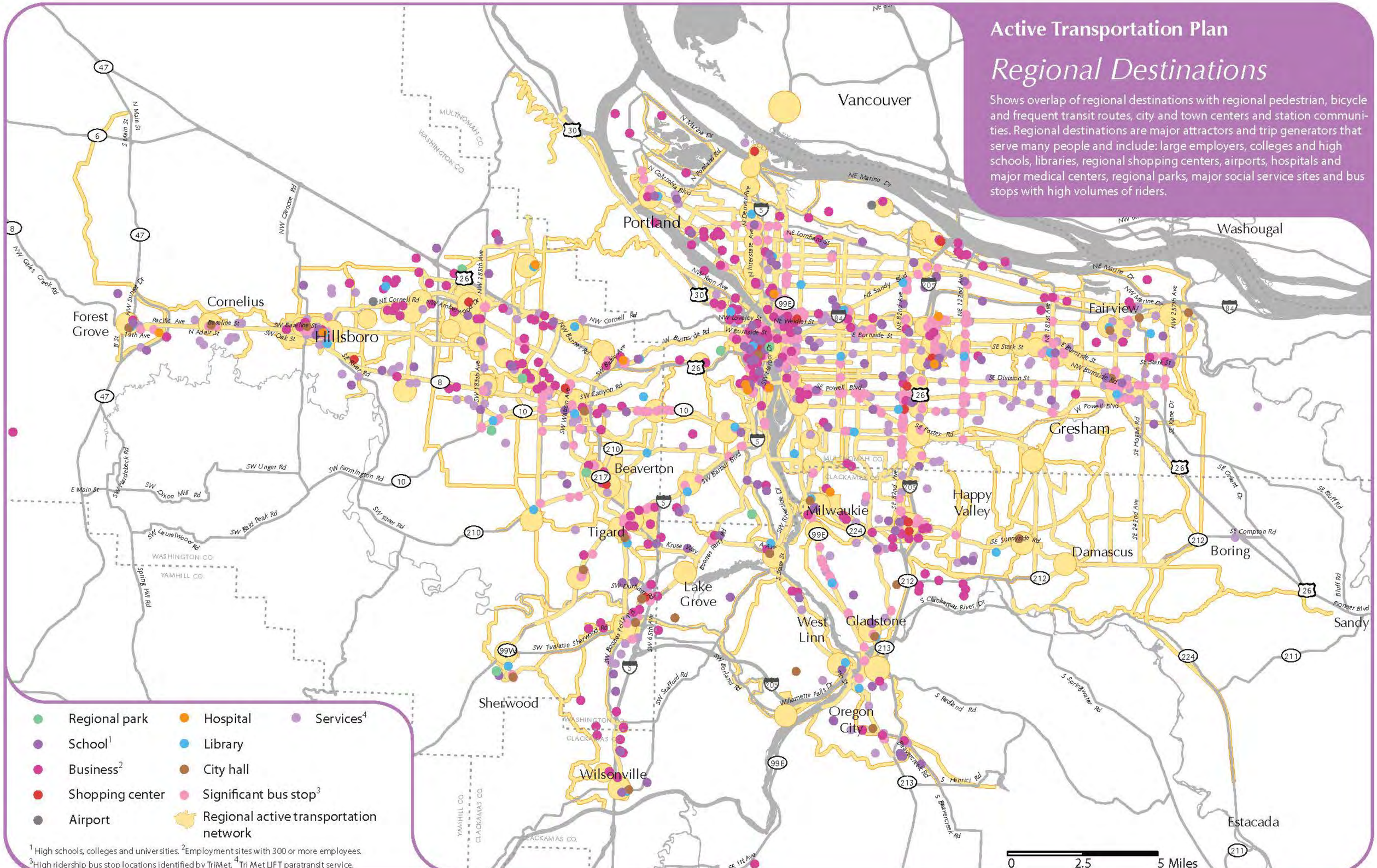


Appendix 10: Regional Destinations

Active Transportation Plan

Regional Destinations

Shows overlap of regional destinations with regional pedestrian, bicycle and frequent transit routes, city and town centers and station communities. Regional destinations are major attractors and trip generators that serve many people and include: large employers, colleges and high schools, libraries, regional shopping centers, airports, hospitals and major medical centers, regional parks, major social service sites and bus stops with high volumes of riders.



[1] High schools, colleges and universities. [2] Employment sites with 300 or more employees.
[3] High ridership bus stop locations identified by TriMet. [4] Tri Met LIFT paratransit service.

Clean air and clean water do not stop at city limits or county lines. Neither does the need for jobs, a thriving economy, and sustainable transportation and living choices for people and businesses in the region. Voters have asked Metro to help with the challenges and opportunities that affect the 25 cities and three counties in the Portland metropolitan area.

A regional approach simply makes sense when it comes to providing services, operating venues and making decisions about how the region grows. Metro works with communities to support a resilient economy, keep nature close by and respond to a changing climate. Together, we're making a great place, now and for generations to come.

Stay in touch with news, stories and things to do.

www.oregonmetro.gov/connect

Metro Council President
Tom Hughes

Metro Council
Shirley Craddick, District 1
Carlotta Collette, District 2
Craig Dirksen, District 3
Kathryn Harrington, District 4
Sam Chase, District 5
Bob Stacey, District 6

Auditor
Suzanne Flynn

MAKING A GREAT PLACE

Metro