2013

Oregon City Transportation System Plan

OREGON CITY TRANSPORTATION PLAN

June, 2013

VOLUME 2

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Acknowledgements

The 2013 Oregon Transportation System Plan was a collaborative process among various public agencies, key stakeholders and the community. Input, assistance and outreach by the following helped make the Plan possible:

- **Alta Planning**

  Matt Berkow

  Drew Meisel

- **Angelo Planning Group**

  Darci Rudzinski

  Shayna Rehberg

- **Stakeholder Advisory Team**
- **Technical Advisory Team**

A special acknowledgement goes out to all the Oregon City residents, business owners, and visitors who attended community meetings or submitted comments on the project website. Your input helped make this Plan possible.

This project is partially funded by a grant from the Transportation and Growth Management (TGM) Program, a joint program of the Oregon Department of Transportation and the Oregon Department of Land Conservation and Development. This TGM grant is financed, in part, by federal Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU), local government, and the State of Oregon funds.

Contents

Section A

PLANS AND POLICIES FRAMEWORK

This memorandum summarizes the planning documents, policies, and regulations that are applicable to the 2012 Oregon City Transportation System Plan (TSP) update (see Appendix A for a complete list). The City's current TSP will serve as the foundation for the update process, upon which new information obtained from system analysis and stakeholder input will be applied to address changing transportation needs through the year 2035. As new strategies for addressing transportation needs are proposed, compliance and coordination with the plans, policies, and regulations described in this document will be required.

Transportation System Planning in Oregon

Transportation System Planning in Oregon is required by state law as one of the 19 statewide planning goals[1] (Goal 12- Transportation). The Transportation Planning Rule (TPR), OAR 660-012[2], defines how to implement State Planning Goal 12. Specifically, the TPR requires:

- The state to prepare a TSP, referred to as the Oregon Transportation Plan (OTP);
- Metropolitan planning organizations (MPOs) to prepare a Regional Transportation Plan (RTP) that is consistent with the OTP (the Metro RTP[3] applies to Oregon City); and
- Counties and cities to prepare local TSPs that are consistent with the OTP and RTP.

The TPR directs TSPs to integrate comprehensive plan land use with transportation needs and to promote systems that serve statewide, regional and local transportation needs. These requirements aim to improve community livability by encouraging land use patterns and transportation systems that make it more convenient for people to walk, bicycle, use transit and drive less to meet their daily needs.

As the guiding document for regional and local TSPs, the OTP[4] establishes goals, policies, strategies and initiatives that address the core challenges and opportunities facing transportation in Oregon. These are further implemented with the Oregon Highway Plan (OHP)[5] and the RTP, which is adopted to meet Federal requirements.

[1] Statewide Planning Goals: http://www.oregon.gov/LCD/goals.shtml

[2] Transportation Planning Rule: http://arcweb.sos.state.or.us/rules/OARS_600/OAR_660/660_012.html

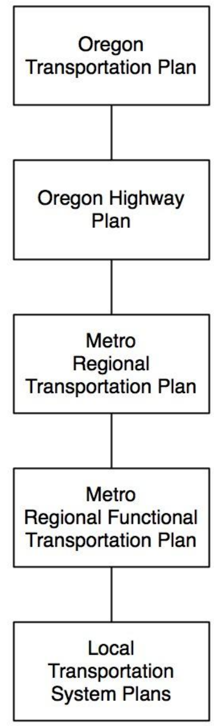
[3] Metro Regional Transportation Plan: http://www.oregonmetro.gov/index.cfm/go/by.web/id=25038

[4] Oregon Transportation Plan: http://www.oregon.gov/ODOT/TD/TP/ortransplanupdate.shtml

[5] Oregon Highway Plan: http://www.oregon.gov/ODOT/TD/TP/orhwyplan.shtml

Why does Oregon City need an Updated TSP?

The City's current TSP was adopted in 2001. Since then new requirements have been integrated into the OTP, OHP and Metro RTP, many key transportation projects have been completed, the local Urban Growth Boundary and Urban Reserve areas have changed, and the City's Comprehensive Plan and Municipal Code was updated. The last 10 years of regulatory, land use and transportation system changes will be considered in this TSP update.



ODOT's Transportation System Plan Guidelines[6] direct TSP updates to address recent policy and regulatory changes, and calls out recent changes to the OTP, OHP, TPR, and federal changes implemented into the RTP. Since adoption of the 2001 Oregon City TSP, the OTP was updated (2006) to emphasize maintaining assets in place, optimizing existing system performance through technology and better system integration, creating sustainable funding, and investing in strategic capacity enhancements. Policy 1F (Mobility Standards) of the OHP was amended to allow for the adoption of alternative mobility standards where "practical difficulties make conformance with the highway mobility standards infeasible." Appendix C of the OHP (Access Management Spacing Standards) was also modified to be consistent with amendments to the Access Management Rule, OAR 734-051.

Metro's Regional Transportation Functional Plan[7] **(RTFP)** directs how Oregon City should implement the RTP through the TSP and other land use regulations. The RTFP codifies existing and new requirements which local plans must comply with to be consistent with the RTP. If a TSP is consistent with the RTFP, Metro will find it to be consistent with the RTP.

The RTFP provides guidance on several areas including transportation design for various modal facilities, system plans, regional parking management plans and amendments to comprehensive plans. The following directives specifically pertain to updating local TSPs:

- Include regional and state transportation needs identified in the 2035 RTP along with local needs
- Local needs must be consistent with RTP in terms of land use, system maps and non-SOV modal targets
- When developing solutions, local jurisdictions shall consider a variety of strategies, in the following order:
    - TSMO (Transportation System Management Operations)
    - Transit, bicycle and pedestrian projects
    - Traffic calming

[6] ODOT Transportation System Plan Guidelines: http://www.oregon.gov/ODOT/TD/TP/TSP.shtml
[7] Metro Regional Transportation Functional Plan: http://www.oregonmetro.gov/index.cfm/go/by.web/id=274

    - Land use strategies in OAR 660-012-0035(2)[8]
    - Connectivity, including pedestrian and bicycle facilities
    - Motor vehicle capacity projects
- Local jurisdictions can propose regional projects as part of RTP process
- Local jurisdictions can propose alternate performance and mobility standards, however, changes must be consistent with regional and statewide planning goals
- Local parking regulations shall be consistent with the RTFP

[8] This section of the Transportation Planning Rule requires Metro area jurisdictions to evaluate land use designations, densities, and design standards to meet local and regional transportation needs.

How is the Transportation System Defined?

The following sections summarize the state highway classifications and land use designations for areas of Oregon City derived from these regulatory documents. This information ultimately determines the adopted standards and regulations that apply to state highways in Oregon City.

ODOT Classifications for State Highways in Oregon City

OHP Policy 1A (State Highway Classification System) categorizes state highways for planning and management decisions. Within Oregon City, state highways are classified as Interstate Highway, Regional Highway, District Highway, or Expressway (see summary at the end of this section).

Special Designations: OHP Policy 1B identifies special highway segment designations for specific types of land use patterns to foster compact development on state highways in which the need for appropriate local access outweighs the considerations of highway mobility. Within Oregon City, portions of OR 99E and OR 43 have Special Transportation Area (STA) designations.

State Highway Freight System: OHP Policy 1C addresses the need to balance the movement of goods and services with other uses. It states that the timeliness of freight movements should be considered when developing and implementing plans and projects on freight routes. Within Oregon City, I-205 and OR 99E are classified as Federal Truck Routes, while I-205 is also classified as an Oregon Freight Route.

Updates to the TSP will support the existing highway classifications and will enhance the ability of the highways in Oregon City to serve in their defined functions. The following summarizes the classifications of state highways in Oregon City:

- I-205 (East Portland Freeway, No. 64) is classified as an Interstate Highway, part of the National Highway System (NHS), a Freight Route, and a Truck Route.
- OR 99E (Pacific Highway East, No. 81) is classified as a District Highway and a Truck Route from the north City limits (at the Clackamas River) to I-205. From I-205 to the south City limits it is classified as a Regional Highway and a Truck Route. It also has a STA designation from 14th Street to Railroad Avenue.
- OR 213 (Cascade Highway South, No. 160) is classified as a District Highway. From I-205 to Molalla Avenue it also has an Expressway and Bypass designation.
- OR 43 (Oswego Highway, No. 03) is classified as a District Highway, and has a Special Transportation Area (STA) designation from the Oregon City-West Linn Bridge to OR 99E.

Metro Land Use Designations for Oregon City

Metro's 2040 Growth Concept[9] in the RTP applies land use designations to the Portland region. The 2040 Growth Concept is the region's long range plan for managing growth by integrating land use and transportation. The concept concentrates mixed use and higher density development in areas of the region designated as "Centers", "Station Communities", and "Main Streets". The 2040 Growth Concept land uses are arranged in a hierarchy, with the primary and secondary land uses, referred to as 2040 Target Areas, as the focus of RTP investments. The hierarchy also serves as a framework for prioritizing RTP investments.

Primary land uses in Oregon City include:

- The "Oregon City Regional Center" which generally includes the area bounded by the Clackamas River to the north, 7th Street to the south, Washington Street to the east and the Willamette River to the west. In addition, the downtown core of Oregon City, or roughly the area between the Willamette River and Railroad Avenue, from 7th Street to Tumwater Drive, and the area east of Washington Street and north of Abernethy Road to OR 213 is also included in the Regional Center.

Secondary land uses in Oregon City include:

- The "7th Street and Molalla Avenue Corridor" from Washington Street to OR 213
- The "OR 99E Corridor" from Railroad Avenue to around 3rd Avenue (including the Canemah neighborhood)
- The "Employment Land" in the southeast portion of Oregon City, generally bounded by Beavercreek Road to the north and east, Glen Oak Road to the south, and Molalla Avenue/OR 213 to the west

The remaining areas of Oregon City are designated as Neighborhood land uses. These areas have the lowest priority for RTP investments.

[9] Metro 2040 Growth Concept: http://www.oregonmetro.gov/index.cfm/go/by.web/id=29882

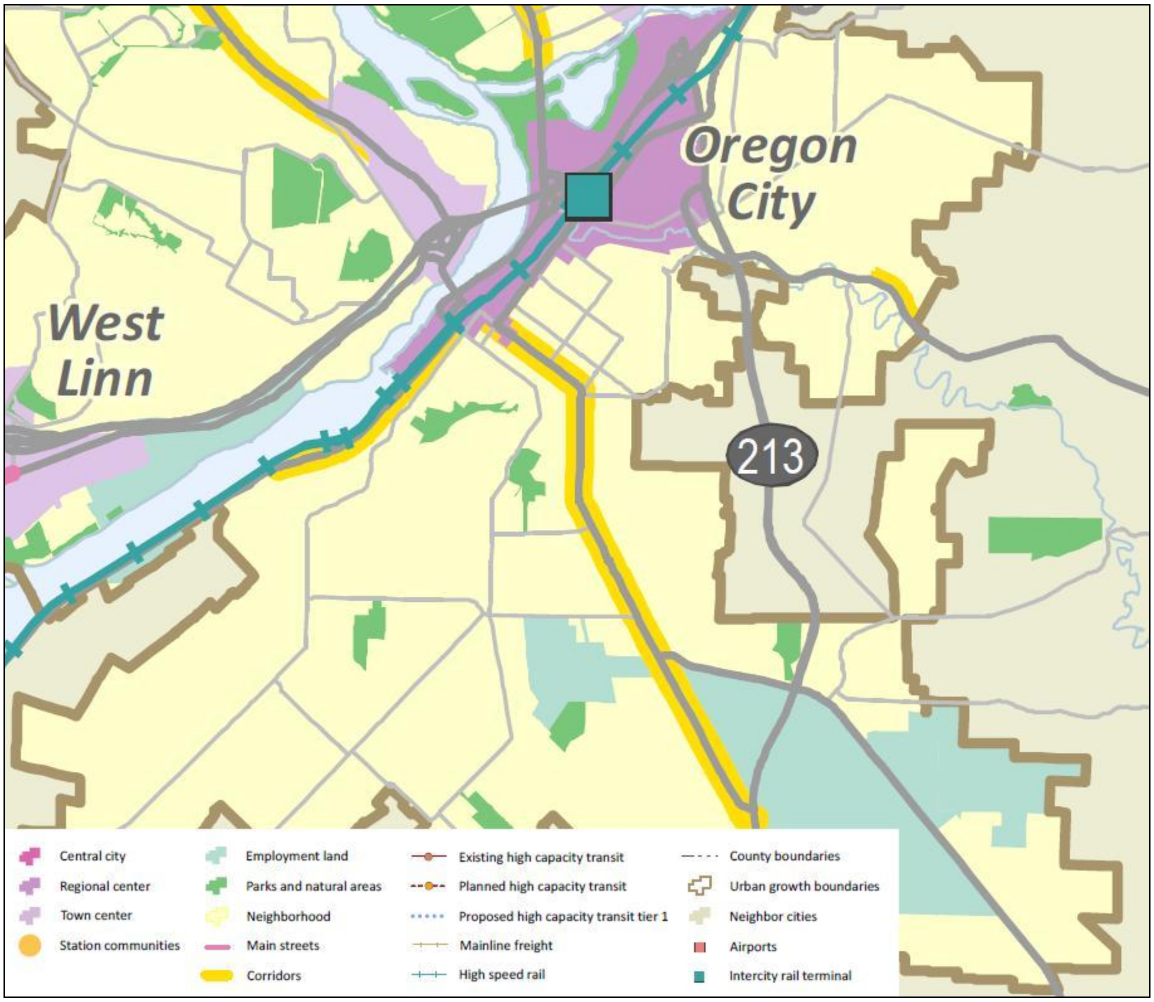


Figure 1: Metro Land Use Designations in Oregon City

How is the Transportation System Managed?

State Highway Mobility Standards: OHP Policy 1F sets mobility standards for ensuring a reliable and acceptable level of mobility on the highway system. The following mobility standards are applicable to state highways in Oregon City (pursuant to Policy 1F, Table 7):

- State highways in **Regional Centers** (including portions of OR 99E, OR 213, and OR 43) have a mobility standard requiring that the highway operate at or below a volume to capacity (v/c) ratio of 1.1 during the peak first hour, and 0.99 during the peak second hour.
- All other state highways in Oregon City (including those through Corridor, Employment, or Neighborhood land use areas) have a mobility standard requiring that the highway operate at or below a volume to capacity (v/c) ratio of 0.99 during the peak first and second hours.

City and County Mobility Standards: The City of Oregon City Transportation System Plan (TSP)[10] identifies LOS D as the minimum performance standard for both signalized and unsignalized intersections under Oregon City jurisdiction. In addition, the transportation element of the Clackamas County Comprehensive Plan[11] requires a Level-of-Service "D" as the minimum acceptable performance standard for signalized and unsignalized intersections on arterial and collector roadways under Clackamas County jurisdiction. The traditional approach to mobility standards will likely be adjusted in response to many evolving conditions such as transportation funding for projects, economic viability, livability, and funding priorities.

Access Management on State Highways: The Oregon Access Management Rule[12] (OAR 734-051) attempts to balance the safety and mobility needs of travelers along state highways with the access needs of property and business owners. ODOT's rule sets guidelines for managing access to the state's highway facilities in order to maintain highway function, operations, safety, and the preservation of public investment consistent with the policies of the 1999 OHP. Access management rules allow ODOT to control the issuing of permits for access to state highways, state highway rights of way and other properties under the State's jurisdiction

In addition, the ability to close existing approaches, set spacing standards and establish a formal appeals process in relation to access issues is identified. These rules enable the State to set policy and direct location and spacing of intersections and approaches on state highways, ensuring the relevance of the functional classification system and preserving the efficient operation of state routes.

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[10] Oregon City TSP, p.2-56, Adopted April 2001.

[11] Clackamas County Comprehensive Plan, Chapter 5- Transportation

[12] Access Management Rule: http://arcweb.sos.state.or.us/rules/OARS_700/OAR_734/734_051.html

OHP Policy 3A sets access spacing standards for driveways and approaches to the state highway system.[13] The standards are based on state highway classification and differ based on posted speed.

Access Management on Local Roadways: The Oregon City TSP identified minimum intersection spacing standards for public roadways under Oregon City jurisdiction. Access spacing guidelines from the TSP are shown in Table 1.

Table 1: Minimum Oregon City Intersection Spacing Standards

Functional Classification	Major Arterial	Minor Arterial	Collector	Neighborhood Collector	Local Street
Major Arterial	2 miles	1 mile	¼ mile	1,000 feet	500 feet
Minor Arterial	1 mile	½ mile	1,000 feet	800 feet	400 feet
Collector	¼ mile	1,000 feet	800 feet	600 feet	300 feet
Neighborhood Collector	1,000 feet	800 feet	600 feet	500 feet	200 feet
Local Street	500 feet	400 feet	300 feet	200 feet	150 feet

RTP Performance targets: The Metro RTP established new performance targets (see Table 2) for safety, congestion, freight reliability, climate change, active transportation, sidewalk/trail/transit infrastructure, clean air, travel, affordability, and access to daily needs. The performance targets are regional goals that Oregon City TSP should work toward achieving.

Table 2: 2035 RTP Performance Targets

Objective	Target by 2035
Safety	Reduce serious injuries and fatalities in all modes of travel by 50% (vs. 2005)
Congestion*	Reduce vehicle hours of delay (VHD) by 10% per person (vs. 2005)
Freight reliability	Reduce VHD per truck trip by 10% (vs. 2005)
Climate change	Reduce transportation greenhouse gas emissions by 40% (vs. 1990)
Active transportation	Triple walking, biking and transit mode share (vs. 2005)
Basic infrastructure	Increase by 50% access times to sidewalks, trails and transit (vs. 2005)
Clean air	Ensure 0% population exposure to at-risk levels of pollution
Travel	Reduce vehicle miles traveled per person by 10% (vs. 2005)
Affordability	Reduce average household combined cost of housing and transportation by 25% (vs. 2000)

[13] ODOT Access Management Standards (Appendix C): http://www.oregon.gov/ODOT/TD/TP/orhwyplan.shtml

Access to daily needs	Increase by 50% the number of essential destinations within 30 minutes by bike, transit for low-income, minority, disabled pop. (vs. 2005)

* Interim volume-to-capacity ratio (v/c) measures still apply

In addition to supporting the performance targets, the TSP will need to incorporate transportation system management and operations (TSMO) into planning. The following RTP policies provide the foundation for TSMO in the region:

- Use advanced technologies, pricing strategies and other tools to actively manage the transportation system
- Provide comprehensive real-time traveler information to people and businesses
- Improve incident detection and clearance times on the region's transit, arterial and throughway networks
- Implement incentives and programs to increase awareness of travel options and incent change

RTP Non-Single Occupancy Vehicle (SOV) Target: The RTP established regional mode share targets that are intended to be goals for cities and counties to work toward during implementation of the 2040 Growth Concept at the local level. Increases in walking, bicycling, ridesharing and transit mode shares will be used to demonstrate compliance with per capita travel reductions required by the state Transportation Planning Rule. The following modal targets apply to RTP land uses in Oregon City:

- Regional Centers and Corridors: Non-drive alone modal target of 45 to 55 percent
- Employment areas and Neighborhoods: Non-drive alone modal target of 40 to 45 percent

As required by the RTP and the TPR, jurisdictions within the Metro region must adopt policies and actions that encourage a shift towards non-SOV modes. The Metro Non-Single Occupancy Vehicle (SOV) Target Actions Study summarizes the required non-SOV strategy requirements for local jurisdictions to implement:

- Adopt 2040 modal targets in TSP policies
- Adopt street connectivity plans and implementing ordinances
- Adopt maximum parking ratios to implement the parking requirements of Title 2 of the Urban Growth Management Functional Plan
- Adopt transit strategies, including planning for adequate transit facilities and service; pedestrian facility planning and infrastructure that support transit use; location and design of buildings in transit zones that encourages transit use; and adoption of a transit system map, consistent with Metro requirements.

The Metro Non-Single Occupancy Vehicle (SOV) Target Actions Study recommends the following measures as additional strategies to be considered in the Oregon City TSP:

- Continue to require transportation-efficient development through efforts to meet density and other land use targets in centers and corridors as part of compliance with Metro Functional Plan and related requirements.
- Construct bicycle and pedestrian projects, consistent with state, federal and local government requirements. Local governments and Metro should prioritize projects that enhance connectivity of the bicycle and pedestrian system and access to transit.
- Continue to support TriMet and other transit agencies in providing frequent, reliable and comprehensive transit service, and local implementation of pedestrian and bicycle infrastructure to improve access to transit. Credit local jurisdictions with efforts to support transit agencies in these efforts.
- Support and encourage efforts to implement employer-based TDM strategies. Coordinate with employers even in areas where the formation of TMAs is not required.
- Encourage and assist in implementing parking cash-out programs or other techniques to eliminate employer subsidies for parking. Consider requiring local governments to eliminate free employee parking and provide informational materials and technical assistance to employers interested in implementing such programs.
- Support and coordinate Safe Routes to School programs and projects. Local jurisdictions and Metro should support and help coordinate these efforts through project funding and technical assistance.

Major Projects: OHP Policy 1G requires maintaining performance and improving safety by improving efficiency and management before adding capacity. The intent of policy 1G and Action 1G.2 is to ensure that major improvement projects to state highway facilities have been through a planning process that involves coordination between state, regional, and local stakeholders and the public, and that there is substantial support for the proposed improvement.

Off-System Projects: OHP Policy 2B establishes ODOT's interest in projects on local roads that maintain or improve safety and mobility performance on state roadways, and supports local jurisdictions in adopting land use and access management policies. The TSP will include sections describing existing and future land use patterns, access management, and implementation measures.

Traffic Safety: OHP Policy 2F identifies the need for projects in the state to improve safety for all users of the state highway system through engineering, education, enforcement, and emergency services. One component of the TSP is to identify existing crash patterns and rates and to develop strategies to address safety issues. Proposed projects will aim to reduce the vehicle crash potential and/or improve bicycle and pedestrian safety by providing upgraded facilities that meet current standards.

Alternative Passenger Modes: OHP Policy 4B, Action 4B.4 requires that highway projects encourage the use of alternative passenger modes to reduce local trips. The TSP will develop ways to support and increase the use of alternative passenger modes to reduce trips on highways and other facilities. This will include improvement to bicycle and pedestrian facilities and consideration of transit movement along roadways.

Projects on State Highways: The Highway Design Manual[14] (HDM) provides uniform standards and procedures for ODOT and is in general agreement with the 2001 American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*. Some key areas where guidance is provided are the location and design of new construction, major reconstruction, and resurfacing, restoration or rehabilitation (3R) projects. The HDM should be used for all projects on state highways in Oregon City to determine design requirements, including the maximum allowable volume to capacity ratios for use in the design of highway projects.

Other Background Information for the TSP Update

The following sections summarize additional background information or guidance documents that will be used in updating the Oregon City TSP.

Projects to be considered in Future Transportation Analysis

Several of the documents reviewed identified transportation improvement projects that will be considered in future transportation analysis in Oregon City. The projects include:

2010-2013 Statewide Transportation Improvement Program[15] (STIP) projects:

- Intersection projects on OR 213 at the Washington Street and Redland Road intersections
- Bike and pedestrian projects on Main Street between 5th Street and 10th Street
- Motor vehicle access, transit stop, bike lane, pedestrian crossing, and sidewalk projects on McLoughlin Boulevard between the Clackamas River bridge and Dunes Drive
- Construction of a jughandle intersection on OR 213 at Washington Street

Metro RTP: Projects were identified along Metro Mobility Corridors, including Tualatin/Oregon City (Mobility Corridor #7), Oregon City/Gateway (Mobility Corridor #8), and Oregon City/Willamette Valley (Mobility Corridor #14).

Near-term (1-4 years)

- System and demand management along mobility corridor and parallel facilities for all modes of travel (Mobility Corridor #7, 8, and 14).
- Practical design solutions for bike and pedestrian connections to transit (Mobility Corridor #7).

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[14] ODOT Highway Design Manual: http://www.oregon.gov/ODOT/HWY/ENGSERVICES/hwy_manuals.shtml

[15] ODOT STIP: http://www.oregon.gov/ODOT/HWY/STIP/

- Practical design solutions for bikes/pedestrians for safety and to connect to transit (Mobility Corridor #8).
- Address arterial connectivity and crossings (Mobility Corridor #8, and 14).
- I-205/OR 213 Interchange (Mobility Corridor #14).
- Project development for regional trails, Oregon City Loop and Newell Canyon (Mobility Corridor #14).

Medium-term (5-10 years)

- Complete gaps in the arterial network (Mobility Corridor #7, 8, and 14).
- Complete corridor refinement plan (Mobility Corridor #7 and 8).
- Develop congestion pricing methodologies for I-205 (Mobility Corridor #7 and 8).
- Develop plan and implement SEP to connect Oregon City Regional Center with high capacity transit (Mobility Corridor #7 and 8).
- Identify funding solutions for alternative mode options (Mobility Corridor #7 and 8).
- Project development for regional infrastructure to serve Park Place and Beavercreek Road concept plan UGB expansion areas (Mobility Corridor #14).

Long-term (10-25 years)

- Construct high capacity transit connection to Oregon City Regional Center (Mobility Corridor #7).
- Identify funding solutions for alternative mode options, including high capacity transit to Oregon City (Mobility Corridor #8).
- Construct regional trails and access in Newell Creek and Oregon City Loop (Mobility Corridor #14).

Metro Regional Trails and Greenways Plan[16]: This Plan recommended three regional trails through Oregon City.

- The Oregon City Loop Trail, creating a loop around the perimeter of Oregon City. The trail will cut through Newell Creek Canyon, connect to the Beaver Lake Trail, and skirt the southern edge of the city on its way back to the Willamette River across from its confluence with the Tualatin River.
- The Beaver Lake Trail which will begin at the End of the Oregon Trail Center in Oregon City and head south on the east side of Newell Creek Canyon and east to Beaver Lake.
- The Oregon Trail-Barlow Road Trail which will follow the pioneer wagon train route from the Cascades west to the End of the Oregon Trail Center in Oregon City.

[16] Metro Regional Trails and Greenways: http://www.oregonmetro.gov/index.cfm/go/by.web/id=595

TriMet Transit Investment Plan, TIP (2011)[17]**:** The TIP details the investments TriMet will make in the region to expand transit service. The following projects are applicable to Oregon City.

- Walkability assessment at Molalla Avenue / County Red Soils Campus for pedestrian obstacles and recommendations for any needed projects.
- Portland to Milwaukie Light Rail Project, which will connect downtown Portland to Milwaukie and connect to Frequent Service buses from the Oregon City Regional Center.
- A proposed Bus Rapid Transit (BRT) corridor following I-205 between Clackamas Town Center possibly stretching as far as Beaverton, with service to Oregon City, Tualatin, and Tigard.
- Frequent bus service line expansion to and from Oregon City, primarily around the Oregon City Transit Center.

Oregon City Capital Improvement Plan (2008): The Oregon City Capital Improvement Plan recommended various street modernization projects to comply with City standards, projects at several intersections, and several intersection or roadway capacity or operational projects.

Oregon City Trails Master Plan (2004): The Oregon City Trails Master Plan recommends seven regional trails, 25 community trails, and 34 local trails to be constructed over the next 25+ years.

Oregon City McLoughlin Boulevard Enhancement Plan (2005): The McLoughlin Boulevard Enhancement Plan illustrates motor vehicle, pedestrian and bicycle projects on OR 99E (McLoughlin Boulevard) from Railroad Avenue to the Clackamas River Bridge.

Oregon City Downtown Community Plan (1999): The Downtown Community Plan updated the comprehensive plan and zoning code and established a vision and implementing strategies for growth and improvement of the designated Metro Regional Center in the downtown Oregon City vicinity. The plan emphasizes the creation of pedestrian-friendly places, varied mixed use developments, new open space, and civic amenities. The plan had the following transportation recommendations:

- Widening of McLoughlin Boulevard near 1-205
- Widening the 1-205 southbound on-ramp
- Connecting 12th Street to McLoughlin Boulevard
- Modifying the Main Street/7th Street intersection
- Widening 14th Street
- Improving and signalizing several intersections

[17] TriMet Transit Improvement Plan: http://trimet.org/tip/index.htm

- Creating new linkages that improve local circulation in the landfill area near OR 213 and Washington Street
- Creating McLoughlin Boulevard and Washington Street as bicycle corridors
- Creating Main Street and Washington Street as primary pedestrian corridors
- Constructing the multi-purpose pathway from the Cove to downtown
- Preserving pedestrian facilities and completing missing links
- Enhancing local transit service to the study area and other parts of Oregon City
- Establishing a Transportation Management Association with assistance from Tri-Met.

Oregon City Downtown Circulation Plan and Parking Study (2010): The Downtown Circulation Plan recommended restoring two-way traffic to Main Street between 6th and 9th Streets, along 7th Street between Main and Railroad, and on Railroad Avenue between 6th and 7th Streets, maximizing curbside and off-street parking, and opportunities for pedestrian and bike projects that connect the downtown and adjacent neighborhoods.

Actions or Strategies to be considered in Updating the TSP

Several of the documents reviewed identified transportation actions or strategies that will be considered in updated the Oregon City TSP. The actions or strategies include:

Oregon City Comprehensive Plan (2004): The Oregon City Comprehensive Plan ("Comprehensive Plan") is intended to meet the requirements of the Statewide Planning Goals and the regional Urban Growth Management Functional Plan and to guide the community's vision for the future growth and development of the city. The plan is founded on six principals: promote sustainability and sustainable development; contain urban development; promote redevelopment; protect natural resources; foster economic vitality; provide efficient and cost-effective services, and; ensure a sense of history and place. Comprehensive Plan goals and policies are organized under the same headings as the Statewide Planning Goals. Section 12, Transportation, includes background information and key policy points for the following long-range plans, considered "ancillary plans" to the Comprehensive Plan: Oregon City Transportation Plan (2001, to be updated with this planning project); Oregon City Downtown Community Plan (1999), 7th Street Corridor Design Plan (1996), and Molalla Avenue Boulevard and Bikeway Improvements Plan (2001). This section of the Comprehensive Plan also notes that the city was working on plans for the OR 99E corridor to improve access control, landscaping, pedestrian safety, and the connection to the riverfront (*Oregon City McLoughlin Boulevard Enhancement Plan*) and a Street Connectivity Plan that would comply with the RTP design standards. Information contained in Section 12 pertaining to roadway design standards, multi-modal transportation, rail, marine, and air transportation has been summarized from the 2001 TSP. This information, as well as subsections summarizing information technologies, infrastructure funding, and parking, will need to be updated to be consistent with the information developed for the updated TSP.

In addition to descriptions of the existing transportation system, Section 12 contains the City's adopted transportation goals and policies. Comprehensive Plan policies will need to be made consistent with modified and new transportation policies developed as part of the TSP update.

Oregon City Municipal Code (2010): The City of Oregon City's Zoning Map displays the type and location of land uses in the City. The land use section of the Code implements the Comprehensive Plan by providing descriptions of zone designations, allowable uses within those zones, and development regulations. In addition to these underlying zones, the City adopted a Natural Resources Overlay District (Chapter 17.49), Geologic Hazards Overlay (Chapter 17.44), Floodplain Overlay District (Chapter 17.42), Willamette River Greenway Overlay (Chapter 17.48) and a Historic Overlay District (Chapter 17.40). The following is an overview of code sections that may need to be updated, consistent with the findings and recommendations of the updated TSP.

Site Plan and Design Review is required for all new non-residential development and multi-family uses in all zones.

Standards are found in Chapter 17.62 and include requirements for building location, orientation and design as well as parking, ingress and egress, street connectivity and access to be obtained through an alley when feasible (see Section 17.62.050 – Standards). Sidewalks are required in accordance with the city's transportation master plan and street design standards (17.62.050.8) and code requirements include a number of standards to ensure a "well-marked, continuous and protected on-site pedestrian circulation system (17.62.050.9)" for safe pedestrian access through the parking lot, between building entrances and between the main entrance and the street.

Improvements to the right-of-way, pedestrian ways, bike routes and bikeways, and transit facilities must and be consistent with the TSP and design standards in Title 17. When approving land use actions, the City requires all relevant intersections to be maintained at the minimum acceptable level of service (LOS) upon full build-out (17.62.050.15).

To further promote transit (and pedestrian travel), there are additional development requirements pertaining to building orientation and entrance location for development on a transit street (Section 17.62.080). The Municipal Code provides Tri-Met the authority to require transit-related improvements to be constructed at the time of development (17.62.050.16).

Chapter 16.08 of the Municipal Code controls the process and approval standards applicable to subdivisions. The requirements for a preliminary subdivision plat include a Traffic/Transportation Plan with the following information (16.08.025.B):

- A detailed site circulation plan showing proposed vehicular, bicycle, transit and pedestrian access points and connections to the existing system, circulation patterns and connectivity to existing rights-of-way or adjacent tracts, parking and loading areas and any other transportation facilities in relation to the features illustrated on the site plan

- A traffic impact study prepared by a qualified professional transportation engineer, licensed in the state of Oregon, that assesses the traffic impacts of the proposed development on the existing transportation system and analyzes the adequacy of the proposed internal transportation network to handle the anticipated traffic and the adequacy of the existing system to accommodate the traffic from the proposed development. The City Engineer may waive any of the foregoing requirements if determined that the requirement is unnecessary in the particular case.

Chapter 16.12 details the minimum standards for land division approval. Transportation circulation and connectivity are supported through block length maximums (16.12.020) and pedestrian and bicycle access to activity centers, where this access is not provided via street right-of-way ("discontinuous street right-of-way," Section 16.12.035). Applicants are "responsible for improving the city's planned level of service on all public streets" and "for designing and providing adequate vehicular, bicycle and pedestrian access to their developments (16.12.095)." Chapter 16.08 of the Municipal Code controls the process and approval standards applicable to subdivisions. The requirements for a preliminary subdivision plat include a traffic/transportation plan prepared by a professional transportation engineer (16.08.025.B) showing onsite and nearby vehicular, pedestrian and bike circulation.

Development is also subject to compliance with Title 12 of the Municipal Code. Chapter 12.04 identifies standards for streets based on the classification in the TSP. TSP figures from the TSP are incorporated into the code by reference and include Figure 5-1: Functional Classification System and New Roadway Connections; Figure 5-3: Pedestrian System Plan; Figure 5.6: Bicycle System Plan; and Figure 5.7: Public Transit System Plan (Section 12.04.180). The City has a different design standard for "constrained" local streets and rights-of-way, as shown in Table 12.04.045, and requires that these narrower facilities meet minimum life safety requirements (Section 12.04.200). Minimum street intersection spacing standards are included in Table 12.04.040. Street design standards in Chapter 12.04 also address designing for pedestrian and bicycle safety (12.04.245) and transit (12.04.260). Requirements and standards for pedestrian and bicycle accessways (defined as an off-street path or way) are also found in Chapter 12.24, while street trees are discussed in Chapter 12.08.

Parks & Recreation Master Plan (2008): The Oregon City Parks and Recreation Master Plan Update is intended to help meet the needs of current and future residents by positioning Oregon City to build on the community's unique parks and recreation assets and identify new opportunities. The following are guiding themes expressed through the community planning process:

- Build on Oregon City's natural and recreational outdoor assets
- Support a pedestrian-friendly, "walkable" community, including bicycling
- Enhance the "quality of life" for residents through parks and recreation
- Create new funding mechanisms to sustain the level of standards the community supports

- Balance passive, self-directed, and active recreational opportunities through goals and strategies
- Maintain and upgrade the existing assets and expand park and recreation opportunities as opportunities arise
- Expand citywide events
- Further embrace the historical aspects of Oregon City

Oregon City Futures: A Strategy for Economic Development (2006): The Oregon City Economic Development report is a strategy to guide development and redevelopment of key opportunity areas in Oregon City with an emphasis on economic development. It recommends strategies to help Oregon City in implementing its Metro 2040 designation as one of seven Regional Centers in the Portland Metropolitan Area.

The report identifies the appropriate functions and land uses for the multiple districts within the Oregon City Regional Center, including the Historic Old Town, Blue Heron, Landfill, Clackamette Cove, Waterfront, and the Oregon City Shopping Center Districts. In addition, the key characteristics of several local oriented districts were identified outside of the Regional Center, including the Hospital, Seventh Street Corridor, Hilltop, College, and Industrial Districts.

Oregon City Urban Renewal Plan (2007): The Oregon City Urban Renewal Plan is intended to eliminate blighting influences and to implement goals and objectives of Oregon City's Comprehensive Plan. The boundary of the Renewal Area includes the Downtown, the Park Place Interchange, the Lagoon/Waterfront, the End of Trail, the Washington/7th Corridor, and the Heritage Center areas. Inadequate streets and traffic congestion, the lack of pedestrian and bicycle facilities, parking and other transportation deficiencies have been identified as issues contributing to the depressed conditions in the urban renewal area, and are considered constraints to the future development called for in the Oregon City Comprehensive Plan. Transportation improvements may include the construction, reconstruction, repair or replacement of streets, traffic control devices, bikeways, pedestrian ways and amenities, and multi-use paths.

Main Street Oregon City Program (2008): The Main Street Oregon City program[18] is designated as a Performing Main Street by the National Trust for Historic Preservation. The program works to facilitate, coordinate, and create an environment that generates a positive downtown image, preserves historic and cultural landmarks, and stimulates the economic vitality and investment in Oregon City's downtown area. The Main Street program gathers downtown stakeholders together to act as a catalyst for change in Oregon City's 167 year old downtown. This volunteer led initiative is working to make Oregon City a better place to live, work and visit.

[18] Main Street Oregon City program: http://downtownoregoncity.org/

TriMet Bike Parking Design Standards: Access to transit via bicycle is a key element of the TriMet's desire for a total transit system. Providing convenient, visible, and secure bicycle parking is a cost-effective way to increase the catchment area of transit. This document supplements the TriMet Design Criteria and describes design considerations for bicycle parking at light rail transit (LRT) stations, commuter rail stations, and transit centers. These guidelines were developed using survey, inventory, and count data as well as research of best practices and recommendations. The following topics are addressed:

- Bike & Rides
- Bike parking access
- Urban & neighborhood stations: design & layout
- Community stations: design and layout
- Bike & Ride secure area layout
- Bike rack and locker layout
- Bike rack and locker spacing
- Bus stop considerations

TriMet Elderly and Disabled Transportation Plan (2009): The 2009 TriMet Elderly and Disabled Transportation Plan (EDTP) builds upon the 2006 EDTP, which recognized the increased and varied transportation needs for a growing population of elders and people with disabilities. The goal is to offer a range of services that match individual abilities and support customer independence and convenience, but also promote fixed route and other lower-cost options as the best use of scarce transportation resources while emphasizing coordination and reducing redundancy. The recommendations of the plan include:

- Make the RideWise consumer education and travel training program a standard and fully coordinate a new and different TriMet LIFT paratransit eligibility process with RideWise. This program gives people freedom, independence and choice.
- Neighborhood shuttles and shopper shuttles to take elders and people with disabilities (E&D) to fixed route transit and to activities, such as grocery shopping, that are difficult to do on the bus. These are hybrid fixed route/paratransit services, so trips can be grouped, but the service is personalized.
- Involving people with disabilities and elders in sensitivity awareness and training for fixed route and paratransit drivers, in fixed route customer service monitoring, in fixed route travel training, and in assisting people with disabilities make transfers from one route to another or use the system beyond an initial training period.
- Give organizations used accessible vans in exchange for providing rides to elders and people with disabilities and recruiting members to be volunteer drivers in the Ride Connection community-based transportation program.
- Fixed route service frequencies and coverage in some suburban areas, as well as ways to get to the fixed routes, will need to be improved. The total fixed route transit system from the

waiting area, customer service by the operators, priority seating, and security will need to be continually monitored for accessibility and improvement.

- A truly multi-modal transportation system will have pedestrian-safe communities with sidewalks. This plan recommends beginning by developing a Pedestrian Master Plan for one suburban area that can be used as a model by other communities.
- The increase in fatal crashes involving drivers over age 75 can be attributed in part to the driving environment — complicated intersections, hard-to-read signs, badly timed traffic lights. This plan recommends Federal Highway Administration (FHWA) guidelines be adopted for signage, intersection design, pavement markings, lighting, merging lanes for entering freeways and many other roadway features that take into account the limitations of older drivers.
- Older drivers must deal with gradual changes in functioning, changes in their reflexes, their ability to make quick decisions, and their vision at night. This plan recommends older driver safety programs be regularly scheduled throughout the tri-county area and that the programs introduce people to their public transit options as well.

Goal 5 Inventory (2011): Oregon City completed Goal 5 inventory requirements by designating several wetland, open space, riparian corridors, and historically designated structures throughout the City and within the Canemah National Register Historic District and the McLoughlin Conservation District.

Major Developments since 2001: Major developments since the 2001 Oregon City TSP can be found at: http://www.orcity.org/planning/landuse

Transportation Funding Mechanisms: Oregon City has the following current transportation funding mechanisms:

- Transportation System Development Charges (SDCs)
- Metro regional flexible funds
- ODOT flexible funds
- ODOT Pedestrian/Bicycle grant program
- Federal Highway Administration Transportation Enhancement grant program administered by ODOT
- Federal Appropriation and Authorization funds
- Pavement Maintenance Utility Fund

Appendix A: Applicable Plan and Policies

The following plans and policies were reviewed for the Oregon City TSP Update:

State of Oregon

- Transportation System Planning Guidelines
- Transportation Planning Rule (OAR 660-012-0010)
- Oregon Statewide Planning Goals
- Oregon Access Management Rule (OAR 734-051)
- Oregon Transportation Plan
- Oregon Highway Plan
- ODOT Highway Design Manual
- 2010-2013 Statewide Transportation Improvement Program

Metro

- Metro 2035 Regional Transportation Plan
- Metro 2035 Regional Transportation Functional Plan
- Metro 2040 Growth Concept
- Metro Non-Single Occupancy Vehicle (SOV) Target Actions Study
- Metro Regional Trails and Greenways Plan

City of Oregon City

- 2001 Oregon City Transportation System Plan
- Oregon City Capital Improvement Plan
- Oregon City Comprehensive Plan
- Oregon City Municipal Code
- Oregon City McLoughlin Boulevard Enhancement Plan
- Oregon City Downtown Community (Regional Center) Plan
- Oregon City Urban Renewal Plan
- Oregon City Downtown Main Street Program
- Goal 5 Inventory and Map
- Inventory of all major development or transportation projects and annexations constructed since 2001
- List of current funding mechanisms including any City projections from System Development Charges or other existing funding mechanisms
- Oregon City Downtown Circulation Plan and Parking Study
- Parks and Recreation Master Trails Plan
- Parks and Recreation Master Plan

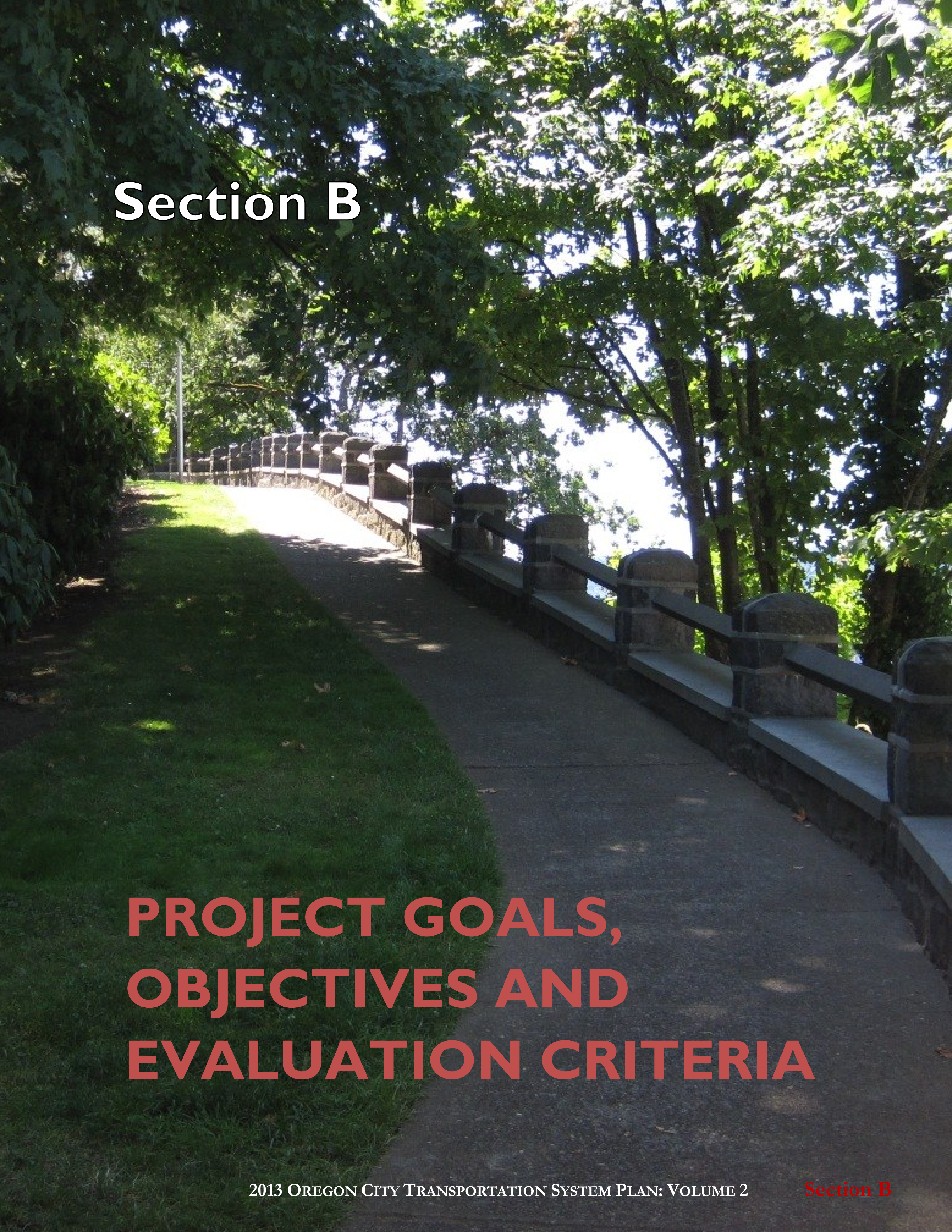
- Oregon City's Economic Opportunities Analysis Report

Clackamas County

- Clackamas County Transportation System Plan

TriMet

- TriMet Transit Investment Plan
- TriMet Bike Parking Design Standards
- TriMet Elderly and Disabled Transportation Plan



Section B

PROJECT GOALS, OBJECTIVES AND EVALUATION CRITERIA

Project Goals and Objectives

The goals and objectives of the Transportation System Plan (TSP) should reflect the vision of the community and provide the policy foundation for the Oregon City TSP. The following recommended goals and objectives considered the past TSP goals and documents adopted after the TSP was completed in 2001. The update to the TSP will include several changes to State and Regional transportation plans and regulations. The TSP will also address and consider evolving transportation engineering, policy, and planning approaches such as active transportation, context sensitive design and Intelligent Transportation Systems.

Goal 1. Provide an equitable, balanced and connected multi-modal transportation system

Provide a "complete" transportation system throughout Oregon City that provides travel options and connects people to jobs, schools, services, recreation, social and cultural institutions within the City.

- **Objective A. Ensure that the transportation system provides equitable access to underserved and vulnerable populations**

  Provide a transportation system that offers people choices, regardless of age, ability, income level and geographic location, and allows them to respond and adapt to changing conditions.

- **Objective B. Reduce total housing and transportation costs for residents**

  Encourage transportation system investments that allow housing diversity and mixed land uses to help reduce the total housing and transportation costs for Oregon City residents.

- **Objective C. Identify new or improved system connections to enhance system efficiency**

  Complete a city-wide connectivity analysis and identify improvements to comply with Metro Regional Transportation Functional Plan, Title 1, section 3.08.110 and provide an efficient, multi-modal transportation system.

- **Objective D. Give priority to connections that help to advance other goal areas**

The priority of investing in new or improved connections is magnified where multiple objectives can be met, e.g., supporting transit, reducing reliance on state highway facilities, deferring major capacity improvements, etc.

- **Objective E. Assure the Oregon City Municipal Code supports a balanced and connected multi-modal transportation system.**

  Review the Municipal Code and make revisions as needed to support a balanced and connected multi-modal transportation system (such as removing barriers which create automobile congestion or impede connectivity among pedestrians or bicyclists.

Goal 2. Increase the convenience and availability of pedestrian, bicycle, and transit modes

Strengthen the pedestrian and bicycle systems in all areas of the city. In addition, identify areas that have existing or future transit-supportive densities and amenities and work with local transit providers such as TriMet, Canby Area Transit (CAT), South Clackamas Transportation District (SCTD), etc. to cost-effectively improve coverage and frequency to achieve greater ridership productivity.

- **Objective A. Identify projects to close gaps and address deficiencies in the pedestrian and bicycle system**

  A system gap analysis should consider proximity to major active transportation centers, such as shopping, schools, and public buildings to determine system gaps and deficiencies.

- **Objective B. Provide safe, comfortable and convenient transportation options**

  Consider active transportation user needs that complement the basic provision of services to encourage higher levels of usage (e.g., street lighting, arterial crossing treatments, bike parking).

- **Objective C. Identify necessary changes to land development code to ensure connectivity between compatible land uses for pedestrian and bicycle trips**

  Land development code provisions should be reviewed to ensure that compatible land uses do not erect barriers which prohibit pedestrian and bicycle connections that limit convenient access and create out-of-direction travel. An example includes borders between high-density residential uses and adjoining retail centers.

- **Objective D. Identify areas that support additional transit services, and coordinate with transit providers to improve the coverage, quality and frequency of services**

  Land uses in Oregon City should be reviewed to identify suitable sites for additional transit services. A mix of land uses and activities should be encouraged to support additional transit service in the City.

- **Objective E. Consider the potential access needs for candidate High Capacity Transit and frequent service bus routes**

  The alignments of the potential future High Capacity Transit (HCT) and existing and/or future frequent service bus routes in Oregon City should be reviewed to consider new or enhanced access needs for prospective station areas.

Goal 3. Enhance the health and safety of residents

Ensure that the transportation system maintains and improves individual health, safety and security by maximizing the comfort and convenience of walking, biking and transit transportation options, public safety and service access.

- **Objective A. Identify improvements to address high collision locations**

  Address high priority safety needs and identify improvements in order to minimize incidents and improve safety for walking, biking and driving trips in the City.

- **Objective B. Identify necessary changes to street design guidelines to support context sensitive design solutions**

  The City's street design guidelines should be responsive to practical needs of individual cases to limit environmental and cost impacts, and the city staff should have authority to approve design exceptions on construction projects that meet the basic needs of the system.

- **Objective C. Reduce impervious street surfaces through "Green Streets"**

  Minimize negative environmental impacts of impervious streets in the City by incorporating "Green Street" techniques to transform streets into landscaped linear park like spaces that capture storm water runoff.

- **Objective D. Provide a network of family-friendly walking and biking routes**

  Encourage less experienced users to access destinations throughout Oregon City via foot or bike by developing a linked network of shared-use streets and paths that provide more comfortable walking and biking routes. The comfort of the routes should be increased by applying green street features and traffic calming techniques and markings.

Goal 4. Emphasize effective and efficient management of the transportation system

Optimize travel capacity and improve travel conditions by better managing our own travel demands, meeting more of our daily needs within our own community, making our existing transportation facilities as smart and efficient as possible, and being strategic about transportation investments. The City should seek to find innovations and fine tuning of existing systems and policies and avoid or forestall costly major roadway capacity improvements.

- **Objective A. Identify opportunities to reduce the use of state facilities and arterials**

for local trips

Areas of the city that have few or no options to traveling on state facilities or arterials should be reviewed to identify possible new or improved local connections.

- **Objective B. Seek to shift vehicle travel to off-peak periods**

  Explore programs to encourage more travel in off-peak hours to better use the existing roadway system. This will include consideration of possible financial incentives for major use sites (e.g., parking pricing, fee discounts), and other travel demand management techniques.

- **Objective C. Maintain the existing transportation system assets.**

  Adequately maintain transportation facilities to preserve their intended function and maintain their useful life.

- **Objective D. Identify opportunities to improve travel reliability and safety with TSMO solutions**

  Seek to advance system management operations strategies that are identified in the Metro Transportation System Management and Operation (TSMO) plan and Metro Regional Travel Options Strategic Plan in helping to preserve the function and quality of operations on state highway facilities and arterials in the City.

- **Objective E. Demand Management**

  Encourage and support the implementation of Transportation Demand Management (TDM) programs.

Goal 5. Foster a sustainable transportation system

A key approach to building a sustainable community requires a transportation system that is environmentally and fiscally sustainable that focuses on decreasing vehicle emissions and transportation related greenhouse gas emissions.

- **Objective A. Support alternative vehicle types by identifying potential electric vehicle plug-in stations and developing implementing code provisions**

  Identify potential supporting locations for electric vehicle plug-in stations and develop changes to building codes to include electric services to support future at home and at work plug in stations.

- **Objective B. Identify existing and future expected VMT levels within the City of Oregon City, and consider opportunities and actions needed to meet RTP targets**
- **Objective C. Encourage alternatives to daily single-occupancy vehicle commuting.**

  Encourage and support technology that encourages carpooling, cooperatives, walking, bicycling, etc.

- **Objective D. Develop and support alternative mobility standards on state facilities and City streets where necessary**

  Identify where alternative mobility standards on state facilities may be necessary for potential future action, consistent with Oregon Highway Plan provisions and explore alternative mobility standards for City streets located in constrained areas.

- **Objective E. Identify areas where alternative land use types would significantly shorten trip lengths or reduce the need for motor vehicle travel within the city**

  The proximity between existing and future land uses may be reviewed to encourage land use patterns and transportation systems that make it more convenient for people to walk, bicycle, use transit and drive less to meet their daily needs.

- **Objective F. Minimize impacts to the natural environment.**

  Avoid adverse impacts to the scenic, natural and cultural resources in Oregon City.

Goal 6. Ensure the transportation system supports a prosperous and competitive economy

Support a prosperous and competitive economy by preserving and enhancing business opportunities, and ensuring the efficient movement of people and goods.

- **Objective A. Freight access and truck travel reliability**

  Improve the freight system efficiency, access, capacity and reliability.

- **Objective B. Increase the distribution of travel information to maximize the reliability and effectiveness of existing major roadway facilities**

  Identify solutions to increase the distribution of travel information through active management (TSMO) techniques and Intelligent Transportation Systems (ITS) solutions.

- **Objective C. Reinforce growth and multi-modal access to 2040 Target Areas**

  Transportation investments should be consistent with and support development within the Oregon City Regional Center, the 7th Street/Molalla Avenue corridor, the OR 99E corridor and the Employment land in the southeast portion of Oregon City.

- **Objective D. Seek to advance travel strategies that are identified in the Metro Regional Mobility Corridors**

Goal 7. Identify solutions and funding to meet system needs

The City will identify transportation investments that can be made with available funding to ensure that system needs can be delivered for growth planned within the community.

- **Objective A. Identify stable revenue sources for transportation investments to meet**

the needs of the City, as documented in the updated TSP.

- **Objective B. Consider costs and benefits when identifying project solutions and prioritizing public investments.**
- **Objective C. Identify new funding sources to leverage high priority transportation projects.**

Goal 8. Comply with state and regional transportation plans

The City will meet the requirements of the Oregon Transportation Planning Rule, the Oregon Highway Plan, and the Metro 2035 Regional Transportation Plan (RTP) and Regional Functional Transportation Plan (RFTP).

- **Objective A. Meet the mobility standards for state highways, or develop and propose alternative standards, consistent with Oregon Highway Plan provisions.**
- **Objective B. Develop TSP policy and municipal code language to implement the TSP update.**
- **Objective C. Consider regional needs identified in the Metro RTP, including those identified with the mobility corridors.**
- **Objective D. Consider and evaluate transportation solutions and strategies consistent with the guidelines and priorities of the Metro RFTP.**

Evaluation Criteria

Project alternatives developed through this update will be evaluated by criteria that are an extension from the goals and objectives. These project level criteria provide a point-based technical rating method that will be used to evaluate how well proposed design alternatives meet the measure of effectiveness criteria. By summing ratings (and weighting if desired), alternatives can be compared. In this way, a consistent method will be used to evaluate and rank the alternatives.

Evaluation Criteria and Scoring Methodology

The evaluation criteria were selected based on the City's existing and proposed transportation related goals and objectives. The criteria focuses on compliance with state and local plans and policies, engineering design requirements, and a desire to maximize positive (and minimize negative) economic, social (livability), and environmental impacts. Table 1 lists the evaluation criteria and the corresponding scoring methodology.

Table 1: Oregon City TSP Evaluation Criteria and Scoring

Measure of Effectiveness	Evaluation Score	
Goal 1. Provide an equitable, balanced and connected multi-modal transportation system		
Equitable Access Improves access to underserved or vulnerable populations	+1	Increases access to underserved or vulnerable populations
	0	No change
	-1	Decreases access to underserved or vulnerable populations
Transportation and Housing Cost Reduces total transportation and housing costs	+1	Reduces transportation and housing costs
	0	No change
	-1	Increases transportation and housing costs
Connectivity Connection enhances system efficiency	+1	Improves system efficiency
	0	No change
	-1	Negative impact on system efficiency
Multiple Objectives Connection or improvement satisfies multiple objectives	+1	Satisfies multiple objectives
	0	Satisfies single objective
	-1	Satisfies single objective, but has negative impact on another
Goal 2. Increase the convenience and availability of pedestrian, bicycle, and transit modes		
Pedestrian and Bicycle Facilities Adds bikeway and walkways that fill in system gaps, improve system connectivity, and are accessible to all users.	+1	Improves pedestrian or bicycle connectivity or accessibility
	0	No change
	-1	Reduces connectivity or accessibility
Transit Facilities Improves access to transit facilities. Promotes transit as a viable alternative to the single occupant vehicle.	+1	Improves transit facilities
	0	No change
	-1	Negative impact on provision of services
Provision of services Improves the basic provision of services to encourage higher levels of usage for walking and biking trips	+1	Improves provision of services
	0	No change
	-1	Negative impact on provision of services
Goal 3. Enhance the health and safety of residents		
Safety Improves safety of the transportation system.	+1	Increases safety of the transportation system
	0	No change
	-1	Has potential geometric or user safety concerns
Health	+1	Encourages active living and physical

Measure of Effectiveness		Evaluation Score
Encourages active living and physical activity.		activity
	0	No change
	-1	Discourages active living and physical activity
<u>Pollution Impact</u> Minimizes transportation related pollution.	+1	Reduces transportation related pollution
	0	No change
	-1	Increases transportation related pollution
Goal 4. Emphasize effective and efficient management of the transportation system		
<u>Deferred Investment</u> Reduces need for major highway project construction	+1	Reduces need for major investment
	0	No change
	-1	Accelerates need for major investment
<u>Improved Roadway Efficiency</u> Implements Transportation Demand Management (TDM) or other strategies to create greater mobility, reduce auto trips, make more efficient use of the roadway system, and minimize air pollution.	+1	Improves roadway efficiency
	0	No change
	-1	Negative impact on roadway efficiency
<u>Daily Traffic Capacity</u> Improvement makes daily traffic capacity more reliable.	+1	More reliable daily traffic capacity
	0	No change
	-1	Less reliable daily traffic capacity
<u>Alternative Routes</u> Enhances travel for local trips off the state highway system	+1	Reduces the use of state facilities for local trips
	0	No change
	-1	Increases the use of state facilities for local trips
Goal 5. Foster a sustainable transportation system		
<u>Non-Single Occupancy Vehicle (SOV) Focus</u> Emphasizes the movement of people over vehicles, which reduces the citywide vehicle-miles-travelled (VMT)	+1	Improves non-SOV targets
	0	No change
	-1	Negative impact on non-SOV targets
<u>Environment</u> Minimizes impact to the natural environment	+1	Enhances the natural environment
	0	No change
	-1	Negatively impacts the natural environment
<u>Land Use</u> Supports alternative land use types	+1	Greater potential for mixed land uses
	0	No change

Measure of Effectiveness		Evaluation Score
	-1	Less potential for mixed land uses
Goal 6. Ensure the transportation system supports a prosperous and competitive economy		
<u>Freight</u> Improves freight access/connectivity	+1	Improves freight facilities
	0	No change
	-1	Negative impact on freight facilities
<u>Corridor Reliability</u> Implements strategies to provide stable and reliable auto and truck traffic flows on major facilities.	+1	Improves roadway reliability
	0	No change
	-1	Negative impact on roadway reliability
<u>2040 Target Areas</u> Improves access in the Metro 2040 Target Areas	+1	Improves access in 2040 Target Area
	0	No change
	-1	Negative impact on access in 2040 Target Area
Goal 7. Identify solutions and funding to meet system needs		
<u>Fundability</u> Available funding sources exist to implement projects in a timely fashion.	+1	Funding sources are available
	0	Feasible costs, but no identified funding
	-1	High costs and no funding expected
<u>Cost Effectiveness</u> Assumed project benefits exceed project costs	+1	Cost effective solution
	0	Average cost solution
	-1	Not a cost effective solution
Goal 8. Comply with state and regional transportation plans		
<u>Compatibility</u> Compatible with other jurisdiction's plans and policies, (including adjacent cities, counties, Metro or ODOT).	+1	Compatible with other plans and contributes to their implementation
	0	Compatible with other plans, but does not necessarily contribute to their implementation
	-1	Not compatible with other plans
<u>Agency Standards</u> Consistent with the standards of the City, Region, and State as a whole.	+1	Consistent with all standards
	0	May require some deviations to standards, but likely to be approved
	-1	Inconsistent with standards and not expected that deviations would be approved

Appendix

Table A1: Comparison of City TSP Goals and Objectives with Metro 2035 RTP Goals

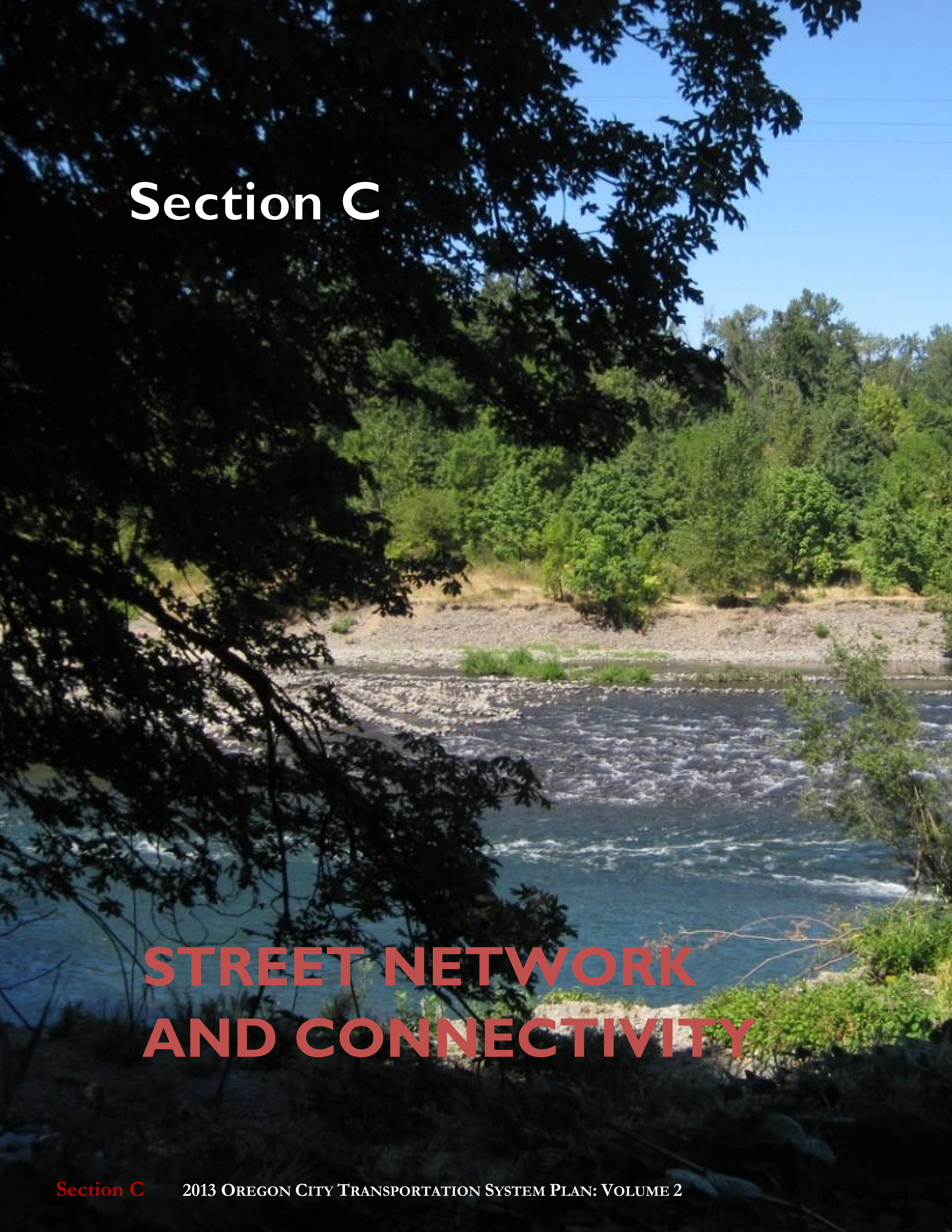
Metro 2035 RTP Goal and Policy	Oregon City TSP Goal / Objective
1.1 Compact Urban Form and Design - use transportation investments to reinforce growth in and multi-modal access to 2040 Target Areas and ensure that envelopment in 2040 Target Areas is consistent with and supports the transportation investments.	Goal 1 / Objective C
1.2 Parking Management - minimize the amount and promote the efficient use of land dedicated to vehicle parking	Goal 3/ Objective B
2.2 Regional Passenger Connectivity - ensure reliable and efficient connections between passenger intermodal facilities and destinations in and beyond the region to improve non-auto access to and from the region and promote the region's function as a gateway for tourism	Goal 2/ Objective D & E
2.3 Metropolitan mobility - maintain sufficient total person-trip and freight capacity to allow reasonable and reliable travel times	Goal 2/ Objective F Goal 3/ Objectives A, B, C & D
3.1 Travel Choices - achieve modal targets for increased walking, bicycling, use of transit and shared ride and reduced reliance on the automobile and drive alone trips	Goal 2/ Objective A, B, C, D & F Goal 4/ Objective B
3.2 Vehicle Miles of Travel - reduce vehicle miles traveled per capita	Goal 5/ Objective A, B, C & D
3.3 Equitable access and barrier free transportation - provide affordable and equitable access to travel choices and serve the needs of all people and businesses, including people with low income, children, elders and people with disabilities	Goal 1/ Objectives A & C Goal 2/ Objectives A, B & D
4.1 Traffic Management - Apply technology solutions to activity manage the transportation system.	Goal 4/ Objective A Goal 5/ Objective A
4.4 Demand management - implement services, incentives and supportive infrastructure to increase telecommuting, walking, biking, taking transit, and carpooling, and shift travel to off-peak periods	Goal 3/ Objective B Goal 4/ Objective C Goal 5/ Objective C
4.5 Value Pricing - consider a wide range of value pricing strategies and techniques as a management tool	Goal 3/ Objective B
5.1 Operational and public safety - reduce fatalities, serious injuries and crashes per capita for all modes of travel	Goal 4/ Objective D Goal 2/ Objective B
6.5 Climate Change - Reduce transportation related greenhouse gas emissions	Goal 5/ Objective A, B, C & D
7.1 Active Living - Provide safe, comfortable and convenient transportation options that support active living and physical activity to meet daily needs and access services	Goal 2/ All
9.2 Maximize return on public investment - make transportation investment decisions that use public resource effectively and efficiently, using performance-based planning	Goal 6/ Objective B
9.3 Stable and innovating funding - stabilize existing transportation revenue while securing new and innovative long-term sources to build, operate and maintain the system for all modes	Goal 6/ Objectives A, C

Reference: Metro RTP 2035 Goals and Policies

Ultimately, the goals and objectives of this TSP update will be modified to allow for consistency and updating of the Oregon City Comprehensive Plan, Section 12. Table A2 identifies the existing goals of the Comprehensive Plan and details how the concepts of each goal are addressed in the Goals and Objectives of this TSP Update:

Table A2: Comparison of Existing City TSP Goals and Objectives with Comprehensive Plan

Comprehensive Plan Goal	Oregon City TSP Goal / Objective where Addressed
Goal 12.1 Land Use-Transportation Connection- Ensure that the mutually supportive nature of land use and transportation is recognized in planning for the future of Oregon City.	Goal 1/ Objective A & B Goal 2/ Objective A, B, C & D Goal 4/ Objective B
Goal 12.2 Local and Regional Transit- Promote regional mass transit (South Corridor bus, Bus Rapid Transit, and light rail) that will serve Oregon City.	Goal 2/ Objective D & E Goal 4/ Objective B
Goal 12.3 Multi-Modal Travel Options- Develop and maintain a transportation system that provides and encourages a variety of multi-modal travel options to meet the mobility needs of all Oregon City residents.	Goal 1/ All Goal 2/ All Goal 3/ All Goal 5/ Objective C & D
Goal 12.4 Light Rail- Promote light rail that serves Oregon City and locate park-and-ride facilities at convenient neighborhood nodes to facilitate access to regional transit.	Goal 2/ Objective A, B, C, D & E Goal 4/ Objective B
Goal 12.5 Safety- Develop and maintain a transportation system that is safe.	Goal 2/ Objective A & B Goal 4/ Objective A & D
Goal 12.6 Capacity- Develop and maintain a transportation system that has enough capacity to meet users' needs.	Goal 1/ Objective A Goal 2/ Objective A, B & F Goal 3/ All Goal 4/ Objective A & C
Goal 12.7 Sustainable Approach- Promote a transportation system that supports sustainable practices.	Goal 1/ Objective A & D Goal 2/ All Goal 4/ Objective B Goal 5/ All
Goal 12.8 Implementation/Funding- Identify and implement needed transportation system improvements using available funding.	Goal 4/ All Goal 5/ Objective A Goal 6/ All



Section C

STREET NETWORK AND CONNECTIVITY

This document provides an overview of the street system in Oregon City. Included is a detail of the multi-modal street system, an overview of multi-modal connectivity and an outline of recommended implementation measures required to update the street system as part of the TSP update.

Multi-Modal Street System

Traditional roadway designs focus on the safety and flow of motor vehicle traffic. The one size fits all design approach is less effective at integrating the roadway with the character of the surrounding area and addressing the needs of other users of a roadway. For instance, the design of an arterial roadway through a commercial area has often traditionally been the same as one through a residential neighborhood, both primarily focused on the movement of motor vehicles.

Oregon City recognizes that all roadways within the City should be multi-modal or "complete streets", with each street serving the needs of the various travel modes. The City also realizes that not all streets should be designed the same. To account for this, Oregon City classifies the street system into a hierarchy organized by function and street type (representative of their places). These classifications ensure that the streets reflect the neighborhood through which they pass, consisting of a scale and design appropriate to the character of the abutting properties and land uses. The classifications also provide for and balance the needs of all travel modes including pedestrians, bicyclists, transit riders, motor vehicles and freight. Within these street classifications, context sensitive design may result in alternative cross-sections.

Multi-Modal Street Function

Functional classification of roadways is a common practice in the United States. Traditionally, roadways are classified based on the type of vehicular travel it is intended to serve (local versus through traffic). In Oregon City, the functional classification of a roadway (shown in Figure 1) determines the level of mobility for all travel modes, defining its design characteristics (such as minimum amount of travel lanes), level of access and usage within the City and region. The street functional classification system recognizes that individual streets do not act independently of one another but instead form a network that works together to serve travel needs on a local and regional level. From highest to lowest intended usage, the classifications are freeway, expressway, major arterials, minor arterials, collectors and local streets. Roadways with a higher intended usage generally provide more efficient motor vehicle traffic movement (or mobility) through the City, while roadways with lower intended usage provide greater access for shorter trips to local destinations.

Freeways and Expressways are limited access state roadways. These roadways serve the highest volume of motor vehicle traffic and are primarily utilized for longer distance regional trips. Both OR 213 and I-205 have posted speed limits of 55 miles per hour.

Major Arterial Roadways are intended to move traffic through Oregon City. These roadways generally experience higher traffic volumes and often connect to locations outside of the City (such as Beavercreek Road) or act as a corridor connecting many parts of the City (such as Molalla Avenue). Posted speed limits on these roadways are generally between 30 to 40 miles per hour, with the higher speeds posted in less urbanized areas and lower speeds in areas with more congestion such as downtown.

Minor Arterial Roadways are intended to serve local traffic traveling to and from major arterial roadways. These roadways provide greater accessibility to neighborhoods, often connecting to major activity generators and provide efficient through movement for local traffic. Posted speeds on minor arterial roadways typically range between 25 and 45 miles per hour.

Collector Roadways often connect the neighborhoods to the minor arterial roadways. These roadways serve as major neighborhood routes and generally provide more direct property access or driveways than arterial roadways. Posted speeds on collector roadways generally range between 25 and 35 miles per hour.

Local Roadways provide more direct access to residences in Oregon City. These roadways are often lined with residences and are designed to serve lower volumes of traffic with a statutory speed limit of 25 miles per hour.

Functional Classification Changes

The functional classifications of transportation routes in Oregon City were reviewed to determine the appropriateness of the classification and connectivity. The Metro Regional Transportation Functional Plan requires that, to the extent possible, arterials be spaced at one-mile intervals and collectors to be spaced at half-mile intervals[1]. Overall, most areas in Oregon City comply with the spacing standards to the extent possible. Existing development, topography, environmental areas, the Urban Growth Boundary (UGB) and OR 213 each pose a significant constraint in further improving the arterial and collector connectivity in Oregon City. The functional classifications of several roadways throughout the City were modified to address the connectivity gaps identified below, or due to adequate connections in the immediate area. The updated functional classifications can be seen in Figure 1, while the classification changes are shown in the Appendix.

[1] Metro Regional Transportation Functional Plan, Section 3.08.110 Street System Design Requirements

Arterial Connectivity gaps were identified in the following areas (see Figure 2):

1. An east to west gap between OR 99E and South End Road. *Connectivity hindered by topography and alignment would be outside of the UGB.*
2. An east to west gap between South End Road and OR 213 (near the south City limits). *Connectivity hindered by existing development, topography and alignment would be outside of the UGB.*
3. An east to west gap between Molalla Avenue and Holly Lane, south of Redland Road and north of Maple Lane Road. *Connectivity hindered by existing development, topography, OR 213 and portions of the alignment would be outside of the UGB.*
4. An east to west gap between OR 213 and Beavercreek Road, near Glen Oak Road. *New arterial classification designated in the area (Meyers Road).*
5. A north to south gap between Holcomb Boulevard and Maple Lane Road, east of OR 213. *New arterial classification designated in the area (Holly Lane).*

Collector Connectivity gaps were identified in the following areas (see Figure 2):

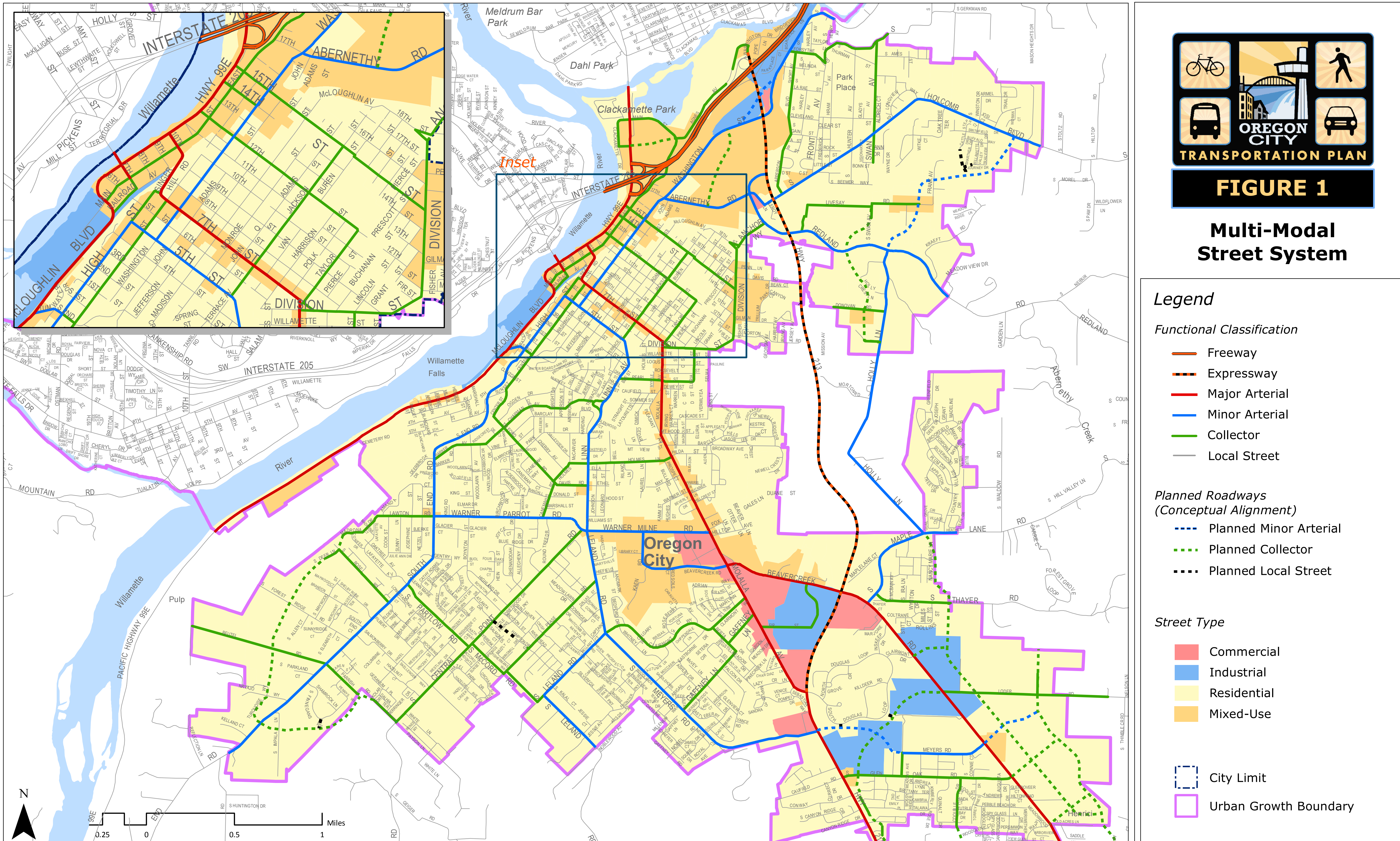
6. An east to west gap between Molalla Avenue and Holly Lane, south of Redland Road and north of Maple Lane Road. *Connectivity hindered by existing development, topography, OR 213 and portions of the alignment would be outside of the UGB.*
7. An east to west gap between OR 99E and South End Road. *Connectivity hindered by existing development, topography and alignment would be outside of the UGB.*
8. A north to south gap between Division Street and Beavercreek Road, west of OR 213. *Connectivity hindered by existing development, topography and alignment would be outside of the UGB.*
9. North to south and east to west gaps between Holcomb Boulevard and Redland Road. *New collector classifications designated in the area.*
10. A north to south gap between Holcomb Boulevard and Maple Lane Road, east of Holly Lane. *Connectivity hindered by topography and alignment would be outside of the UGB.*
11. North to south and east to west gaps to the west of South End Road. *New collector classifications designated in the area.*
12. North to south and east to west gaps, southeast of the Beavercreek Road/ Maple Lane Road intersection. *New collector classifications designated in the area.*

Multi-Modal Street Type

Oregon City further classifies the roadways within the City based on the neighborhood it serves and the intended function for pedestrians, bicyclists and transit riders in that specific area. Within the context of Oregon City's complete street system that will serve all modes, the street type of a roadway defines its cross-section characteristics and determines how users of a roadway interact with the surrounding land use. Since the type and intensity of adjacent land uses and zoning directly influence the level of use by pedestrians, bicyclists and transit riders, the design of a street (including its intersections, sidewalks, and transit stops) should reflect its surroundings.

The street types strike a balance between street functional classification, adjacent land use, zoning designation and the competing travel needs by prioritizing various design elements. Five street types were designated in Oregon City:

- **Mixed-Use Streets** typically have a higher amount of pedestrian activity and are often on a transit route. These streets should emphasize a variety of travel choices such as pedestrian, bicycle and transit use to complement the development along the street. Since mixed-use streets typically serve pedestrian oriented land uses, walking should receive the highest priority of all the travel modes. They should be designed with features such as wider sidewalks, traffic calming (see the traffic calming section later in this document), pedestrian amenities, transit amenities, attractive landscaping, on- street parking, pedestrian crossing enhancements and bicycle lanes.
- **Residential Streets** are generally surrounded by residential uses, although various small shops may be embedded within the neighborhood. These streets often connect neighborhoods to local parks, schools and mixed-use areas. They should be designed to emphasize walking, while still accommodating the needs of bicyclists and motor vehicles. A high priority should be given to design elements such as traffic calming (see the traffic calming section later in this document), landscaped buffers, walkways/ pathways/ trails, on-street parking and pedestrian safety enhancements.
- **Commercial Streets** are primarily lined with retail and large employment complexes. These uses serve customers throughout the City and region and may not have a direct relationship with nearby residential neighborhoods. These streets are somewhat more auto-oriented, but should still accommodate pedestrians and bicyclists safely and comfortably. Design features should include landscaped medians or a two-way left turn lane, sidewalks and bike lanes, pedestrian crossing enhancements and a buffer between the roadway and the sidewalk.
- **Industrial Streets** serve industrial areas. These streets are designed to accommodate a high volume of large vehicles such as trucks, trailers and other delivery vehicles. Pedestrians and bicyclists may be less frequent in these areas, but should still be accommodated safely and comfortably. Roadway widths are typically wider to accommodate larger vehicles. On-street parking should be discouraged.
- **Constrained Streets** are generally located in steep, environmentally sensitive, rural, historic, or development limited areas of the City. These streets may require different design elements that may not be to scale with the adjacent land use. Constrained elements may include narrower or limited travel lanes, and pedestrian and bicycle facilities, or accommodations that generally match those provided by the surrounding developed land uses. To the extent possible, pedestrian and bicycle accommodations should be provided on an adjacent roadway, via a shared-use path or shared within the right-of-way using distinctive design details.

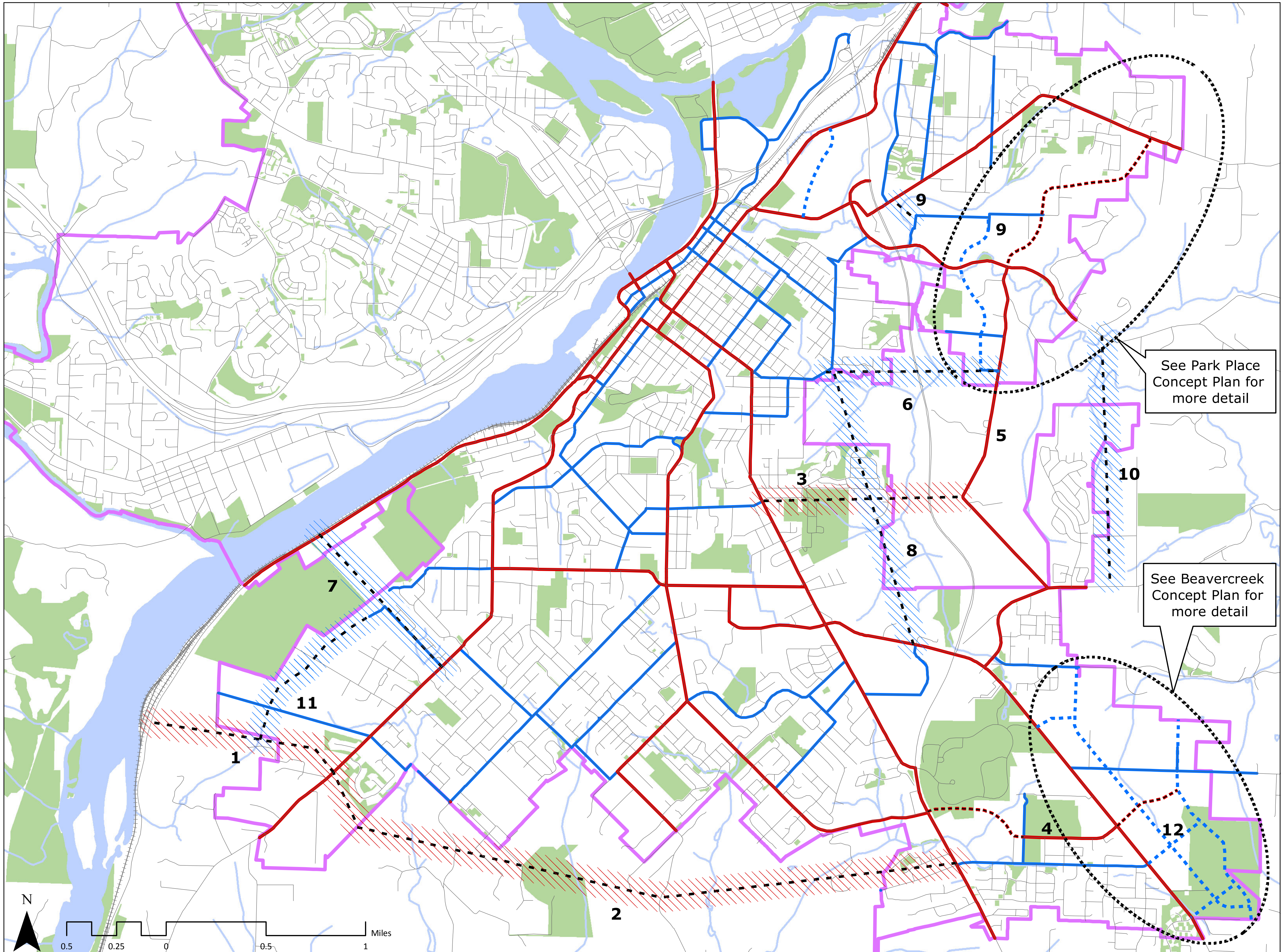


OREGON CITY
TRANSPORTATION PLAN
FIGURE 1
Multi-Modal Street System
Legend
Functional Classification
Freeway
Expressway
Major Arterial
Minor Arterial
Collector
Local Street
Planned Roadways (Conceptual Alignment)
Planned Minor Arterial
Planned Collector
Planned Local Street
Street Type
Commercial
Industrial
Residential
Mixed-Use
City Limit
Urban Growth Boundary
Inset
Oregon City
Willamette Falls
Clackamette Park
Dahl Park
Meldrum Bar Park
Park Place
Willamette River
Pacific Highway 99E
Interstate 205
Abernethy Creek
N
0.25
0
0.5
1
Miles

OREGON CITY TRANSPORTATION PLAN

FIGURE 2

Arterial and Collector Street Connectivity



Legend

Existing Arterial and Collector Streets

- Existing Arterial Street
- Existing Collector Street

Arterial and Collector Connectivity Gaps

- Arterial Gap of over 1 mile
- Collector Gap of over 1/2 mile
- # Connectivity Gap Reference Number (See Technical Memoradum #3)

- Steep Slope
- Building
- Stream
- River
- Park/Public Property
- Urban Growth Boundary
- Railroad

Design Types of Streets

Design of the streets in Oregon City requires attention to many elements of the public right-of-way and considers how the street interacts with the adjoining properties. The four zones that comprise the cross-section of streets in Oregon City, including the context zone, walking zone, biking/on-street parking zone and driving zone, are shown in Figure 9. The design of these zones varies based on the functional classification and street type. Overall, there are 16 different design types, ranging from Mixed-Use Major Arterial to Residential Local Street. Note that a design type is not available for limited access roadways classified as Freeway or Expressway. The maximum design criteria for streets can be seen in Section 12.04.180 of the Oregon City Municipal Code. The City may also reduce or eliminate lower- priority design elements of the street along constrained streets located in steep, environmentally sensitive, rural, historic, or development limited areas of the City.

- **Context Zone:** The context zone is the point at which the sidewalk interacts with the adjacent buildings or private property (see Figure 4). The purpose of this zone is to provide a buffer between land use adjacent to the street and to ensure that all street users have safe interactions.
- **Walking Zone**: This is the zone in which pedestrians travel (see Figure 4). The walking zone is determined by the street type and should be a high priority in mixed-use and residential areas. It includes a clear throughway for walking, an area for street furnishings or landscaping (e.g. benches, transit stops and/or plantings) and a clearance distance between curbside on-street parking and the street furnishing area or landscape strip (so parking vehicles or opening doors do not interfere with street furnishings and/or landscaping). Streets located along a transit route should incorporate furnishings to support transit ridership, such as transit shelters and benches, into the furnishings/landscape strip adjacent to the biking/on-street parking zone.
- **Biking/On-Street Parking Zone:** This is the zone for biking and on-street parking, and is the location where users will access transit. It should include bike lanes or buffered bike lanes. The biking/on-street parking zone is determined by the street type and should be a high priority in mixed-use and residential areas.
- **Driving Zone:** This is the throughway zone for drivers, including cars, buses and trucks and should be a high priority in commercial/ employment and industrial areas. The functional classification of the street generally determines the number of through lanes, lane widths, and median and left-turn lane requirements. However, the route designations (such as transit street or freight route) take presentence when determining the appropriate lane width in spite of the functional classification. Wider lanes should only be used for short distances as needed to help buses and trucks negotiate right-turns without encroaching into adjacent or opposing travel lanes. Streets that require a raised median should include a pedestrian refuge at marked crossings. Otherwise, the median can be narrowed at midblock locations, before widening at intersections for left-turn lanes (where required or needed).

Figure 3: Components of Oregon City Streets

Figure 4: Up Close View of the Context and Walking Zones

Determining Optimum Street Designs

The following steps should be used to determine the optimum cross-section for a street:

Step 1: Determine the functional classification and street type based on Figure 8.

Step 2: Determine the maximum street design as shown in Section 12.04.180 of the Oregon City Municipal Code.

Step 3: Determine if the street is located along a regional truck route, local truck route, or a transit route. If so, the through lane width should be a minimum of 12 feet along a truck route or 11 feet along a transit route. If not, the lane width can be reduced a minimum of 12 feet along major arterials, 11 feet on minor arterials, and 10 feet along collectors and local streets, as determined by the City.

Step 4: Determine if more than two through lanes are needed. More than two through lanes should only be considered if the street and parallel routes cannot effectively accommodate the travel demand.

Step 5: Determine if left-turn lanes are needed at intersections. Intersection design should generally try to minimize pedestrian crossing distance. If turn-lanes are warranted, consider the trade-offs between improved driving mobility and increased crossing distance.

Step 6: Compare the optimum street design to the available right-of-way. If the cross-section is wider than the right-of-way, identify whether right-of-way acquisition is necessary or reduce the width of or eliminate lower-priority elements as determined by the City.

Multi-Modal Connectivity

The aggregate effect of local street design impacts the effectiveness of the regional system when local travel is restricted by a lack of connecting routes, and local trips are forced onto the regional network.[2] Therefore, streets should be designed to keep through motor vehicle trips on arterial streets and provide local trips with alternative routes. Street system connectivity is critical because roadway networks provide the backbone for bicycle and pedestrian travel in the region. Metro's local street connectivity principal encourages communities to develop a connected network of local streets to provide a high level of access, comfort, and convenience for bicyclists and walkers that travel to and among centers.

Connectivity of the existing transportation system was reviewed to identify current deficiencies. These locations will be further addressed in the pedestrian, bicycle and motor vehicle plans Topography, environmental constraints, railroads and existing development may be limiting the connectivity in areas of Oregon City. These factors may not stop the possible connections from being made in the noted areas lacking connectivity, but will affect what modes could be accommodated and the financial viability. The major areas lacking connectivity include:

- East and west connectivity across OR 213 between Redland Road and Beavercreek Road, a distance of over two miles
- East to west connectivity between OR 99E (south of the Canemah neighborhood) and the South End neighborhood, with greater than four miles between connections

A multi-modal connectivity plan for Oregon City is shown in Figure 5. It specifies the general location where new streets or shared-use paths could potentially be installed as nearby areas are developed or as the opportunity arises. The purpose of the plan is to ensure that new developments accommodate circulation between adjacent neighborhoods to improve connectivity for all modes of transportation. The criteria used for providing connections are as follows (as required in the Metro Regional Transportation Functional Plan[3]):

- Provide a full local street connection at least every 530 feet (or 1/10 of a mile), if possible
- Provide a pedestrian and bicycle connection every 330 feet if a full-street connection is not possible

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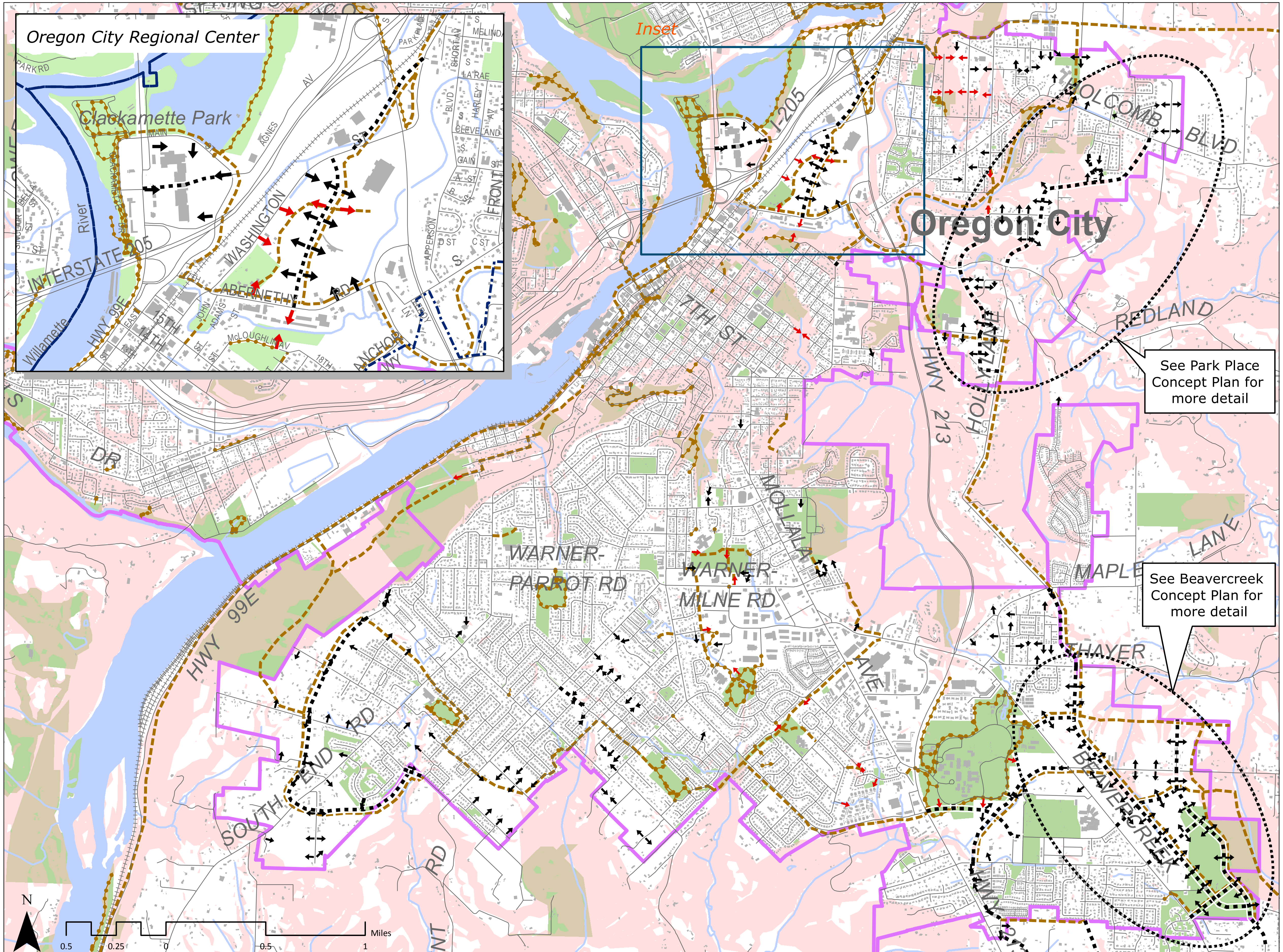
[2] Metro 2035 Regional Transportation Plan, Local Street Network Concept

[3] Metro Regional Transportation Functional Plan, Section 3.08.110, Subsection E, Street System Design Requirements



OREGON CITY TRANSPORTATION PLAN

FIGURE 5

Multi-Modal Connectivity Plan

Legend

Street Connectivity

- Existing Street
- Planned Roadway Extension (Conceptual Alignment)
- Potential Street Extension

Trail Connectivity

- Existing Shared-Use Path
- Planned Shared-Use Path (Conceptual Alignment)
- Potential Trail Connection

- Steep Slope
- Building
- Stream
- River
- Park/Public Property
- Urban Growth Boundary
- Railroad

To protect existing neighborhoods from the potential traffic impacts caused by extending stub end streets, connector roadways should incorporate neighborhood traffic management into design and construction. In addition, when a development constructs stub streets, they shall install signs indicating the potential for future connectivity to increase the awareness of residents.

In order to ensure that new development complies with the objectives of the multi-modal street plan, applicants of residential or mixed-use developments of five or more acres will be required to provide a proposed street map as part of the development approval process. The street map must be consistent with the requirements of the Metro Regional Transportation Functional Plan[4] and should be reviewed to ensure the development does the following:

- Provide full street connections with spacing of no more than 530 feet between connections, except where prevented by barriers
- If full street connections are prevented, provides bike and pedestrian accessways with spacing of no more than 330 feet, except where prevented by barriers
- Limit use of cul-de-sacs and other closed-end street systems to situations where barriers prevent full street connections or to locations where pedestrian/bike accesses are to be provided at 330 feet intervals
- Include no cul-de-sacs and other closed-end street longer than 200 feet or having no more than 25 dwelling units
- Include street cross-sections demonstrating dimensions of right-of-way improvements, and posted or expected speed limits

Applicants of residential or mixed-use developments of less than five acres should comply with the following standards[5].

- Provide full street connections with spacing of no more than 530 feet between connections, except where prevented by barriers
- Include no cul-de-sacs and other closed-end street longer than 350 feet[6]
- If full street connections are prevented, provides bike and pedestrian accessways with spacing of no more than 350 feet, except where prevented by barriers

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[4] Metro Regional Transportation Functional Plan, Section 3.08.110, Subsection E, Street System Design Requirements

[5] Metro Regional Transportation Functional Plan, Section 3.08.110, Subsection F, Street System Design Requirements

[6] Oregon City Municipal Code, Title 12, Section 12.04.225

Recommended TSP and Code Revisions

The following documents the implementation measures required for the street network and connectivity as part of the TSP update:

- Adopt the Multi-Modal Street System: This will replace the functional classification system for the City.
- Adopt the Design Types for Streets: This will replace the typical cross-sections for streets in the City.
- Adopt the Context Zone Standards for Streets: This includes new/updated standards for frontage, block size, access spacing and pedestrian crossings.
- Adopt the Multi-modal Connectivity Plan: This specifies the general locations where new streets or shared-use paths could potentially be installed as nearby areas are developed or as the opportunity arises.
- Develop local truck routes. Create figures that identify the streets located along a regional truck route, local truck route or a transit route.
- Adopt language that identifies when the City can consider constrained design options for streets.
- The arterial and collector connectivity gaps must be considered when developing solutions for the transportation system.

Appendix

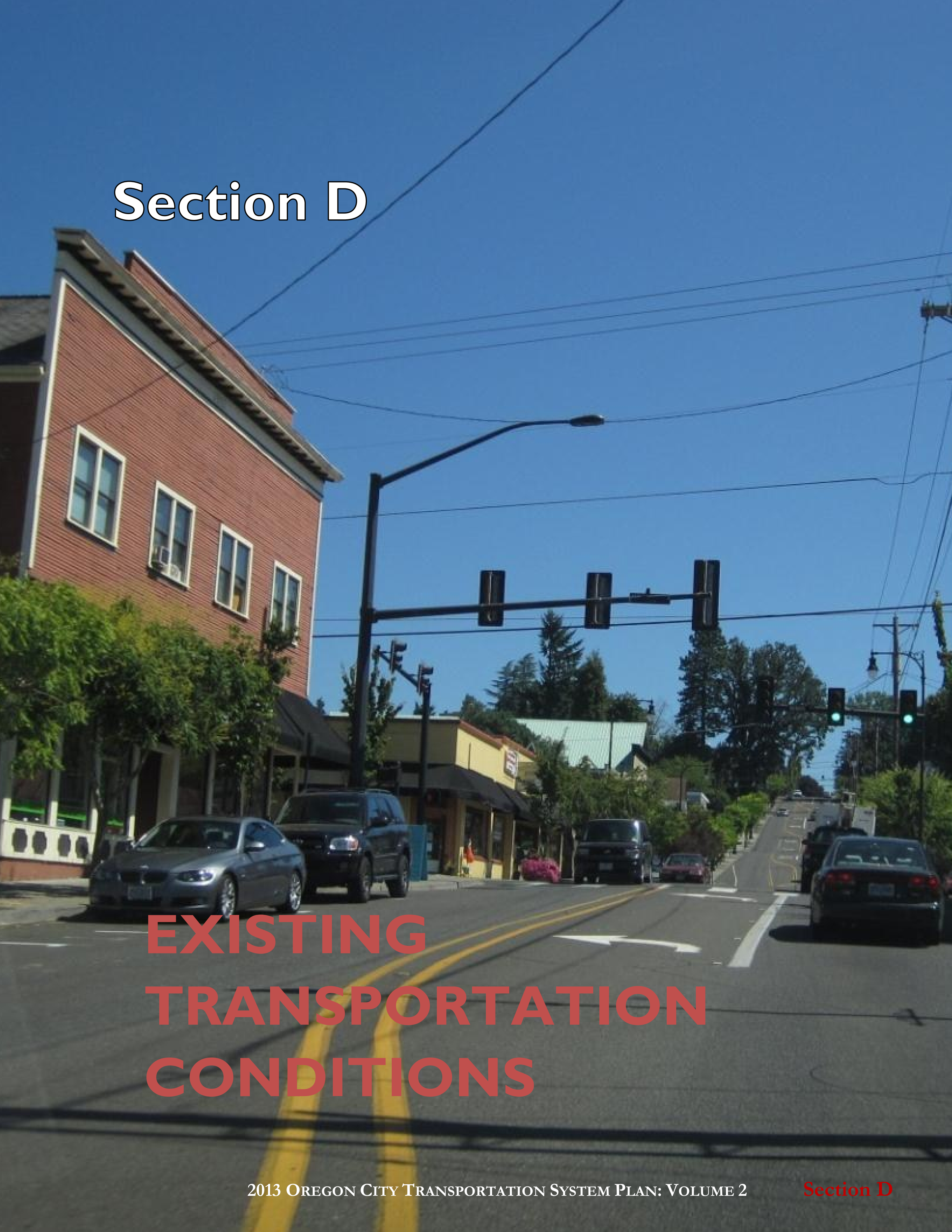
Table A1: Oregon City Functional Classification Changes

Roadway	From	To	Change from Prior Classification	Reason for Change
Beutel Road	South End Road	End of Beutel Road	Upgrade from Local to Collector	Collector connectivity gap
Lawton Road / Madrona Drive	South End Road	End of Madrona Drive	Upgrade from Local to Collector	Collector connectivity gap
Rose Road / Deer Lane	South End Road	End of Deer Lane	Upgrade from Local to Collector	Collector connectivity gap
Meyers Road	Beavercreek Road	High School Avenue	Upgrade from Local to Minor Arterial	Arterial connectivity gap
High School Avenue	End of High School Avenue	Glen Oak Road	Upgrade from Local to Collector	Collector connectivity gap
Chanticleer Place/ Chanticleer Drive	Russ Wilcox Way	Edgemont Drive	Upgrade from Local to Collector	Collector connectivity gap
Loder Road	UGB	Beavercreek Road	Upgrade from Local to Collector	Collector connectivity gap
Holly Lane	Redland Road	Maple Lane Road	Upgrade from Local to Minor Arterial	Arterial connectivity gap
Donovan Road	Holly Lane	End of Donovan Road	Upgrade from Local to Collector	Collector connectivity gap
Livesay Road	West of Frank Avenue	Redland Road	Upgrade from Local to Collector	Collector connectivity gap
Swan Avenue	Holcomb Boulevard	End of Swan Avenue	Upgrade from Local to Collector	Collector connectivity gap
Pearl Street	Eluria Street	Molalla Avenue	Upgrade from Local to Collector	Collector connectivity gap
Pearl Street	Molalla Avenue	Linn Avenue	Upgrade from Local to Collector	Collector connectivity gap
7th Street	OR 99E	Taylor Street	Upgrade from Minor Arterial to Major Arterial	Consistency with Metro functional classification
Center Street	5th Street	South 2nd Street	Upgrade from Local to Collector	Collector connectivity gap
Railroad Avenue/ 7th Street	Main Street	OR 99e	Upgrade from Local to Collector	Collector connectivity gap
12th Street	OR 99e	Main Street	Upgrade from Local to Collector	Collector connectivity gap
14th Street	OR 99e	Washington Street	Upgrade from Local to Collector	Collector connectivity gap
15th Street	OR 99e	Main Street	Upgrade from Local to Collector	Collector connectivity gap

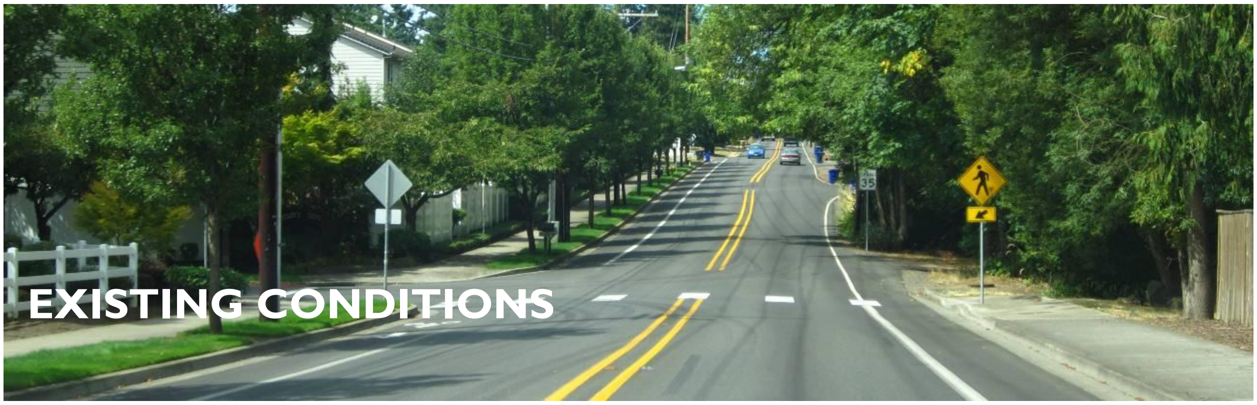
Clackamette Drive/ Dunes Drive	Main Street	OR 99E	Upgrade from Local to Collector	Collector connectivity gap
Agnes Avenue/ Washington Street	Main Street	I-205	Upgrade from Local to Collector	Collector connectivity gap
Skellenger Way/ Salmonberry Drive/ Hazel Grove Drive/ Fibert Drive	Central Point Road	South End Road	Downgrade from Collector to Local Streets	Adequate nearby connection
Spring Valley Drive	Boynton Street	Partlow Road	Downgrade from Collector to Local Street	Adequate nearby connection
Boynton Street	Warner Parrott Road	Central Point Road	Downgrade from Collector to Local Street	Adequate nearby connection
Shenandoah Drive	Warner Parrott Road	Central Point Road	Downgrade from Collector to Local Street	Adequate nearby connection
Woodlawn Avenue	Barker Avenue	Warner Parrott Road	Downgrade from Collector to Local Street	Adequate nearby connection
Central Point Road	Warner Parrott Road	UGB	Downgrade from Minor Arterial to Collector	Collector connectivity gap
Haven Road/ Prospector Terrace	Frontier Parkway	Leland Road	Downgrade from Collector to Local Street	Adequate nearby connection
Frontier Parkway	Meyers Road	Leland Road	Downgrade from Collector to Local Street	Adequate nearby connection
South Fir Street	Fir Street	Molalla Avenue	Downgrade from Minor Arterial to Collector	Collector connectivity gap
Marjorie Lane	Beavercreek Road	End of Marjorie Lane	Downgrade from Minor Arterial to Local Street	Adequate nearby connection
Caufield Road	OR 213	End of Caufield Road	Downgrade from Collector to Local Street	Adequate nearby connection
Ethel Street	Hood Street	Linn Avenue	Downgrade from Collector to Local Street	Adequate nearby connection
Laurel Lane	Holmes Lane	End of Laurel Lane	Downgrade from Collector to Local Street	Adequate nearby connection
May Street	Molalla Avenue	End of May Street	Downgrade from Collector to Local Street	Adequate nearby connection
Warner Street	Molalla Avenue	End of Warner Street	Downgrade from Collector to Local Street	Adequate nearby connection
Holmes Lane	Molalla Avenue	Linn Avenue	Downgrade from Minor Arterial to Collector	Collector connectivity gap
Barclay Hills Drive/Alden Street/Hilda Street	Newell Ridge Drive	Molalla Avenue	Downgrade from Collector to Local Street	Adequate nearby connection
Roosevelt Street	Eluria Street	Molalla Avenue	Downgrade from Collector	Adequate nearby

			to Local Street	connection
Division Street/ Anchor Way	Redland Road	7th Street	Downgrade from Minor Arterial to Collector	Collector connectivity gap
Monroe Street	12th Street	7th Street	Downgrade from Collector to Local Street	Adequate nearby connection
Cleveland Street	Swan Avenue	Apperson Boulevard	Downgrade from Collector to Local Street	Adequate nearby connection

Section D



EXISTING TRANSPORTATION CONDITIONS



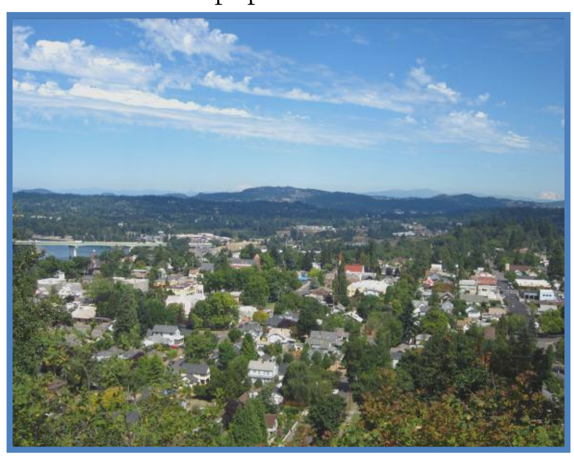
EXISTING CONDITIONS

This document introduces the transportation conditions in the City of Oregon City. Questions to be answered in this document include:

- What makes Oregon City unique?
- Where do people want to go?
- Where do people come from?
- What parts of the City do people come from?
- What factors determine how people travel?
- What transportation infrastructure is available?
- What travel conditions do people face?

What makes Oregon City unique?

Located along the shores of the Willamette and Clackamas Rivers near the scenic Willamette Falls, Oregon City is the oldest incorporated City west of the Rockies. With a population of around 34,000, the City is characterized by topography that rises sharply from the riverfront and downtown to reach 250 feet, above the Willamette River. The two to three blocks wide downtown is located at the base of a basalt bluff where the McLoughlin Conservation District is found, one of two of the City's historic neighborhoods. At higher elevations and further south from downtown, newer neighborhoods and commercial development has developed over the past 50 years. The City is now comprised of 12 unique neighborhoods as illustrated by the Neighborhood Associations (see Figure in appendix).



View from the Oregon City hillside

In recent years, the City has made great strides at inventing in the Downtown and the 7th Street-Molalla Avenue corridor and becoming a regional destination for employment, shopping and education. These characteristics make Oregon City unique, as well as define the key transportation issues that the City seeks to overcome.

Where do people want to go?

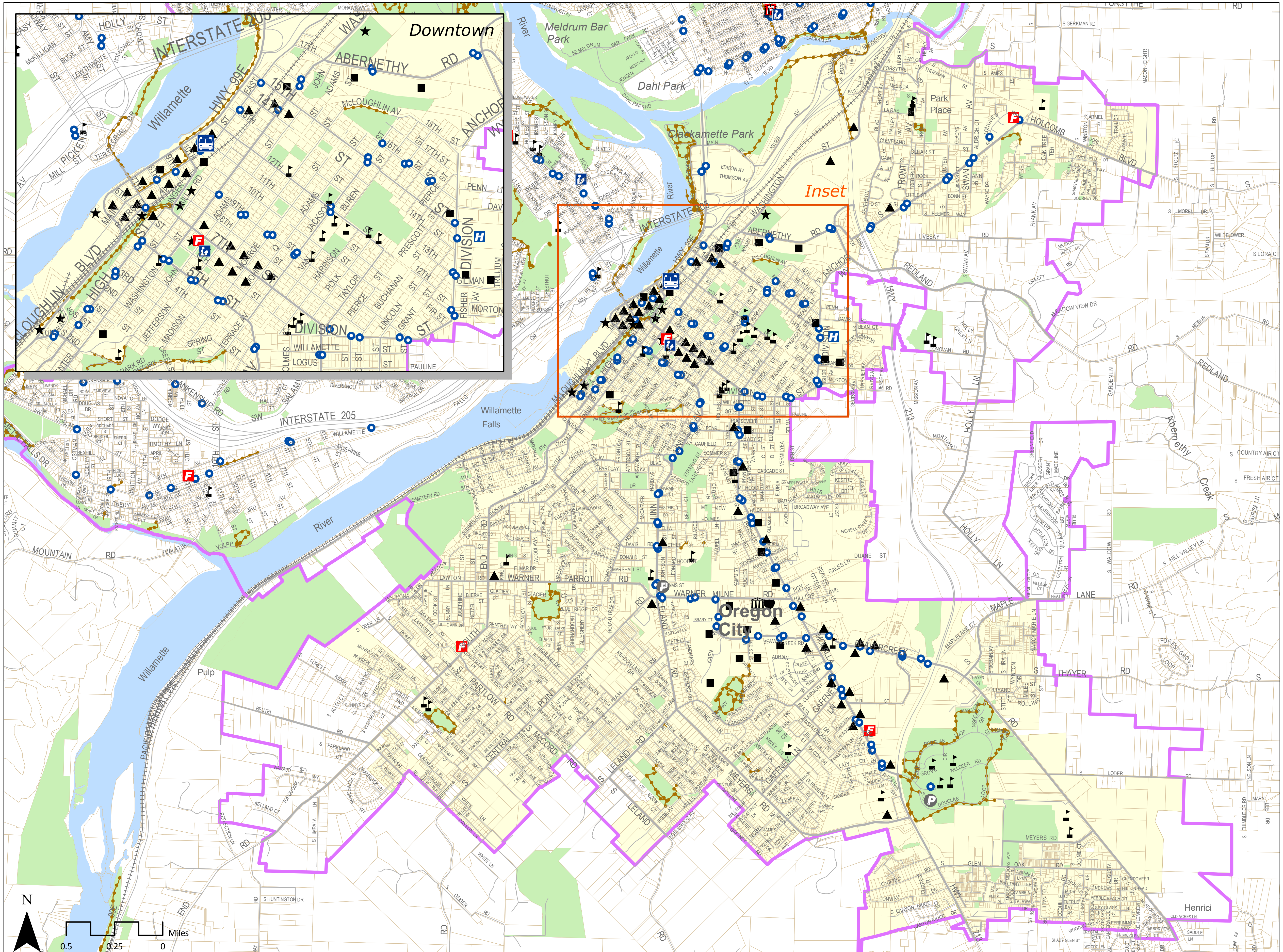
One of the first steps in planning for an effective transportation system is gaining an understanding of the key destinations that people currently travel to throughout the City. These destination points are referred to as activity generators (or trip attractors).

As the oldest incorporated City west of the Rockies, Oregon City is home to several cultural or recreational destinations that attract tourists and residents alike. Major destinations include the End of the Oregon Trail Interpretive Center, Museum of the Oregon Territory, Willamette Falls and the Willamette River waterfront, Carnegie Center, Municipal Elevator, McLoughlin House, Ermatinger House, and Barclay House.

Oregon City is also home to a regional educational institution, Clackamas Community College, in addition to several other major employment and shopping areas, including the historic downtown core. The most common categories of activity generators in the City include (see Figure 1 on the following page for the general locations of some of these activity generators):

- Recreational/Entertainment (e.g. Boat docks, parks, Willamette River Regional Trail, Oregon City Swimming Pool, McLoughlin Promenade)
- Schools (e.g. Clackamas Community College, Holcomb Elementary, Gaffney Lane Elementary, Gardiner Middle, Oregon City High)
- Places of employment (e.g. Oregon City Regional Center, Clackamas County Red Soils Business Park, business areas, industrial areas, offices)
- Shopping (e.g. downtown, grocery stores, shopping centers, restaurants)
- Cultural (e.g. End of the Trail Interpretive Center, McLoughlin House, Museum of the Oregon Territory, Main Street evens, other community events)
- Public Transportation (e.g. Bus stops, Oregon City Transit Center, park and ride, Amtrak)

Each of these categories of activity generators represents important starting and ending points for travel and provides a good basis for planning ideal routes.



OREGON CITY TRANSPORTATION PLAN

FIGURE 1

Activity Generators

Legend

Activity Generators

- Cultural
- Professional/Office
- Shopping
- Hospital
- School
- Library
- City Hall
- Fire Station
- Police Station

Transit

- Park and Ride
- Bus Stop
- Oregon City Transit Center

- Existing Trails
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary
- Tax Lots

How do people get there?

Most Oregon City residents commuted to work between the years 2005 and 2009 via single occupant motor vehicles (about 76 percent), or carpooling (about 10 percent)[1]. Approximately four percent of residents walked, four percent used public transportation, and two percent biked to work.

Table 1 compares the commute patterns of Oregon City residents to other Cities in the region. Commuting to work via public transportation was fairly similar in Oregon City and West Linn (four percent versus three percent), but accounted for four percent fewer trips in Oregon City than Milwaukie (four percent to eight percent). Fewer residents worked at home in both Oregon City and Milwaukie compared to West Linn (about five percent less), while more walked or biked to work (six percent in Oregon City, five percent in Milwaukie and three percent in West Linn).

Table 1: Transportation Modes Used to Commute to Work

	Percent of Commuters		
Transportation Mode	Oregon City	West Linn	Milwaukie
Workers over 16 years	*14,861*	*12,821*	*10,751*
Motor Vehicle- Single Occupant	76%	76%	74%
Motor Vehicle- Carpool	10%	8%	9%
Walked	4%	2%	4%
Biked	2%	1%	1%
Public Transportation	4%	3%	8%
Worked at Home	4%	9%	4%
Other	0%	1%	0%

Source: US Census Bureau, 2005-2009 American Community Survey

While the U.S. Census Bureau is a valuable source of information for work commute patterns in Oregon City, it does not truly represent the transportation modes utilized to other activity generators like schools, recreation, shopping or access to transit. Non-motor vehicle transportation modes are likely higher in Oregon City for these types of trips.

How transportation modes are used in the City

Pedestrian, bicycle, and motor vehicle activity at key intersections throughout Oregon City was reviewed during the evening peak period (3:15 p.m. to 6:15 p.m.) on a typical weekday in the late spring and early fall of 2011.[2] It was found that during the summer months, activity levels generally increase due to the overall pleasant weather and longer days enticing residents of Oregon City to get out and about in the City. It should be noted that although weekend pedestrian and bicycle activity levels were not measured, they would generally be expected to be higher than the activity levels of a typical weekday.

[1] 2005-2009 American Community Survey, US Census Bureau

[2] Based on counts conducted April 12th, April 13th, April 14th, April 21st and September 7th 2011

- **Pedestrian volumes** are generally highest in Downtown Oregon City and along 7th Street and Molalla Avenue. The highest hourly pedestrian activity during the evening peak occurred at the Molalla Avenue intersection with Clairmont Way, with over 50 pedestrian crossings in the one-hour period between 3:55 p.m. and 4:55 p.m. The highest hourly pedestrian activity levels at the reviewed intersections during the evening peak period are displayed in Figure A1 in the appendix.
- **Bicycle volumes** are generally low during the evening peak period, with no more than nine bicyclists traveling through any of the intersections reviewed during a single one-hour period between 3:15 and 6:15 p.m. The highest volumes occurred on Washington Street between 5th Street and 15th Street, with hourly volumes ranging between eight and nine cyclists. The highest hourly bicycle activity levels at the reviewed intersections during the evening peak period are displayed in Figure A1 in the appendix.
- **Motor vehicle volumes** on the roadways in Oregon City peak during the evening between 3:25 p.m. and 5:10 p.m., but generally vary depending on the time of year. During the summer months, traffic volumes increase due to an influx of recreational and leisure travelers taking advantage of the nice weather. For this reason, the traffic count data was adjusted upward to represent peak seasonal traffic conditions. The peak seasonal traffic volumes developed for the reviewed intersections can be found in Figure A2 in the appendix. Peak seasonal motor vehicle volumes are highest along OR 99E, generally ranging between 1,000 and 2,000 vehicles in each direction during the evening peak hour. Evening peak hour traffic volumes are also high along OR 213, Molalla Avenue, Washington Street and Beavercreek Road, generally ranging between 500 and 1,000 vehicles in each direction.

Where do people come from?

Much of the traffic in Oregon City is often related to employment travel. As shown in Table 2, half of the workers in Oregon City live in another City. The commute mode for employees that travel into the City is often dependent on the regional transportation system. If there is walking, biking, transit or other facility deficits outside the City, then a commuter may be discouraged from utilizing those travel modes.

Table 2: Where Oregon City Workers Live

Oregon City workers who:	Percent of Oregon City Workers	Distance from Oregon City
Live in Oregon City	**50%**	-
Live outside Oregon City	**50%**	**-**
Live in Portland	*20%*	*12+ miles*
Live in West Linn	*7%*	*1+ miles*
Live in Milwaukie	*4%*	*7+ miles*
Live in Gresham	*4%*	*17+ miles*
Live in Other City in Oregon	*15%*	*2+ miles*

Source: Census Transportation Planning Package (CTPP), 2006-2008 American Community Survey

Oregon City Employee Commute Mode

More than three quarters (75 percent) of the commuters in northeast, south-central, southeast and southwest Oregon City and 70 percent in central Oregon City commute to work via single occupant motor vehicle (see Table 3). The greatest percent of residents walking to their place of employment occurs in the southeast part of Oregon City (6 percent of residents) while the highest bicycle commuting to work occurs in central Oregon City (5 percent). The highest usage of public transportation to work occurs in the central and southeast part of the City (4 percent).

Table 3: Work Commute Mode by area of Oregon City

Transportation Mode	Northeast Oregon City (1)	Central Oregon City (2)	South- Central Oregon City (3)	Southeast Oregon City (4)	Southwest Oregon City (5)
Motor Vehicle-Single Occupant	78%	71%	78%	75%	86%
Motor Vehicle-Carpool	6%	12%	11%	11%	8%
Walked	3%	3%	2%	6%	0%
Biked	0%	5%	2%	0%	0%
Public Transportation	2%	4%	3%	4%	2%
Motorcycle/Other	1%	1%	0%	1%	0%
Worked at Home	10%	3%	4%	4%	4%

Source: US Census Bureau, 2005-2009 American Community Survey
1. Includes the Park Place and part of the Caufield (north of Beavercreek Road) neighborhoods
2. Includes Downtown and the McLoughlin neighborhood
3. Includes the Canemah, Barclay Hills, Rivercrest and part of the South End (northeast of the South End Road/Warner Parrott Road intersection) neighborhoods
4. Includes the Towervista, Hillendale, Gaffney Lane and part of the Caufield (south of Beavercreek Road) neighborhoods
5. Includes the Hazel Grove/ Westling Farm and part of the South End (west of South End Road) neighborhoods

What factors determine how people travel?

Travelers often weigh a variety of factors when deciding how to commute to their destination. Whether the trip will be via motor vehicle, walking, bicycle, or public transportation, the choice is often a balance between ease and convenience of travel, travel cost, and travel time.

Where are you going? Whether you are going to work, school, shopping, or to a park, your trip type (or your destination point) often determines your mode of transportation. If you are destined for a park or school you generally have a higher likelihood to walk or bicycle, as opposed to work or shopping in which travel via motor vehicle is generally more convenient. In addition, the distance of that destination would play a role in mode choice. Trips that are shorter generally present a greater opportunity to walk or bicycle, as opposed to longer distance trips that often require transit or motor vehicle to reach the destination.

Will you have to cross a busy road or walk along a road without sidewalks? The availability of sidewalks, curb ramps to provide wheelchair access, crosswalks, and bicycle lanes increase the comfort and access of walking and biking. A lack of these facilities, particularly on higher volume/speed roadways, discourages people from utilizing non-motor vehicle modes of transportation.

Where you work and how long it takes you to get there. Oregon City residents who work outside of the City are likely to commute via motor vehicle due to travel distance and commute time. As seen in Table 4, about 58 percent of Oregon City residents commute outside the City to work. Over 40 percent of these commuters travel to employment locations at least 10 miles outside of the City.

Table 4: Where Oregon City Residents Work

Oregon City residents who:	Percent of Oregon City Workers	Distance from Oregon City
Work in Oregon City	**42%**	-
Work outside Oregon City	**58%**	**-**
Work in Portland	*35%*	*12+ miles*
Work in Milwaukie	*4%*	*7+ miles*
Work in Tigard	*4%*	*13+ miles*
Work in Salem	*3%*	*35+ miles*
Work in Other City in Oregon	*12%*	*6+ miles*

Source: Census Transportation Planning Package (CTPP), 2006-2008 American Community Survey

Age and income. Demographic characteristics such as age and income play a key role in determining mode of transportation. Oregon City residents with lower incomes, as well as the youngest and oldest residents often account for more trips via walking, biking, and public transportation. As seen in Table 5, about a quarter (25 percent) of Oregon City residents living in the neighborhoods south of Downtown (e.g. Barclay Hills, Rivercrest, South End, Towervista, Hillendale, Gaffney Lane, Caufield, Hazel Grove and Canemah) are school-aged children, while about 10 percent of Oregon City residents throughout the City are above the retirement age. The central part of Oregon City (Downtown and McLoughlin neighborhood) accounts for the lowest median household incomes (around $43,000), which is approximately $10,000 to $30,000 less than the other parts of the City.

Table 5: Key Demographics in Oregon City

	Northeast Oregon City	Central Oregon City	South- Central Oregon City	Southeast Oregon City	Southwest Oregon City
Age (by percent of residents)					
School aged (Under 18)	21%	17%	24%	26%	24%
Middle Aged (18 to 66)	68%	71%	68%	64%	63%
Retired Aged (67+)	11%	12%	9%	10%	13%
Median Household Income	$68,110	$42,988	$52,041	$58,362	$70,000

Source: US Census Bureau, 2005-2009 American Community Survey

Is it cold or raining? Weather could potentially play a role in determining how trips are made. Oregon City experiences cool, rainy winters, with mild and generally dry summers. According to the national weather service, average temperatures in the winter months (November to March) are around 45 degrees Fahrenheit, with measurable rainfall occurring about 17 days each winter month. The spring and fall months (April, May, and October) are slightly warmer and dryer, with average temperatures around 55 degrees Fahrenheit, and about 14 days of measurable rainfall. The summer months (June to September) are typically very pleasant, with average temperatures around 65 degrees Fahrenheit, and less than 10 days of measurable rainfall each month.[3] The rainy weather could discourage walking and biking trips, forcing users to potentially make a trip via motor vehicle or other means, when they would otherwise walk or bike.

Are you able to walk or bike on a steep hill? Topography, one of the things that makes Oregon City a unique place with the sloping and hilly terrain, is generally a deterrent to walking and bicycling. The terrain makes these trips more difficult and potentially creates barriers for those with disabilities.

Steep hill without pedestrian or bicycle facilities

[3] Climate Summary for Portland area, National Weather Service

What transportation infrastructure is available?

Oregon City has an abundance of existing transportation infrastructure that residents use on a daily basis. The infrastructure includes sidewalks, bike lanes, multi-use trails, roadways and transit.

Walking

Walking plays a key role in Oregon City's transportation network. Planning for pedestrians not only helps the City provide a complete, multi-modal transportation system, it addresses a social equity issue, ensuring that the young, the elderly, and those not financially able to afford motorized transport have access to goods, services, employment, and education. Approximately four percent of commuters in the City walk to work, with another four percent utilizing public transportation (which generally include a walking trip at the beginning or end) to get to work. In addition to the work commute trips, walking trips are made to and from recreational or shopping areas, schools, or other activity generators. In general, it is desirable to provide continuous sidewalk connections between all activity generators and arterial/collector roadways to allow for safe and attractive non-motorized travel options. Oregon City's walking network, shown in Figure 2, is composed of sidewalks, stairs, and multi-use paths.

Sidewalks are located along roadways, are separated from the roadway with a curb and/or planting strip, and have a hard, smooth surface, such as concrete. The Oregon Department of Transportation (ODOT) standard for sidewalk width is six feet, with a minimum width of five feet acceptable on local streets. Oregon City requires sidewalks to be at least five feet wide. Most of the roadways in downtown Oregon City have sidewalks on both sides, while continuous sidewalks along 7th Street and Molalla Avenue link downtown Oregon City with Clackamas Community College. Beyond these areas, continuous sidewalks are generally limited throughout the City.

View of the Municipal Elevator from Main Street

Stairway/Elevator: The Oregon City Municipal Elevator, located at the 7th Street/Railroad Avenue intersection and the Grand Staircase provide alternative connections for pedestrians to the top of the bluff above downtown.

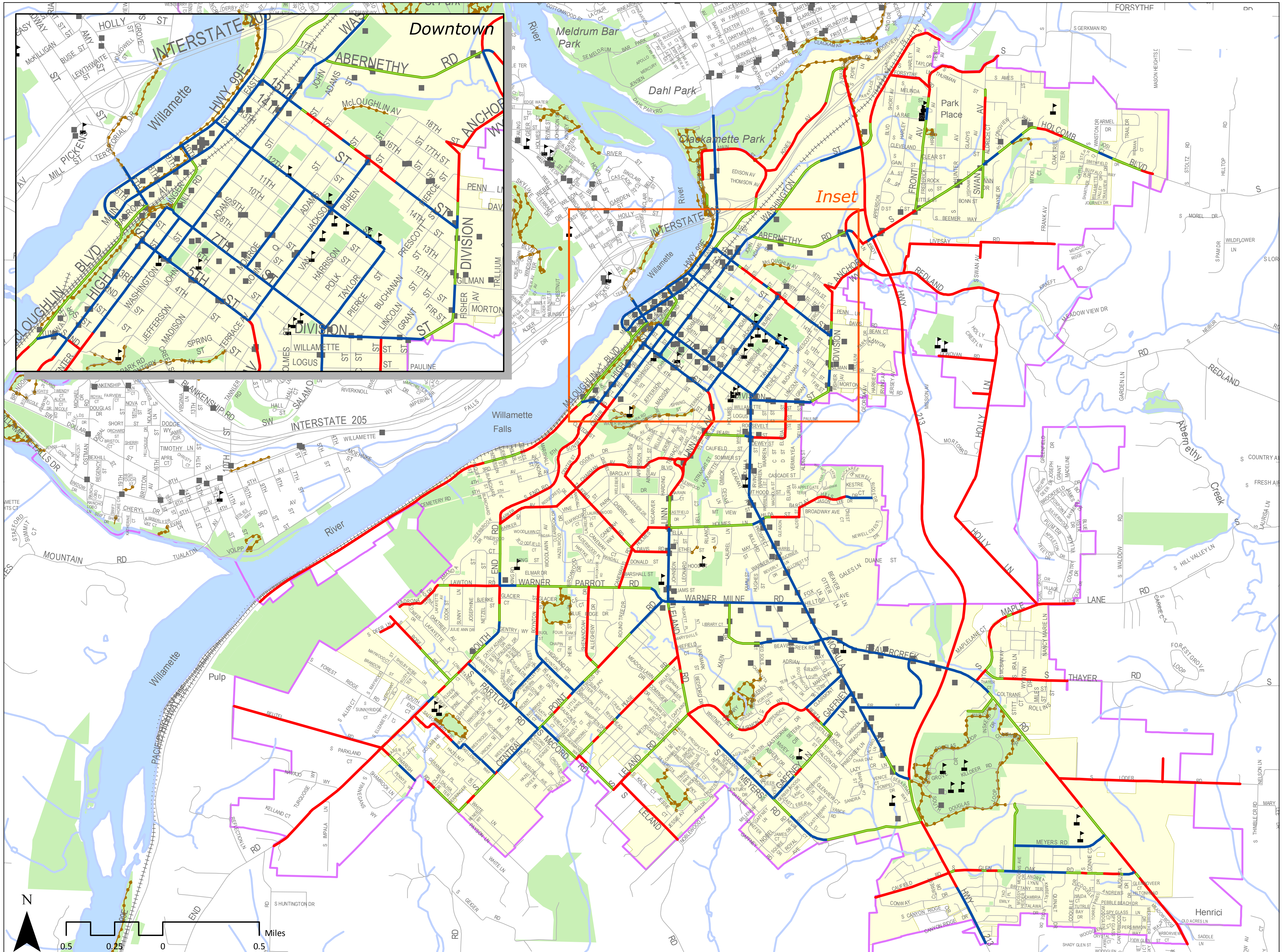
Multi-use paths are used by a variety of non-motorized users, including pedestrians, bicyclists, skateboarders, and runners. Multi-use paths are typically paved (asphalt or concrete) but may also consist of an unpaved smooth surface as long as it meets Americans with Disabilities Act (ADA) standards. Multi-use paths are usually wider than an average sidewalk (i.e. 10 – 14 feet).

- The I-205 multi-use path crosses the Clackamas River from Gladstone to the north of Oregon City via the 82nd Drive/Park Place Bridge. Here the path travels into Oregon City to Clackamette Park where it joins the Willamette River Trail. North of the Clackamas River, the I-205 multi-use path generally runs for 16.5 miles paralleling I-205, connecting downtown Oregon City to Marine Drive near the Portland International Airport. The path also interests with other regional trails such as the Springwater Corridor Trail and the Trolley Trail.

- The McLoughlin Promenade runs for approximately a half-mile along the bluff above downtown Oregon City. The path provides a connection from the McLoughlin House on Center Street to Tumwater Drive near OR 99E. A pedestrian bridge over OR 99E (McLoughlin Boulevard) links the west side of OR 99E with the south end of the McLoughlin Promenade.
- The Willamette River Trail, located between OR 99E and the Willamette River, connects Clackamette Park to downtown Oregon City via Jon Storm Park and the newly enhanced pedestrian accessible Willamette Terrace located near 12th Street.

Willamette Terrace

- Several short multi-use paths connect adjacent roadways to City parks, such as the path connecting Hillendale City Park near Clairmont Way to Red Soils Court, just to the south of Beavercreek Road. These are generally used for recreational purposes.
- A number of natural surface trails, such as the Waterboard Park walking path, are also located in Oregon City. These trails are mostly used by pedestrians, primarily for recreational purposes.



OREGON CITY TRANSPORTATION PLAN

FIGURE 2

Existing Pedestrian Facilities

Legend

Sidewalk Facilities

- Sidewalk Both Sides
- Sidewalk One Side
- No Sidewalk
- School
- Activity Generator
- Existing Trails
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary
- City Limit

Pedestrian facilities were not inventoried on all local streets.

Bicycling

Oregon City's bicycling network, shown in Figure 3, is composed of bikelanes, shared roadways and multi-use paths.

Shared Roadway: Shared roadways include roadways on which bicyclists and motorists share the same travel lane. The most suitable roadways for shared bicycle use are those with low speeds (25 mph or less) and low traffic volumes (3,000 vehicles per day or fewer). Signed shared roadways are shared roadways that are designated and signed as bicycle routes and serve to provide continuity to other bicycle facilities (e.g. bicycle lanes) or designate a preferred route through the community. Common practice is to sign the route with standard Manual on Uniform Traffic Control Devices (MUTCD) green bicycle route signs with directional arrows. Shared roadways can also have signing that highlights a special route or provides directional information in bicycling minutes or distance (e.g., "Library, 3 minutes, ½ mile").

Signed bike route in Oregon City

- There are a few signed bike routes in the City, such as the OR 99E/Washington Street and Molalla Avenue bike routes.
- Sharrows are used on Main Street in downtown Oregon City
- Many local streets in Oregon City are low speed/low volume roadways that could be classified as shared roadways. Although there are no signs or pavement markings to indicate that a particular local street is a shared roadway or part of a bicycle route, these low traffic roadways often connect residential neighborhoods to commercial areas—allowing bicyclists to bypass heavily trafficked thoroughfares in favor of quieter streets.

Multi-use paths such as those around Clackamas Community College and I-205 multi-use path provide off-street travel for bicyclists.

Path adjacent to OR 213 near Clackamas Community College

Shoulder Bikeway: These are paved roadways that have striped shoulders wide enough for bicycle travel. ODOT recommends a six-foot paved shoulder to adequately provide for bicyclists, and a four-foot minimum width in constrained areas. Roadways with shoulders less than four feet are considered shared roadways. Sometimes shoulder bikeways are signed to alert motorists to expect bicycle travel along the roadway.

- OR 213 has a wide roadway shoulder available to bicyclists from Washington Street to Beavercreek Road. It does have bicycle markings in a few locations, good pavement quality and sufficient width to accommodate bicycle travel.

Wide shoulders along OR 213

Bicycle Lanes: Bike lanes are portions of the roadway designated specifically for bicycle travel via a striped lane and pavement stencils. ODOT standard width for a bicycle lane is six feet. The minimum width of a bicycle lane against a curb or adjacent to a parking lane is five feet. A bicycle lane may be as narrow as four feet, but only in very constrained situations. Bike lanes are most appropriate on arterials and collectors, where high traffic volumes and speeds warrant greater separation of the travel modes. Existing bicycle facilities in Oregon City can be seen in Figure 3.

- Bike lanes are generally available along many arterial and collector roadways in the City including Molalla Avenue, Beavercreek Road, Linn Avenue, South End Road, Warner Milne Road, Warner Parrott Road and Washington Street. In addition, a bike connection to the regional I-205 multi-use trail is provided via OR 213 and Washington Street.

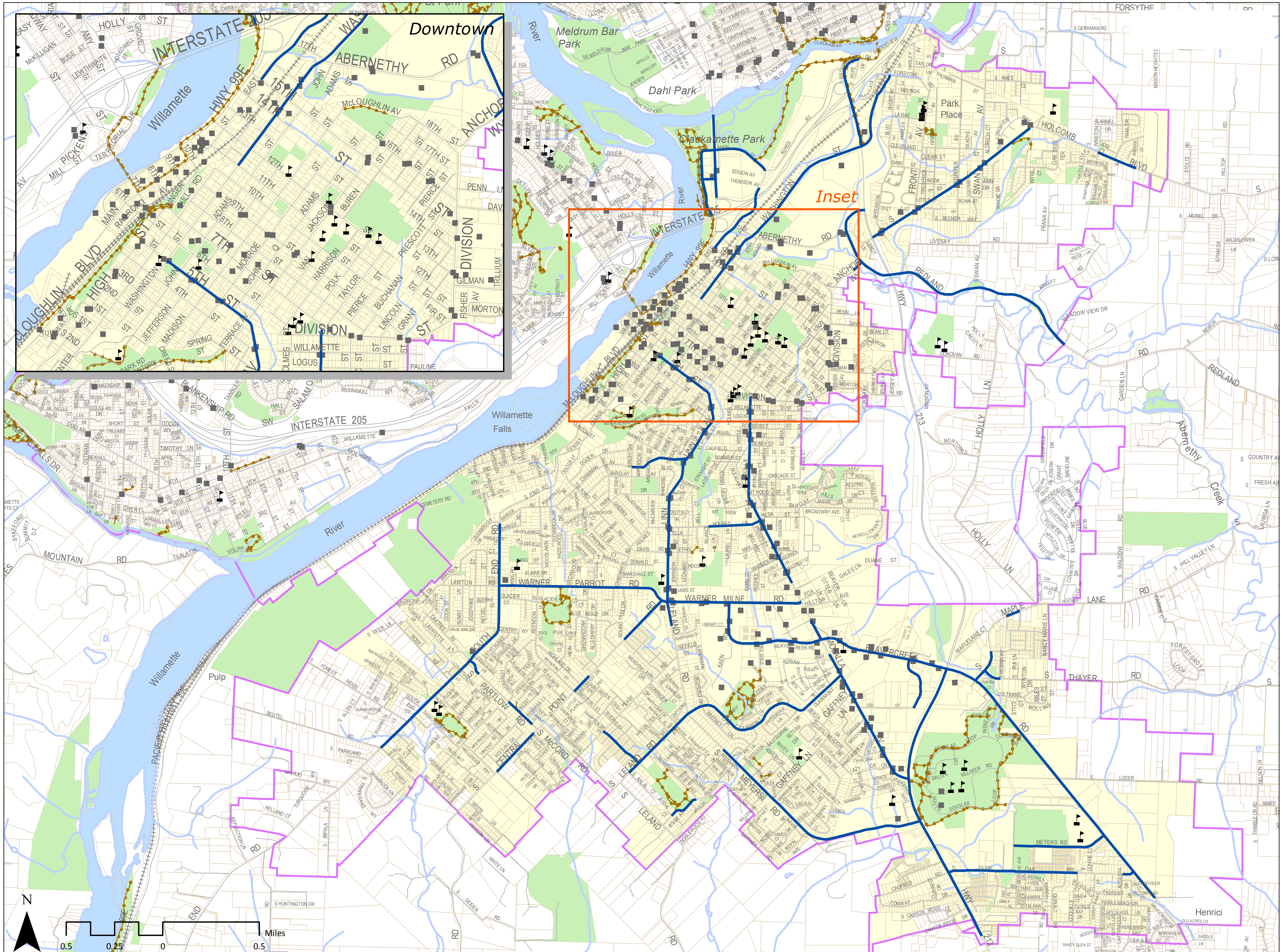
Bicycle Parking: End-of-trip bicycle facilities are a fundamental component of a bicycle network. In addition, a lack of safe and secure parking facilities can be an obstacle to promoting bicycle riding. Bicycle parking can be broadly defined as either short-term or long-term parking.

Short-term bike parking near Jon Storm Park

Short-term parking meant to accommodate visitors, customers, messengers and others expected to depart within two hours; requires approved standard rack, appropriate location and placement, and weather protection.

Long-term parking meant to accommodate employees, students, residents, commuters, and others expected to park more than two hours. This parking is to be provided in a secure, weather-protected manner and location.

- Long-term bike parking is available at Oregon City Hall and the Oregon City Transit Center via bike lockers.



OREGON CITY TRANSPORTATION PLAN

FIGURE 3

Existing Bicycle Facilities

Legend

Bicycle Facilities

- Bicycle Lane
- School
- Activity Generator
- Multi-Use Path
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary
- Tax Lots

Transit

Transit service is provided in Oregon City by TriMet via seven fixed bus routes connecting Oregon City to the rest of the Portland Metropolitan area, and an Americans with Disabilities Act (ADA) paratransit service. The fixed transit routes in Oregon City can be seen in Figure 4. In addition, seasonal transit service is provided to residents and tourists via the Oregon City Trolley, and regional service is provided via the Canby Area Transit system, South Clackamas Transportation District and Amtrak.

Transit Access and Amenities: The Oregon City Transit Center, located on Main Street between Moss Street and 11th Street, offers a transfer point between the seven TriMet fixed bus routes, the Oregon City Trolley and the regional bus service to Canby. The transit center offers a shelter, bench and rentable bike lockers for riders.

Oregon City Transit Center in Downtown

Bus stops in Oregon City are located along Main Street, Railroad Avenue, 2nd Street, High Street, 5th Street, Linn Avenue, 7th Street, Molalla Avenue, Division Street, 9th Street, 16th Street, Jackson Street, Abernethy Road, Holcomb Boulevard, Longview Way, Warner Milne Road and Beavercreek Road. Only some of the bus stops offer benches and shelter and some lack sidewalk connections to the surrounding neighborhoods and businesses. While transit users in the Park Place, McLoughlin, Barclay Hills, Hillendale, Gaffney Lane and Rivercrest neighborhoods are generally in close proximity to a bus stop, those in the Caufield, Canemah, South End, Tower Vista and Hazel Grove/Westling Farm neighborhoods could potentially be over two miles from a bus stop (greater than the typical trip length for the average walking or biking trip).

Park and ride facilities are provided for transit users at two locations in Oregon City, near the Linn Avenue/Williams Avenue intersection (just north of Warner Milne Road) and at Clackamas Community College.

All TriMet buses are equipped with either a boarding ramp or a lift to allow wheelchair access, and include bicycle racks. Riders are only permitted to load their bicycle inside the bus if they can collapse to the size of a standard piece of luggage.

TriMet's LIFT paratransit service provides public transportation to persons with disabilities who are unable to use regular fixed route buses. Curb to curb paratransit service, in wheelchair lift equipped mini-buses, is available generally between 4:30 a.m. and 2:30 a.m. seven days a week.

Frequent bus service to Downtown Portland is provided by Route 33 (McLoughlin) and Route 99 (McLoughlin Express), which run from the transit mall in Downtown Portland to the Oregon City Transit Center or Clackamas Community College. Route 33 runs with 15 minute headways during the a.m., midday, and p.m. peak periods, and offers service between 4:30 a.m. and 1:45 a.m. Monday through Friday. On weekends, Route 33 offers service between 6:00 a.m. and 1:30 a.m. The busiest stops along this route include the Oregon City Transit Center and Clackamas Community College, with nearly 700 and 500 daily boardings and de-boardings respectively.

Route 99 departs Oregon City every 15 minutes between 5:30 a.m. and 8:00 a.m. destined for Downtown Portland and arrives in Oregon City from Downtown Portland every 15 minutes between 3:30 p.m. and 6:30 p.m. Monday through Friday. Some of the busiest stops include the Oregon City Transit Center (131 daily ons/offs), Clackamas Community College (94 daily ons/offs) and Molalla/Clairmont (58 daily ons/offs).

Bus Service to Clackamas Community College is provided by Route 32 (Oatfield), which runs from the transit mall in Downtown Portland or the Milwaukie City Center to Clackamas Community College. Key destinations along this route include the Willamette Falls Hospital, Oregon City Transit Center and the Cities of Portland, Gladstone and Milwaukie. TriMet Route 32 offers bus service between 5:30 a.m. and 7:00 p.m. Monday through Friday, generally with 15 to 30 minute headways. Bus service is also provided on Saturday between the Oregon City Transit Center and Clackamas Community College only, between 10:00 a.m. and 5:30 p.m. with one hour headways. Some of the busiest stops include the Oregon City Transit Center (249 daily ons/offs), Clackamas Community College (174 daily ons/offs) and Molalla/Mountain View (48 daily ons/offs).

Bus Service to Milwaukie is provided by Route 34 (River Road), connecting the Park Place neighborhood (along Holcomb Avenue) to Milwaukie. TriMet Route 34 offers bus service between 5:30 a.m. and 6:45 p.m. Monday through Friday, generally with one to three hour headways. The busiest stop along this route includes the Oregon City Transit Center with 84 daily boardings and de-boardings.

Bus Service to Lake Oswego and the University of Portland is provided by Route 35 (Macadam/Greeley). Route 35 offers bus service between 4:45 a.m. and 1:30 a.m. Monday through Friday, generally with 10 to 30 minute headways. On weekends, Route 35 generally offers service between 6:00 a.m. and 1:15 p.m., approximately every 30 to 60 minutes.

Bus Service to the Clackamas Town Center is provided by Route 79 (Clackamas/Oregon City). Route 79 offers bus service between 6:00 a.m. and 10:30 p.m. Monday through Friday, generally with 30 to 40 minute headways. On weekends, Route 79 offers service between 8:00 a.m. and 10:30 p.m., approximately every 30 to 60 minutes. The Oregon City Transit Center has nearly 700 daily boardings and de-boardings for this route.

Bus Service to West Linn is provided by Route 154 (Willamette). Route 154 provides weekday service between West Linn's Willamette neighborhood and Oregon City approximately every hour between 6:30 a.m. and 7:30 p.m.

The Oregon City Trolley provides free service seven days a week during the summer months for residents and tourists. Key destinations along the route include the McLoughlin House, End of the Oregon Trail Center, Jon Storm Park, Clackamette Park, Ermatinger House, Downtown and the Willamette Falls overlook.

Oregon City Trolley

Bus Service to Canby is provided by Canby Area Transit (CAT). CAT provides weekday service connecting the Oregon City Transit Center to Canby, Aurora, Hubbard and Woodburn.

Bus Service to Molalla is provided via the South Clackamas Transportation District (SCTD). SCDT provides weekday service connecting Clackamas Community College with Carus, Mulino, Liberal and Molalla.

Amtrak provides passenger rail service connecting Oregon City to Seattle and Eugene. The Amtrak station in Oregon City is located on Washington Street, just north of Abernethy Road.

FIGURE 4

Existing Transit Routes

Legend

Transit Facilities

- Bus Stop
- Transit Center
- Park and Ride

Bus Route

- 032
- 033
- 034
- 035
- 079
- 099
- 154

- School
- Activity Generator
- Multi-Use Path
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary
- Tax Lots

Driving

Despite the hilly terrain, the roadways in the Downtown area of Oregon City are generally well connected and follow a gridded pattern. At the top of the hill, many of the roadways are generally windier, not continuous, and have larger blocks despite the relatively flat terrain. In addition, the steep slopes between the Downtown and the other parts of the City allow only limited connections up the hill. For these reasons, it becomes necessary to manage the existing roadways by determining how the traffic from various parts of Oregon City can be channelized within the network in a logical and efficient manner.

How do we manage the roadway network in Oregon City? To manage the roadway network, the City classified the roadways based on a hierarchy according to the intended purpose of each road (as shown in Figure 5). From highest to lowest intended usage, the classifications are freeway, expressway, major arterial, minor arterial, collector, and local streets. Roadways with a higher intended usage generally provide more efficient traffic movement (or mobility) through the City, while roadways with lower intended usage provide greater access for shorter trips to local destinations such as businesses or residences.

Freeways and Expressways are limited access state roadways. These roadways serve the highest volume of motor vehicle traffic and are primarily utilized for longer distance regional trips. Both OR 213 and I-205 have posted speed limits of 55 miles per hour.

Major Arterial Roadways are intended to move traffic through Oregon City. These roadways generally experience higher traffic volumes and often connect to locations outside of the City (such as Beavercreek Road) or act as a corridor connecting many parts of the City (such as Molalla Avenue). Posted speed limits on these roadways are generally between 30 to 45 miles per hour, with the higher speeds posted in less urbanized areas and lower speeds in areas with more congestion such as downtown.

OR 99E is an example of a major arterial roadway.

Minor Arterial Roadways are intended to serve local traffic traveling to and from major arterial roadways. These roadways provide greater accessibility to neighborhoods, often connecting to major activity generators and provide efficient through movement for local traffic. Posted speeds on minor arterial roadways typically range between 25 and 45 miles per hour.

Linn Avenue is an example of a minor arterial roadway.

Collector Roadways often connect the neighborhoods to the minor arterial roadways. These roadways serve as major neighborhood routes and generally provide more direct property access or driveways than arterial roadways. Posted speeds on collector roadways generally range between 25 and 35 miles per hour.

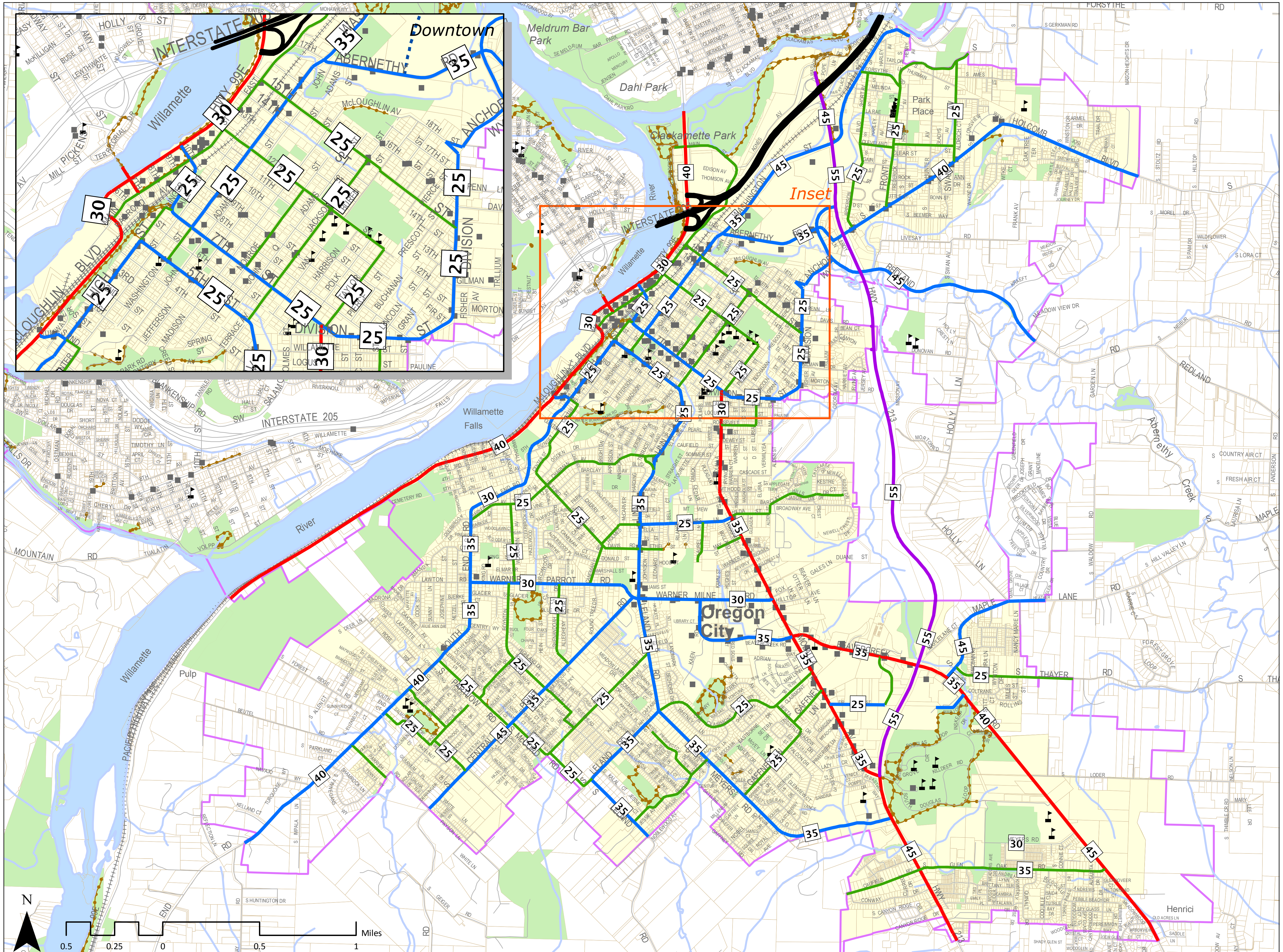
Local Roadways provide more direct access to residences in Oregon City. These roadways are often lined with residences and are designed to serve lower volumes of traffic with a statutory speed limit of 25 miles per hour.

ODOT also classifies roadways in Oregon City under their jurisdiction. Roadways under ODOT jurisdiction (see Figure A3 in the appendix) include the roadways that the City classified as Freeway (I-205), Expressway (OR 213) and several major arterials (i.e. OR 99E, and OR 213). The major characteristics of ODOT roadways in Oregon City are summarized in Table 6. Most of the ODOT roadways in the City are classified by ODOT as District Highways. The exception is I-205, which is classified as an Interstate Highway and OR 99E south of I-205 which is classified as a Regional Highway.

Table 6: ODOT Roadway Characteristics

Roadway (limits)	ODOT Classification*	Special Designations*	Cross section	Posted Speed
I-205 (Willamette River to Clackamas River)	Interstate Highway	Freight Route; Truck Route	4 to 6 lanes	65 mph
OR 213 (I-205 to Molalla Avenue)	District Highway	Expressway; Bypass	4 to 5 lanes	45 to 55 mph
OR 213 (Molalla Avenue to south City limits)	District Highway	N/A	3 to 5 lanes	45 mph
OR 99E (Clackamas River to I-205)	District Highway	Truck Route	4 to 7 lanes	40 mph
OR 99E (I-205 to south City limits)	Regional Highway	Truck Route; Special Transportation Area (STA)**	3 to 5 lanes	30 to 40 mph
OR 43 (Oregon City-West Linn Bridge to OR 99E)	District Highway	STA	2 lanes	25 mph

Source: * Oregon Highway Plan (OHP), Appendix D
**STA designation on OR 99E from 14th Street to Railroad Avenue



OREGON CITY TRANSPORTATION PLAN

FIGURE 5

Existing Functional Classification and Speed Limits

Legend

Existing Functional Classification

- Freeway
- Expressway
- Major Arterial
- Minor Arterial
- Collector
- Local

00 Posted Speed Limit

- School
- Activity Generator
- Multi-Use Path
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary
- Tax Lots

Bridges

Five bridges connect Oregon City to areas north and west of the City. The bridges include:

- **Oregon City-West Linn Arch Bridge** crosses the Willamette River to the northwest of Oregon City, connecting to West Linn. The bridge, constructed in 1922, is just under two tenths of a mile long and is iconic for the region. The bridge is open to motor vehicle, pedestrian and bicycle traffic only. Bicyclists must share the roadway with motor vehicles. In 2010, ODOT estimated 12,700 vehicles crossed the bridge each day.

View of the Arch Bridge from Downtown

- **Abernethy Bridge** opened in 1970 and carries I-205 traffic across the Willamette River between Oregon City and West Linn. The bridge is open to motor vehicle and freight traffic only. In 2010, ODOT estimated 98,100 vehicles crossed the bridge each day.
- **Clackamas River Bridge** opened in 1962 and carries I-205 traffic across the Clackamas River between Oregon City and Gladstone. The bridge is open to motor vehicle and freight traffic only. In 2010, ODOT estimated 129,100 vehicles crossed the bridge each day.
- **John McLoughlin Bridge** carries OR 99E traffic across the Clackamas River to the north of Oregon City, connecting to Gladstone. The bridge is open to motor vehicle, freight, pedestrian and bicycle traffic. Bicyclists must share the roadway with motor vehicles. In 2010, ODOT estimated 32,000 vehicles crossed the bridge each day.
- **82nd Drive/Park Place Bridge** crosses the Clackamas River to the north of Oregon City, connecting to Gladstone. The bridge, constructed in 1921, is open to pedestrians and bicyclists only and is part of the I-205 multi-use path.

View across the 82nd Drive/Park Place Bridge

Bridges are also located on OR 213, Anchor Way, Holcomb Boulevard, and Washington Street. In addition, an active railroad bridge crosses the Clackamas River, just to the east of the I-205 Clackamas River Bridge. A second railroad bridge crossing over the Clackamas River is located about midway between the John McLoughlin Bridge and the 82nd Drive/Park Place Bridge. The railroad tracks leading to this bridge have been removed on both sides and it currently sits unused, abandoned since 1968.

Freight

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The designation of through truck routes provides for this efficient movement, while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. ODOT has identified I-205 as a freight route through Oregon City. While OR 99E is not classified by ODOT as a freight route, it is designated as a truck route by the federal government.

Much of the freight activity in Oregon City is related to the Metro designated employment land. Designated employment land is located near the southeast corner of the City along OR 213, Beavercreek Road and Molalla Avenue. Freight activity is also generated within the Metro designated Oregon City Regional Center. To allow for efficient movement between these designated areas and regional freight routes, Metro has classified several roadways in the City as freight connectors. The connector roadways link I-5 with the employment areas and include OR 213, Beavercreek Road and OR 99E. Freight accounts for approximately two percent of the traffic on OR 213, a little over one percent on Molalla Avenue and about one percent on Maple Lane Road.

Rail

Railroad tracks are available in Oregon City, just west of Clackamas River Drive and Washington Street at the north end of the City and just west of OR 99E along the Willamette River towards the south end of the City. The tracks are owned by Union Pacific Railroad and are currently utilized by freight and Amtrak passenger trains. ODOT estimates that about six passenger trains and between 20 and 25 freight trains pass through Oregon City each day.[4]

Gated at-grade railroad crossings are located at Forsythe Road and 10th Street, while grade separated crossings are located at OR 213, 15th Street, 14th Street, 13th Street, 12th Street and OR 99E.

Air

Portland International Airport (PDX), owned and operated by the Port of Portland, provides regional and international air service for passengers and freight. The airport is located approximately 18 miles (or about 25 minutes) to the north of Oregon City and is connected via I-205. In addition, the Aurora State Airport and Mulino Airport are located less than 15 miles (or 20 minutes) from Oregon City and provide local commercial service and private aircraft use.

Pipeline

A natural gas pipeline serving Oregon City generally crosses the southeast part of the City near Henrici Road. It is operated by Northwest Natural Gas. Several feeder lines from the main pipeline also serve Oregon City. There are no other major regional water or oil pipelines within the City limits.

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[4] ODOT Intercity Passenger Rail Study, ODOT Rail Division, June 2009 Draft.

Water

Oregon City is bordered by the Willamette River on the west side and Clackamas River on the north side of the City. These waterways generally only serve recreational needs. The Willamette Falls Locks, located just south of Downtown Oregon City on the west side of the Willamette River, provides a canal passage for boaters wishing to travel around Willamette Falls.

Transportation System Management and Operations

Transportation System Management and Operations (TSMO) is a set of integrated transportation solutions intended to improve the performance of existing transportation infrastructure through a combination of transportation system management (TSM) and transportation demand management (TDM) strategies and programs.

Transportation System Management (TSM): Oregon City has several regional roadway facilities that serve the City and neighboring communities (I-205, OR 213 and OR 99E). These roadways, along with parallel arterials including Washington Street, 7th Street-Molalla Avenue and Beavercreek Road benefit from TSM infrastructure. Current TSM infrastructure includes:

- Communications infrastructure is available along I-205 and portions of OR 99E, OR 213, Molalla Avenue, Washington Street and Beavercreek Road.
- Coordinated time of day traffic signal control plans at various intersections along OR 99E, OR 213, Molalla Avenue, Washington Street and Beavercreek Road.
- Ramp meters on the OR 99E and OR 213 eastbound and westbound on ramps to I-205
- Cameras at the I-205 interchanges with OR 99E and OR 213 for monitoring travel conditions.
- Road and weather sensor along OR 99E in the Canemah neighborhood.
- Video detection at the Washington Street/Abernethy Road intersection.

The Portland Regional TSMO Plan calls for Arterial Corridor Management (ACM) along OR 213, Beavercreek Road (south of OR 213), OR 213 (to Henrici Road), Washington Street and 7th Street in Oregon City. The project would improve operations by expanding traveler information and upgrading traffic signal equipment and timings.

The Regional TSMO Plan also calls for ACM with adaptive signal timing along Molalla Avenue between 7th Street and OR 213 and Beavercreek Road between Molalla Avenue and OR 213. This project includes the ACM project with signal systems that automatically adapt to current arterial roadway conditions

Transportation Demand Management: Oregon City implements a variety of TDM measures. They include:

- Parking Management
- Roadway Connectivity

- Investing in pedestrian/bicycle facilities

Metro's regional travel demand model was used to evaluate progress towards meeting transportation demand management (TDM) goals, specifically reducing reliance on the single occupancy vehicle (SOV). Metro sets non-SOV targets for areas throughout the region based on 2040 design type. In Oregon City, the Oregon City Regional Center, the 7th Street-Molalla Avenue Corridor and the OR 99E Corridor are required to meet the non-drive alone modal target of 45 to 55 percent. The employment land and the neighborhood land uses in the City are required to meet the non-drive alone modal target of 40 to 45 percent. As shown in Figure A4 in the appendix, the Oregon City Regional Center, as well as much of the northeast, southeast and southwest portions of the City have experienced an increase in non-SOV trips since 2005. These locations are expected to continue to increase trip share via walking, biking, carpooling or public transportation. A few of the more established neighborhoods outside of Downtown will see a slight decline in non-SOV trips through 2035.

Environmental Justice

As stated by the Environmental Protection Agency, "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.[5]" Within the context of the TSP, Environmental Justice is an effort to identify underserved and vulnerable populations so the City can improve transportation services while avoiding future impacts. Figure A5 in the appendix identifies the location of low-income populations (indicating populations most likely to be dependent on public transportation), minority groups and elderly persons. Significant populations of low-income residents are located in the Park Place neighborhood. Significant populations of minority groups are located around Molalla Avenue between Beavercreek Road and Division Street, while significant populations of the elderly are located around the 15th Street/Division Street intersection. There were no significant populations of non-English speakers and people with disabilities in the City.

Household Cost of Transportation

The financial burden of transportation costs is growing in the United States. This is generally due to rising costs associated with fuel, vehicle maintenance, insurance and in some cases, people seeking affordable homes greater distances from employment. To be considered affordable, housing costs should be no more than 30 percent of household income, transportation costs no more than 15 percent of household income, or the combination of housing and transportation expenses should be no more than 45 percent of household income. In the Oregon City area[6] the housing costs are currently estimated at 26.1 percent of household income (2006 data), transportation costs (2008 data) are estimated at 22.3 percent of household income, for a total of 48.4 percent of household

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5 U.S. EPA, Environmental Justice, Compliance and Enforcement, Website, 2007

6 Housing-Transportation Affordability Index, Center for Neighborhood Technology, http://htaindex.cnt.org/method.php

income spent on housing and transportation expenses. The relatively high percentage of income for transportation costs could be due to Oregon City's location at the south edge of the Metro Area and the need for workers to commute longer distances to employment. In addition, many low density neighborhoods lack retail and other community services within the neighborhood or vicinity.

Providing improved travel options, as well as increasing employment in or near Oregon City could help lower transportation costs. Creating opportunities for higher density mixed use areas, as well as neighborhood retail and services centers in or near low density residential areas could potentially reduce the need for driving.

What travel conditions do people face?

The transportation system in Oregon City is managed with a variety of measures to ensure that the transportation infrastructure in the City maintains acceptable quality for residents.

Safety Evaluation

The safety of the roadways and intersections in Oregon City were monitored through collision data as part of the TSP Update. The data was reviewed to identify potential patterns for motor vehicle, pedestrian, and bicyclist collisions.

Collision data from the most recent five years of available data (2005 to 2009) for all roadways in Oregon City was obtained from ODOT and reviewed. Over the past five years, 2,320 collisions (an average of over 464 collisions a year) occurred in Oregon City. A majority of these collisions (about 70 percent) were either rear-end or turning type collisions (see Figure 6). One percent of the collisions involved pedestrians (about five a year), and one percent involved bicycles (about five a year).

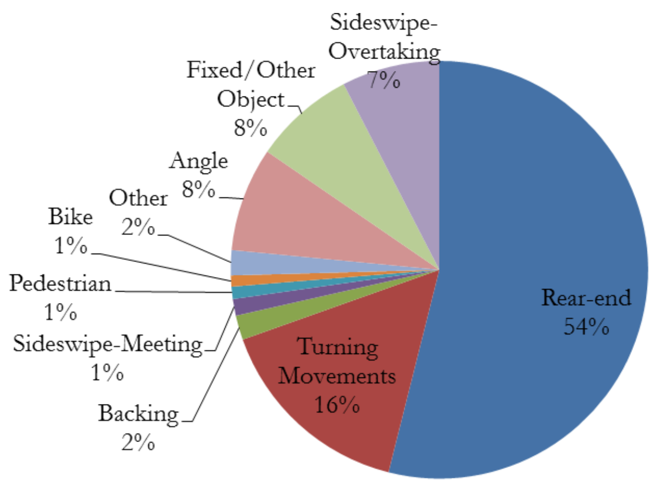


Figure 6: Collision Types (2005 to 2009)

Severities of the collisions in Oregon City over the past five years were generally low, with 58 percent involving property damage only (no injuries). There were four fatalities in the City over the past five years, although fatalities were involved in less than one percent of the collisions.

Pedestrian Safety: There were 22 collisions involving pedestrians over the past five years (eight in 2005, five in 2006, three in 2007, two in 2008 and four in 2009). Of the 22 collisions, six were along Molalla Avenue and 7th Street between Center Street and Warner Milne Road through an area with increased retail activity and a transit corridor. Five additional collisions occurred on OR 99E through Oregon City's downtown: two at 6th Street, one at 10th Street and two at the I-205 ramps. Three additional collisions occurred around downtown Oregon City, one at the Main Street/15th Street, Washington Street/12th Street and Jefferson Street/5th Street intersections. Beavercreek Road had three collisions involving a pedestrian, with one each at Red Soils Court, Fir Street and OR 213. Two occurred in the southwest part of the City, one in the Canemah neighborhood at the OR 99E/Hedges Street intersection and one just north of Canemah at the Tumwater Drive/2nd Street intersection. Two collisions occurred along Holcomb Boulevard through the Park Place neighborhood, one each at Apperson Boulevard and Longview Way, while one occurred towards the south end of the City along Meyers Road at Frontier Parkway. Most of the collisions involving pedestrians were caused by motorists failing to yield the right-of-way. The location of the pedestrian collisions can be seen in Figure 7.

Bicycle Safety: There were 20 collisions involving bicyclists over the past five years (three in 2005, six in 2006, five in 2007, three in 2008 and three in 2009). Of the 20 collisions, seven were on Molalla Avenue between Division Street and Clairmont Way through an area with a high frequency of driveways. Three collisions occurred along both OR 99E and OR 213, with one at Dunes Drive, 14th Street and 2nd Street along OR 99E and one at Washington Street, Redland Road and Meyers Road along OR 213. Linn Avenue had two collisions involving a bicyclist, one each at Eastfield Drive and AV Davis Road. The other collisions involving a bicycle occurred at the Washington Street/14th Street, South End Road/Salmonberry Drive, Beavercreek Road/Kaen Road and Barker Avenue/Clearbrook Drive intersections. Most of the bicycle collisions were caused by a motorist failing to yield the right-of-way when turning. The location of the bicycle collisions can be seen in Figure 7.

Intersection Safety: Collision rates were calculated (based on the past five years of collision data) for each of the 21 intersections reviewed in Oregon City (see Table A1 in the appendix) and summarized in Figure 7. The crash rates at two intersections (Main Street/14th Street and the OR 213/Beavercreek Road intersection) were identified as high collision locations. In addition, the OR 213/Caufield-Glen Oak Road and the Washington Street/12th Street intersections were identified as having above average collision rates. The collisions were further evaluated at these intersections to see if any trends exist.

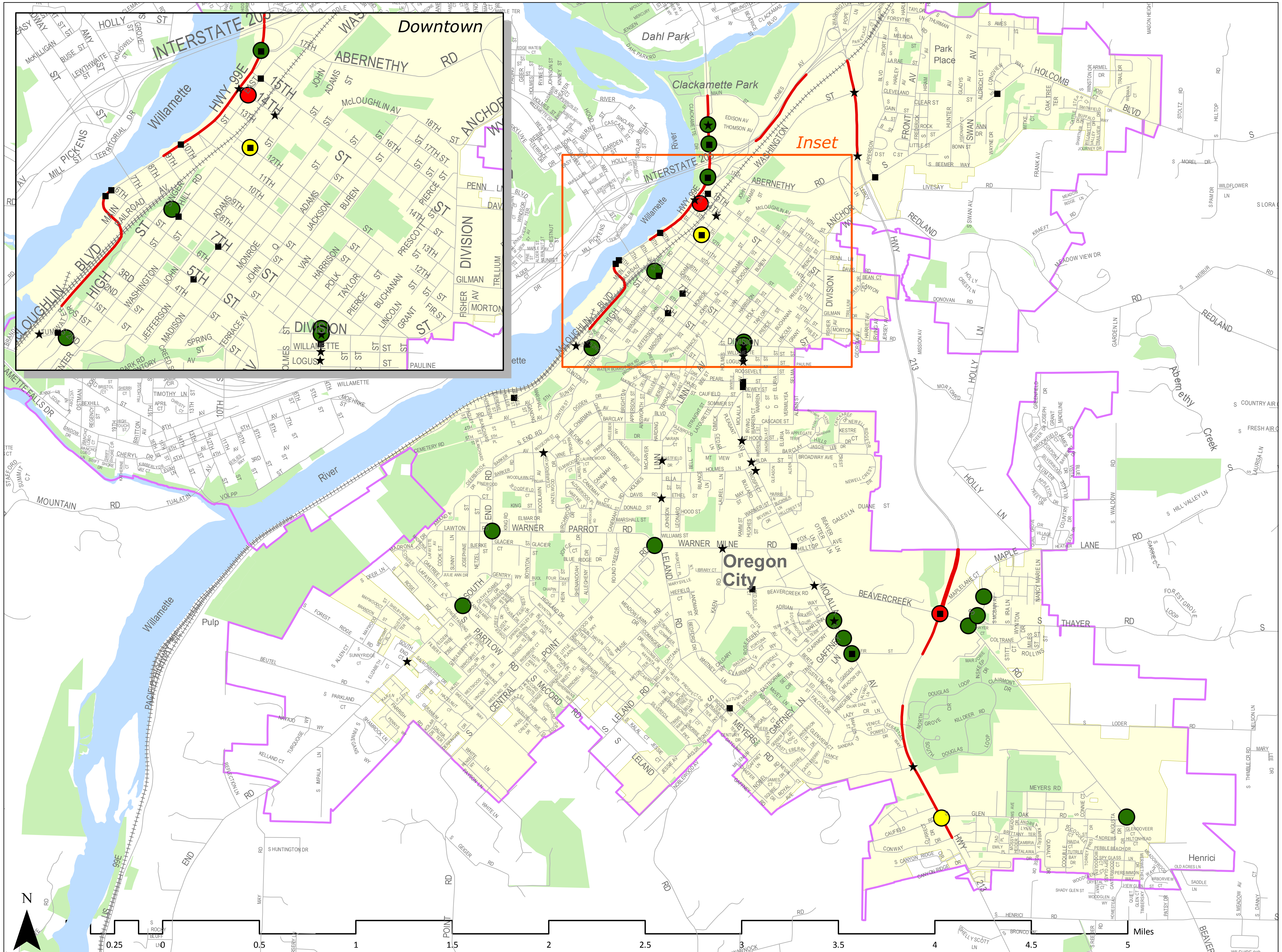
- The Main Street/14th Street intersection is two-way stop controlled, while several of the adjacent intersections along Main Street are all-way stop controlled intersections. Most of the collisions at this intersection were angle type collisions (15 of the 23 collisions) meaning one vehicle pulled out in front of another. This may indicate that drivers on Main Street are unaware that traffic on 14th Street is not required to stop and consequently often fail to yield the right of way.
- The OR 213/Beavercreek Road signalized intersection is located within the 55 mile per hour speed zone and expressway segment of OR 213. This is the first at-grade intersection south of Redland Road for over two miles. Most of the collisions at this intersection were rear-end type (166 of the 212 collisions). This may indicate that drivers are caught off guard by queues from the intersection after traveling at uninterrupted higher speeds for an extended period of time. The severities of the collisions were generally low, with 85 percent involving property damage only (no injuries) or minor injuries. Major injuries were involved in about

seven percent of the collisions and there were no fatalities.

- The OR 213/Caufield-Glen Oak Road signalized intersection is located just south of the 55 mile per hour speed zone and the portion of OR 213 that narrows to one travel lane in each direction. Nearly all of the collisions at this intersection were rear-end type (33 of the 37 collisions). This may indicate that drivers are caught off guard by queues from the intersection or could be focused on maneuvering for position when the road narrows to one lane without noticing stopped vehicles ahead. During evening peak field reviews, queues were observed in the southbound direction extending nearly to Meyers Road.
- The Washington Street/12th Street intersection is two-way stop controlled, with 12th Street yielding the right-of-way. The intersection is characterized by steep topography on both Washington Street and 12th Street. Between 2005 and 2008, 13 collisions occurred at this intersection which is typical for the volume of traffic served. However, in 2009 14 collisions occurred, more than the previous four years combined and amounting to a collision rate more than double the average for the intersection. This may correspond with increased traffic flow on 12th Street after being extended from Main Street to OR 99E. Most of the collisions at this intersection were angle type collisions (17 of the 27 collisions), with eight occurring in 2009. This may indicate that drivers on 12th Street are not noticing the traffic control at the intersection or are unaware that traffic on Washington Street is not required to stop and consequently often fail to yield the right of way. During field reviews, it was noted that the stop sign for the southeast direction of 12th Street is obstructed by tree branches and an electric pole, although a flashing beacon is visible at the intersection. Note that six of the collisions which occurred in 2009 at this intersection were related to a single snow event (five rear-end and one sideswipe type collision).

Are there any areas in Oregon City that are identified as high collision locations by ODOT?
Yes, in Oregon City there are ten locations that rank among the top ten percent of state highways in Oregon for collision frequency.[7] The identified high collision locations are shown in Figure 7 and summarized in the appendix.

[7] 2010 ODOT Safety Priority Index System (SPIS) top 10 percent sites



OREGON CITY TRANSPORTATION PLAN

FIGURE 7

High Collision Locations

Legend

- High Collision Roadway Segment
- ★ Collision Involving Bicycle
- ■ Collision Involving Pedestrian

Intersection Safety

- Average Collision Location
- Above Average Collision Location
- High Collision Location

- River
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary

Pedestrian Conditions

The pedestrian facilities were reviewed as part of this TSP Update to identify facility deficits or potential connectivity or access improvement opportunities. The existing sidewalk system in downtown Oregon City encourages walking trips by providing a high level of connectivity to key destinations, such as shopping, schools, parks and museums. The continuous presence of sidewalks on Molalla Avenue, 7th Street, Warner Milne Road, Beavercreek Road and Meyers Road link much of the major shopping and employment areas of the City with Downtown. Despite the relatively linked walking routes, there are a number of conditions that provide challenges to pedestrians. These include:

Residential neighborhood sidewalk connectivity: While the City has a relatively built-out sidewalk network in much of the major employment and shopping areas, there are limited connections to and within the neighborhoods. Over the past few years, some of the sidewalk gaps throughout the City including portions of Beavercreek Road, Holcomb Boulevard and Central Point Road have been filled. Several major streets connecting to and within the residential neighborhoods of the City including OR 99E (south of Main Street), OR 213 (south of Molalla Avenue), Linn Avenue, Partlow Road, Clairmont Way, Leland Road, Meyers Road, Beavercreek Road, South End Road, Warner Parrot Road, Redland Road, Holcomb Boulevard and Maple Lane Road either lack sidewalks completely, or on one side for extended distances. Sidewalk gaps are most notable in the southern and southwest neighborhoods in the City including Tower Vista, South End, Hillendale, Rivercrest and Canemah. A few of these roadways are under the jurisdiction of ODOT (OR 99E) and Clackamas County (portion of South End Road). In addition, sidewalk gaps are evident around schools such as John McLoughlin Elementary, Holcomb Elementary, King Elementary, Gaffney Lane Elementary and Gardiner Middle. The City should work with developers and these jurisdictions to continue increasing the sidewalk coverage on all roadways in the City.

Pedestrian walking along the shoulder of Main Street

Pedestrian access to Canemah: There are inadequate pedestrian connections between the Canemah neighborhood (along OR 99E at the bottom of the bluff) and the rest of the City. The neighborhood lies between OR 99E and South End Road, however, both lack comfortable well maintained pedestrian facilities and are generally not conductive for walking trips.

Pedestrian roadway crossings: There are pedestrian crosswalks at a large number of intersections in Oregon City, particularly in downtown where pedestrian activity is the highest. However, the need for further crossing enhancements was evident through field observations. Most notable is the need for additional or improved crossings of OR 99E, OR 213, 7th Street, Molalla Avenue and

Washington Street. Pedestrian crossing is difficult across many of these roadways due to high motor vehicle volumes and speeds.

Pedestrian refuge and crosswalk along Molalla Avenue

Signalized crossing opportunities across OR 99E are available at several intersections in downtown between 10th Street and 14th Street. Past 10th Street, a signalized crossing opportunity is not available for nearly a half mile at Main Street. South of downtown, a pedestrian bridge over OR 99E is available just to the north of Tumwater Drive (at the end of the McLoughlin Promenade) and a signalized pedestrian crossing is available at 2nd Street. No additional marked pedestrian crossings (signalized or unsignalized) of OR 99E are available south of 2nd Street through the Canemah neighborhood, a distance of over a half mile.

Crossing opportunities for pedestrians across OR 213 to the Park Place neighborhood (in the northeast portion of the City) are spaced approximately every half mile and available via Washington Street, Holcomb Boulevard and Redland Road. South of Redland Road, a crossing opportunity is not available for over two miles, at Beavercreek Road. Between Beavercreek Road and Caufield-Glen Oak Road, crossing opportunities are available at Molalla Avenue and Meyers Road, spaced about a half mile between each. South of Caufield-Glen Oak Road no additional crossing opportunities of OR 213 are available in the City.

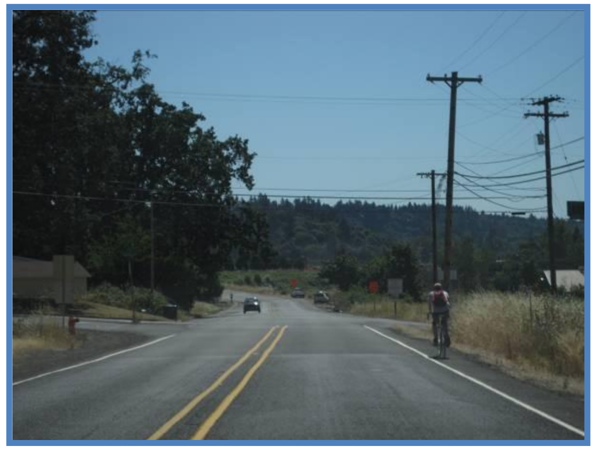
Additional crossing opportunities and enhancements for pedestrians across 7th Street, Molalla Avenue and Washington Street would be beneficial. Visibility issues and steady streams of traffic limit the available gaps for safe pedestrian crossings along these roadways. Marked crossing gaps of greater than a half mile exist on each of these roadways.

Pedestrian connectivity between Downtown and the top of the bluff: The Municipal Elevator and the Grand Staircase provide a pedestrian connection between the lower level and upper portion of 7th Street. Street connections to the top of the bluff from downtown are limited to South End Road, Center Street, 5th Street-Linn Avenue, Singer Hill Road-7th Street, 12th Street, 14th Street and 15th Street. Of these roadways, only Singer Hill Road-7th Street and 12th Street offer continuous pedestrian facilities up the hill, however these facilities are narrow and often impractical for ADA access. Several of these roadways are characterized by steep inclines and narrow winding roadways that are generally not supportive of safe pedestrian travel.

Bicycle Conditions

The bicycle facilities were reviewed as part of this TSP Update to identify facility deficits or potential connectivity or access improvement opportunities. There are two primary north/south routes (5th Street-Linn Avenue and 7th Street-Molalla Avenue) and several primary east/west routes (Warner Milne Road, Warner Parrot Road, Beavercreek Road and Washington Street) in the City with bicycle facilities.

Bicycle facility gaps: While the City has a few primary north/south and east/west routes, there are several facility gaps on major corridors and limited connections within the residential neighborhoods. Bike lane gaps on OR 99E, Washington Street, Leland Road, Meyers Road, Molalla Avenue, Maple Lane Road, Holcomb Boulevard, South End Road, Center Street, Central Point Road and Division Street should be addressed to provide connectivity for bicyclists throughout the City.



Bicyclist riding in the roadway

Bicycle connectivity between Downtown and the top of the bluff: Bicycle connections to the top of the bluff from downtown are limited to South End Road, Center Street, 5th Street-Linn Avenue, Singer Hill Road-7th Street, 12th Street, 14th Street and 15th Street. Of these roadways, only 5th Street-Linn Avenue offers continuous bicycle facilities up the hill. Singer Hill Road-7th Street offers an adjacent bike route between Washington Street and Division Street along 9th Street and Taylor Street. South of Division Street, Singer Hill Road-7th Street becomes Molalla Avenue, which has bike lanes. Several of these roadways are characterized by steep inclines and narrow winding roadways that are generally not supportive of safe bicycle travel.

McLoughlin Promenade: The McLoughlin Promenade could potentially be extended south to provide bicycle and pedestrian connections to the Canemah neighborhood and other areas at the south end of the City. The promenade is only five feet wide and would need to be widened to provide a multi-use trail for bicycle and pedestrian usage. However, the Museum of the Oregon Territory and several businesses lie in the potential path of an off-street multi-use trail in this area. Any potential widening would require historic review to assure it would not detract from the historic significance of the Promenade.

McLoughlin Promenade is only five feet wide

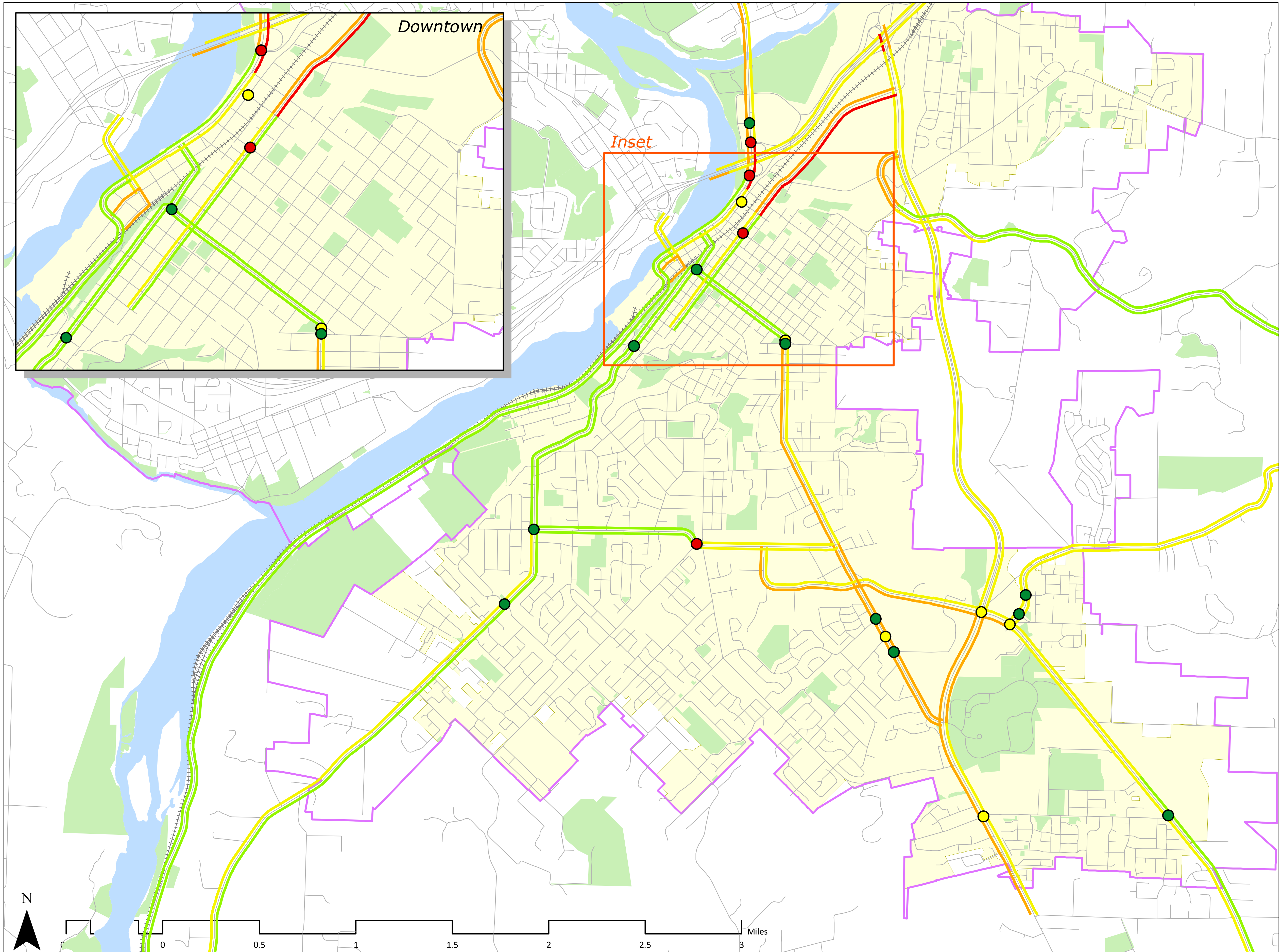
Link the regional trail network with the City network: The connectivity and access to the regional trail network including the I-205 multi-use trail and the potential Oregon City Loop Trail should be enhanced to encourage more biking and walking trips within the City. Bicycle and pedestrian users must currently access the I-205 multi-use trail via OR 99E or Main Street.

Motor Vehicle Conditions

The motor vehicle conditions in Oregon City vary based on the time of year. During the peak seasonal period (typically in August), traffic volumes are higher than those during the average weekday (typically in the spring or fall) and therefore intersection operations are often worse. For this reason, the intersection operations were evaluated at the 21 intersections reviewed during the peak seasonal period. The evaluation utilized 2000 Highway Capacity Manual methodology for all the intersections.

Peak seasonal intersection operations are summarized in Figure 8 and shown in Table A2 in the appendix. During the evening peak period, four of the intersections reviewed are substandard including the OR 99E/I-205 SB Ramps and OR 99E/I-205 NB Ramps intersections. In addition, two unsignalized intersections are substandard (Washington Street/12th Street and Central Point Road/Warner Parrott Road).The side streets at these intersections (12th Street and Central Point Road) generally experience high delay due to steady volumes on the uncontrolled roadway. These approaches typically require more time for an acceptable gap in traffic to make a left turn onto the mainline, therefore, the delay of the side street is high.

Evening peak period motor vehicle speeds were compared to posted speed limits on major roadways in the City. The motor vehicle speeds during the p.m. peak hour were assessed using INRIX historical traffic flows on major roadways. The data, obtained from ODOT, is based on multiple years of collected speed values. As shown in Figure 8, there are several roadways during the evening peak hour that experience travel speeds much lower than the posted speed. Portions of OR 213, OR 99E, Beavercreek Road, Molalla Avenue, and Washington Street experience average travel speeds well below the posted limits during the evening peak hour.



OREGON CITY TRANSPORTATION PLAN

FIGURE 8

Motor Vehicle Operating Conditions (P.M. Peak)

Legend

Roadway Travel Speed compared to Posted Speed

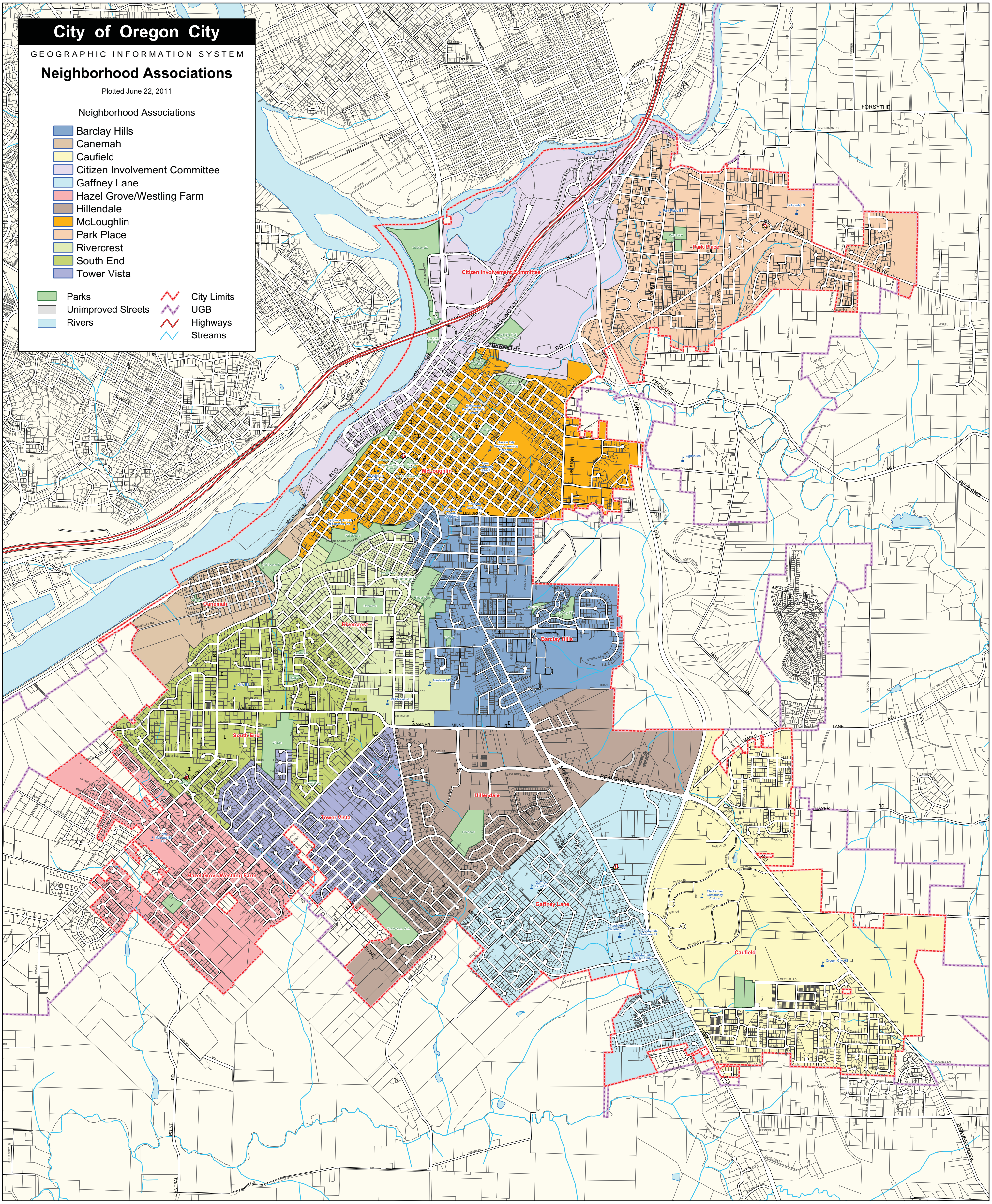
- Congested, well below speed limit
- Slowing, well below speed limit
- Slowing, but near speed limit
- Uncongested, near speed limit

Peak Seasonal Intersection Operations

- Good
- Marginal
- Substandard

- River
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary

Appendix



MAP FOR REFERENCE PURPOSES ONLY.
The information on this map is derived from Oregon City's digital database. However, there may be map errors or omissions. Please contact Oregon City directly to verify map information. Notification of any errors is appreciated.

Please recycle with colored office grade paper.

N
W E
S

0 0.5 1 2 Miles

0 1,000 2,000 4,000 6,000 8,000 10,000 Feet

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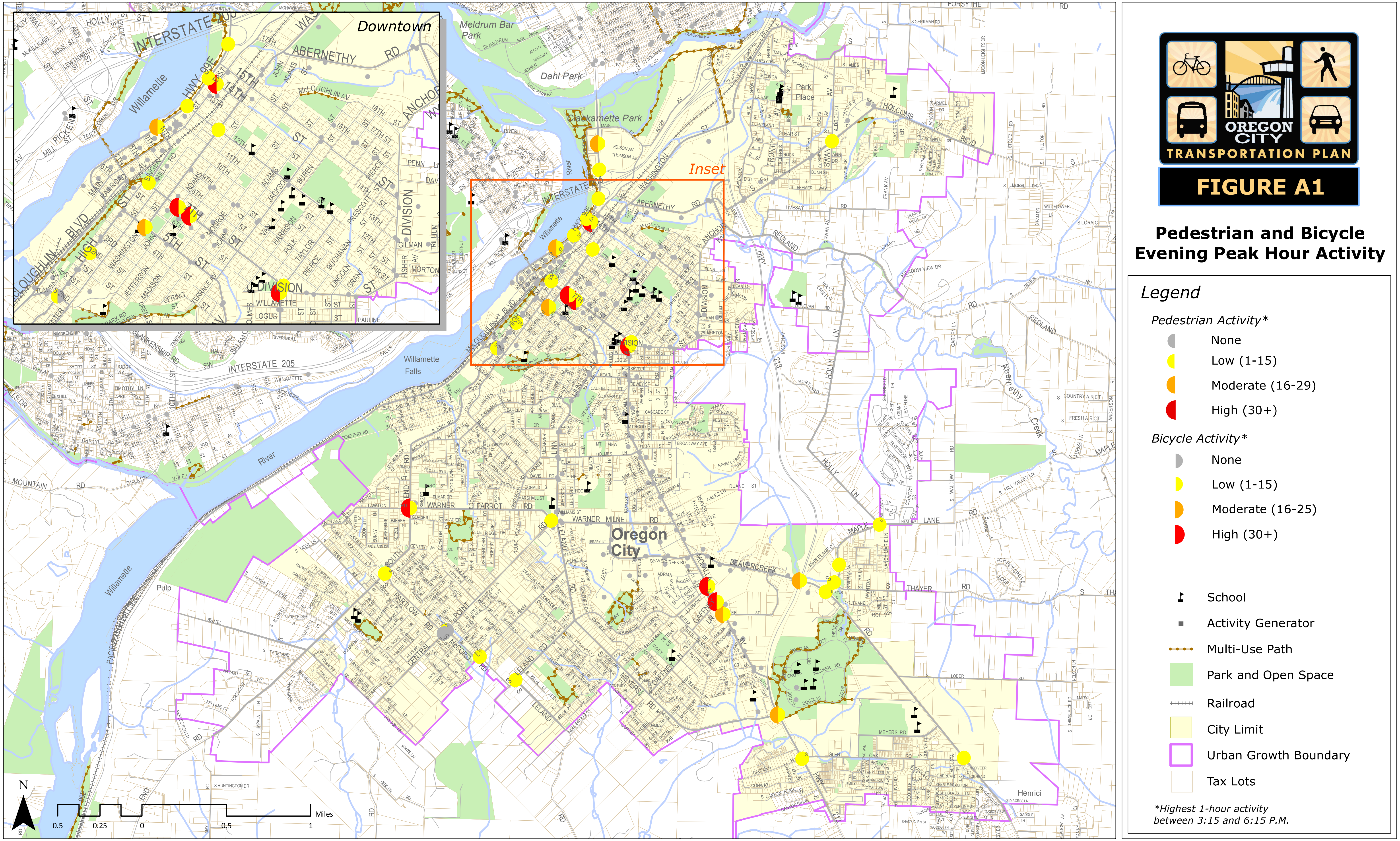
OREGON CITY

Plot date: June 22, 2011
Plot name: Neighborhood Associations - 36x48P - 20110622.pdf
Map name: Neighborhood Associations - 36x48P.mxd

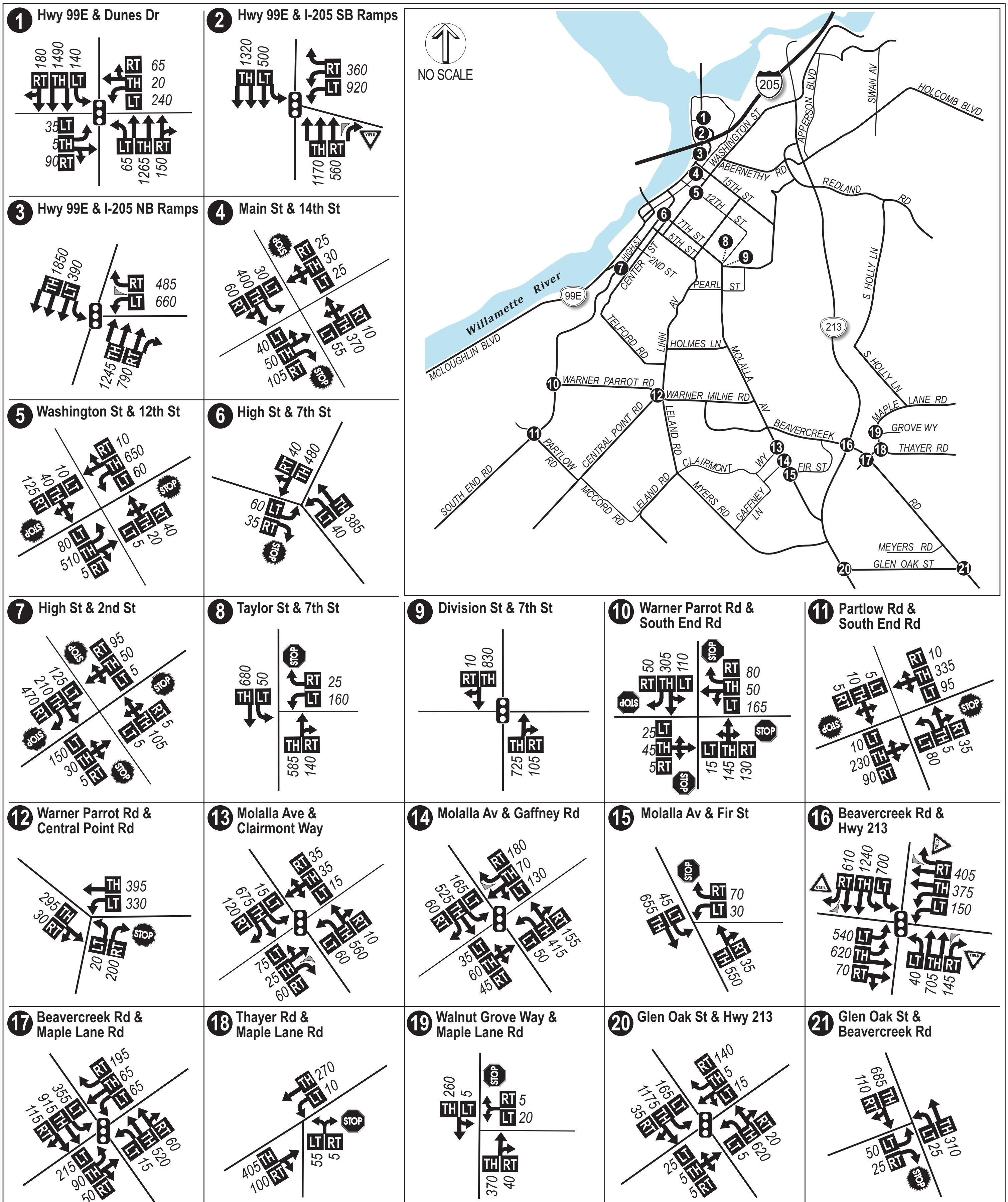

OREGON CITY
TRANSPORTATION PLAN
FIGURE A1
Pedestrian and Bicycle Evening Peak Hour Activity
Legend
Pedestrian Activity*
None
Low (1-15)
Moderate (16-29)
High (30+)
Bicycle Activity*
None
Low (1-15)
Moderate (16-25)
High (30+)
School
Activity Generator
Multi-Use Path
Park and Open Space
Railroad
City Limit
Urban Growth Boundary
Tax Lots
*Highest 1-hour activity between 3:15 and 6:15 P.M.
Downtown
Inset
Oregon City
Willamette River
Willamette Falls
Meldrum Bar Park
Dahl Park
Clackamette Park
Park Place
Abernethy Creek
Pulp
Henrici
INTERSTATE 205
N
Miles
0.5
0.25
0
0.5
1

Peak Seasonal Traffic Volumes (30HV)

During the summer months, traffic volumes increase due to an influx of recreational and leisure travelers taking advantage of the nice weather. For this reason, the traffic count data was adjusted upward using methodology from the ODOT Analysis Procedures Manual[1] to represent peak seasonal traffic conditions. Using the commuter trend various seasonal factors were developed and applied to the count data to represent peak seasonal (referred to as the 30th highest annual hour (30 HV) volume). The final p.m. peak seasonal traffic volumes developed for the reviewed intersections are displayed in Figure A2.

Peak Seasonal Volumes: The collected count data was factored up to replicate the conditions when traffic volumes are typically highest (August). Using the commuter trend, various seasonal factors were established for the traffic count data collected on April 12th, 13th, 14th, 21st and September 7th.

[1] Analysis Procedures Manual, Oregon Department of Transportation, July 2009.



LEGEND

- 00 - Study Intersection & Number
- STOP - Stop Sign
- Traffic Signal
- YIELD - Yield
- ← - Lane Configuration
- 00 - 30th Highest Hour Traffic Volume (PM)
- LT TH RT - Volume Turn Movement (Left•Thru•Right)

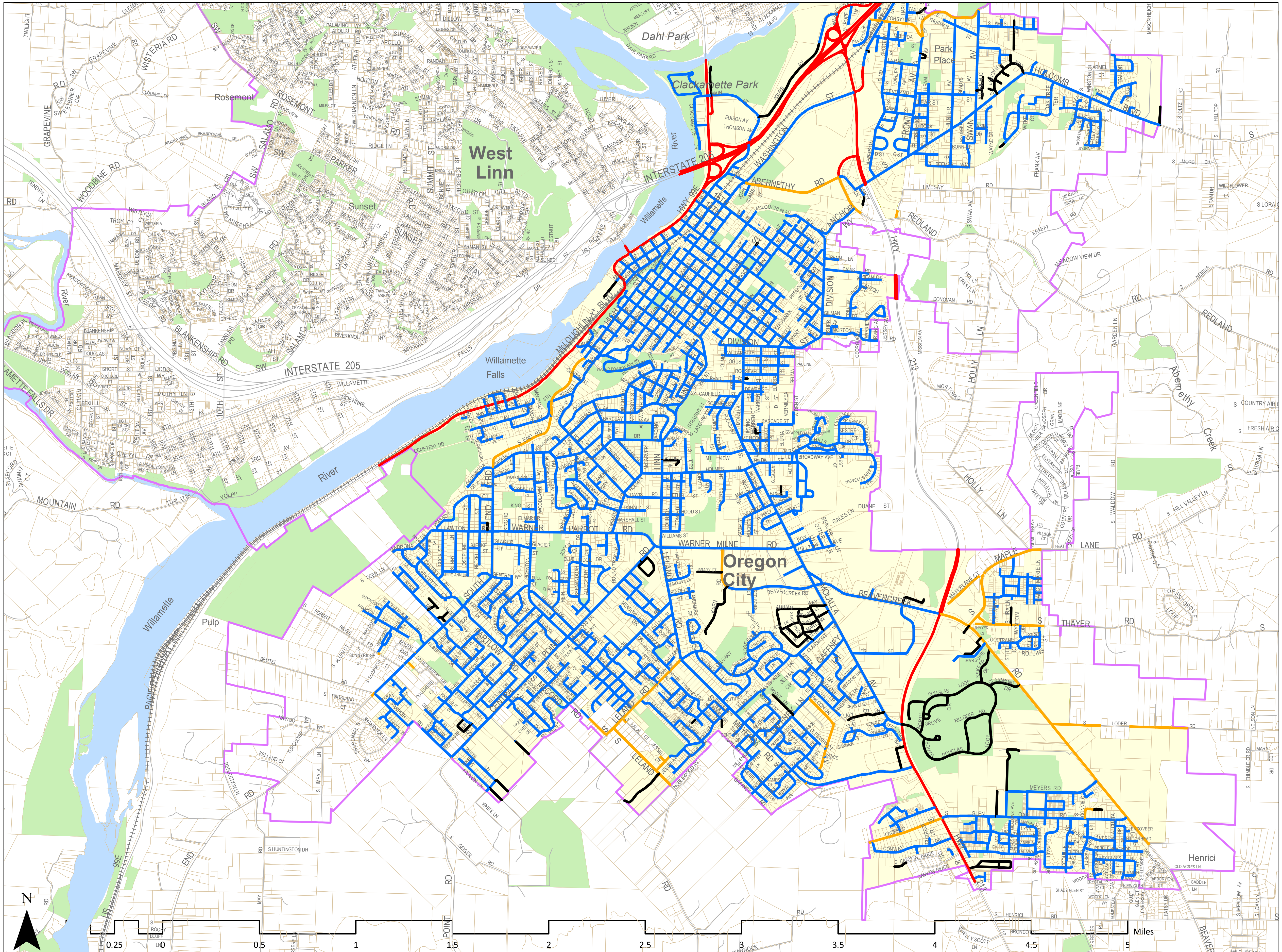
DKS Associates
TRANSPORTATION SOLUTIONS

Figure A2

2011 EXISTING 30HV MOTOR VEHICLE VOLUMES (PM Peak Hour)

OREGON CITY
TRANSPORTATION PLAN

FIGURE A3



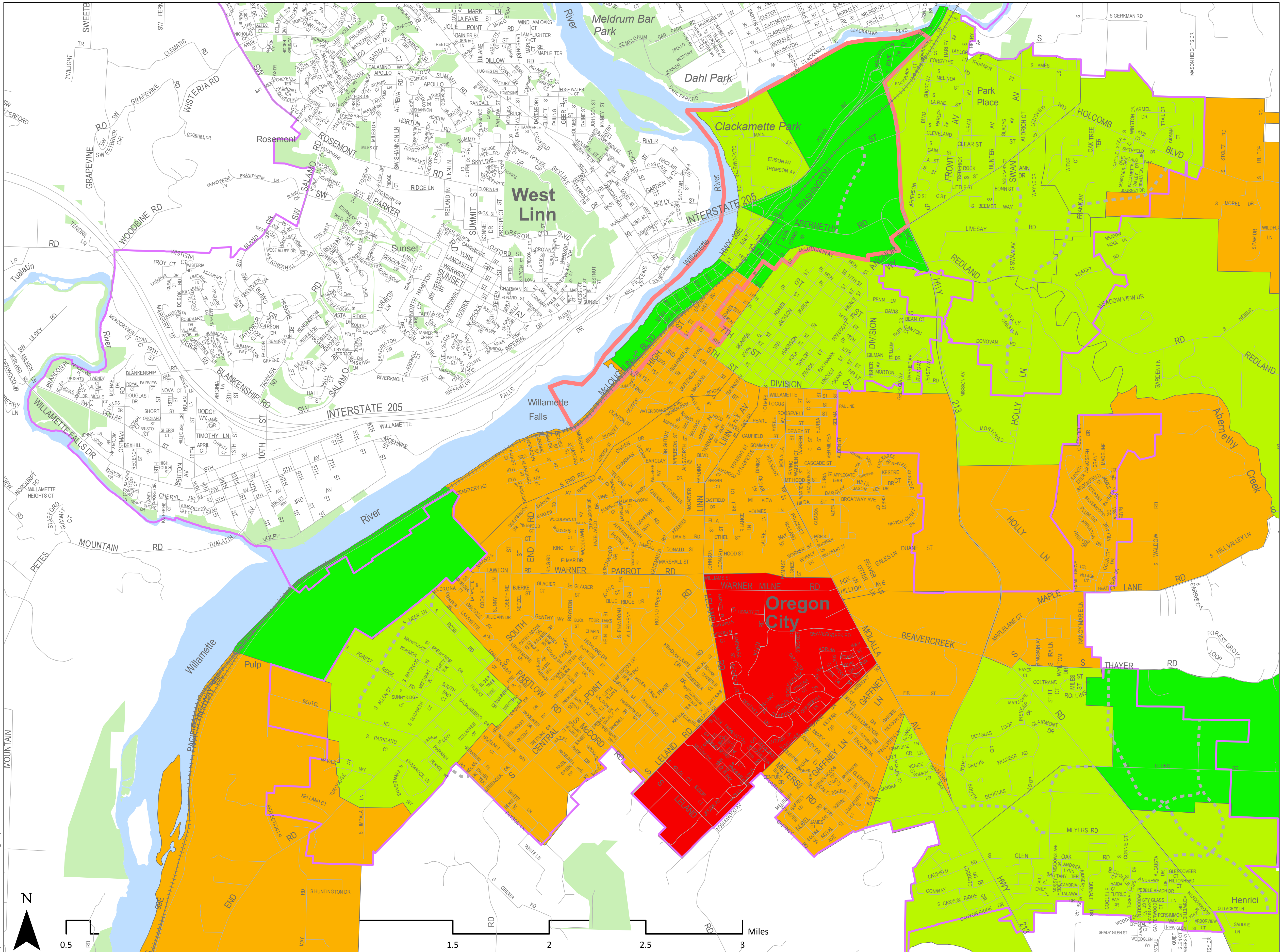
Roadway Jurisdiction

Legend

Roadway Jurisdiction

- Oregon City
- Clackamas County
- ODOT
- Private

- River
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary
- Tax Lots



Sept. 2011 Real Urban Geographics www.realurban.com

OREGON CITY TRANSPORTATION PLAN

FIGURE A4

Non-SOV Mode Share Change

Legend

Non-Single Occupant Vehicle Trip Change between 2005 and 2035

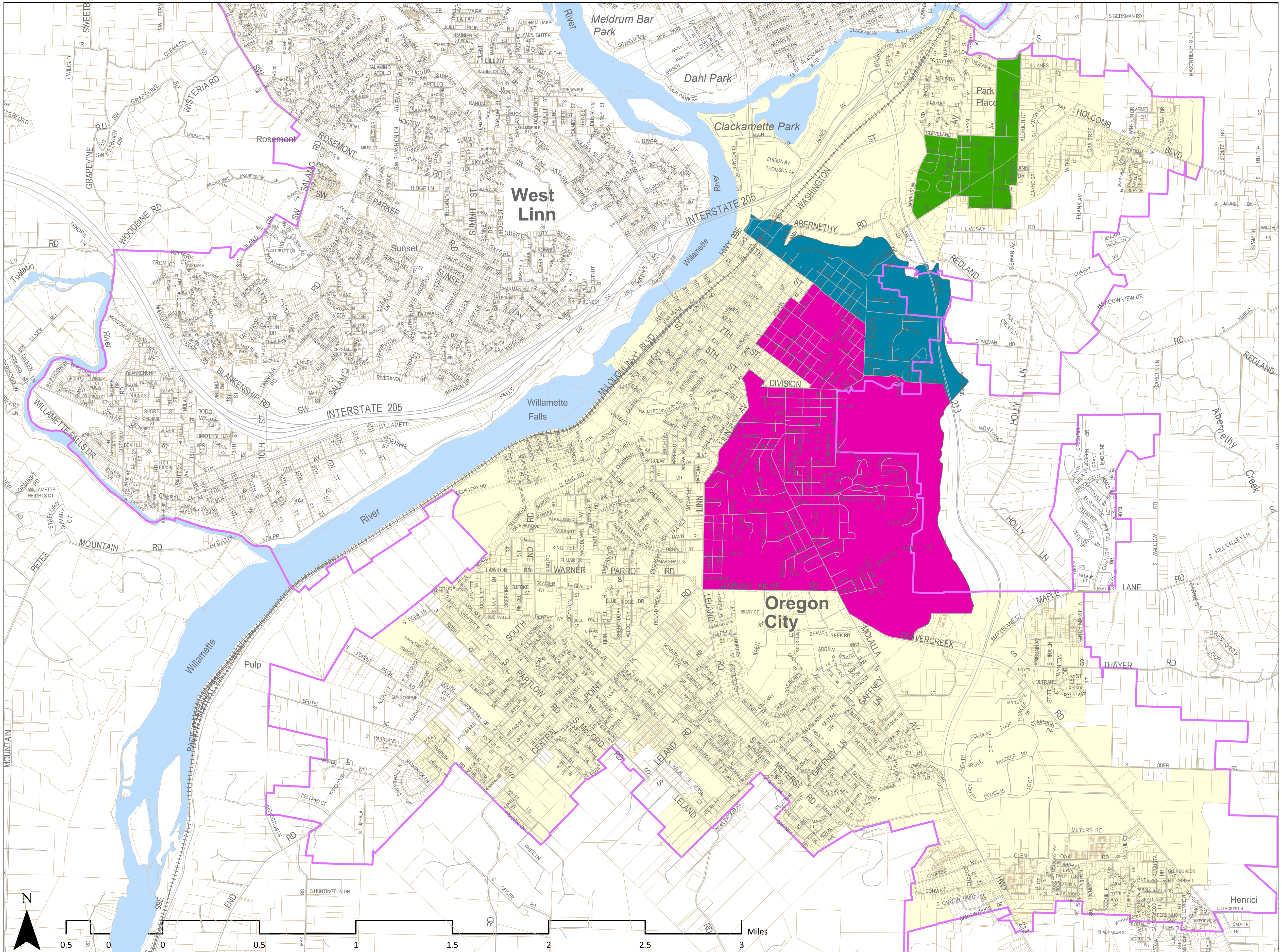
- Greater than a 2% decrease
- Decrease up to 2%
- Increase up to 2%
- Greater than a 2% increase

- Oregon City Regional Center
- River
- Planned Roadways
- Railroad
- Urban Growth Boundary

OREGON CITY TRANSPORTATION PLAN

FIGURE A5

Environmental Justice



Legend

Environmental Justice Populations

- Significant Minority Group Population
- Significant Low Income Population
- Significant Elderly Population

- River
- Railroad
- Urban Growth Boundary
- City Limit
- Tax Lots

Intersection Collisions

The total number of crashes experienced at an intersection is typically proportional to the number of vehicles entering it. Therefore, a crash rate describing the frequency of crashes per million entering vehicles (MEV) is used to determine if the number of crashes should be considered high. Using this technique, a collision rate of 1.0 MEV or greater is commonly used to identify when collision occurrences are higher than average and should be further evaluated.

As shown in Table A1, crash rates were calculated (based on the past five years of collision data) for each of the 21 intersections reviewed in Oregon City.

Table A1: Intersection Collision Evaluation

Intersection	Collision Rate
OR 99E/Dunes Drive	0.51
OR 99E/I-205 WB Ramps	0.43
OR 99E/I-205 EB Ramps	0.34
Main Street/14th Street	**1.07**
Washington Street/12th Street	0.95*
7th Street-Singer Hill/High Street	0.11
High Street/2nd Street	0.31
Taylor Street/7th Street	0.03
Molalla Avenue/Division Street	0.16
South End Road/Warner Parrott Road	0.29
South End Road/Lafayette Avenue-Partlow Road	0.18
Central Point Road/Warner Parrott Road	0.13
Molalla Avenue/Clairmont Way	0.59
Molalla Avenue/Gaffney Lane	0.73
Molalla Avenue/Fir Street	0.28
OR 213/Beavercreek Road	**2.05**
Maple Lane Road/Beavercreek Road	0.38
Maple Lane Road/Thayer Road	0.19
Maple Lane Road/Walnut Grove Way	0.00
OR 213/Caufield-Glen Oak Road	0.92
Beavercreek Road/Glen Oak Road	0.36

*Collision rate at this intersection would be 0.74 if the six collisions that occurred during a single snow event in 2009 are not considered.

Bolded Red and Shaded indicates collision rate exceeds 1.0 MEV

High Collision Locations

The following locations were identified as a high collision location (top ten percent of state highways in Oregon) on the ODOT SPIS:

- I-205 Northbound just past the on-ramp from OR 99E

  This high collision segment experiences an increase in traffic from the OR 99E on-ramp and is impacted by traffic exiting I-205 at OR 213. These factors could be contributing to the amount of collisions.

- OR 99E from one-tenth of a mile north of Dunes Drive to I-205

  This high collision segment includes two congested intersections (I-205 Westbound Ramps and Dunes Drive) and is often impacted by queues from the I-205 interchange.

- OR 99E from I-205 to 12th Street

  This high collision segment includes several signalized intersections and is often impacted by queues from the I-205 interchange.

- OR 99E from 11th Street to 9th Street

This high collision segment generally includes several accesses over a short distance, a narrow tunnel and two curves which could be contributing to the amount of collisions.

- OR 99E from 6th Street to one-tenth of a mile south of Railroad Avenue

This high collision segment generally includes several accesses over a short distance which could be contributing to the amount of collisions.

- OR 213 from I-205 to one-tenth of a mile south of Clackamas River Drive

This high collision segment will be mitigated with a planned jug handle at the OR 213/Washington Street-Clackamas River Drive intersection. Washington Street will be extended to undercrosss OR 213 and connect to Clackamas River Drive.

- OR 213 surrounding the Beavercreek Road intersection

  This segment includes the high collision location at the OR 213/Beavercreek Road intersection exceeding the statewide average collision rate. This segment is located within the 55 mile per hour speed zone and expressway segment of OR 213 and is the first at-grade intersection south of Redland Road for over two miles.

- OR 213 surrounding the Molalla Avenue intersection

  This segment is located within the 55 mile per hour speed zone and expressway segment of OR 213. Congestion at surrounding intersections may be impacting this segment.

- OR 213 surrounding the Meyers Road intersection

  This segment is located just south of the 55 mile per hour speed zone on OR 213. Queues in the southbound direction from the Caufield-Glen Oak Road intersection impact this intersection at times.

- OR 213 surrounding the Caufield-Glen Oak Road intersection

  This segment includes the high collision location at the OR 213/ Caufield-Glen Oak Road intersection that was just under the statewide average collision rate. This segment is located just south of the 55 mile per hour speed zone and the portion of OR 213 that narrows to one travel lane in each direction.

Motor Vehicle Operations

Intersection Mobility Standards: The intersections in Oregon City are monitored through mobility standards (or performance measures). Two methods to gauge intersection operations include volume-to-capacity (v/c) ratios and level of service (LOS).

> **Volume-to-capacity (V/C) ratio:** A decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used (i.e., the saturation) at a turn movement, approach leg, or intersection. It is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and usually results in excessive queues and long delays. ODOT mobility standards are based on v/c ratios.
>
> **Level of service (LOS):** A "report card" rating (A through F) based on the average delay experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays.
>
> All intersections in Oregon City must operate at or below the adopted performance measures or mitigation would be necessary to approve future growth. The adopted intersection mobility standards vary by jurisdiction of the roadways. All intersections under State jurisdiction in Oregon City must comply with the v/c ratios in the 1999 Oregon Highway Plan (OHP). The OHP specifies v/c thresholds based on place type. The standards in Oregon City range from a v/c ratio of 0.85 to 1.10. Intersections under City or County jurisdiction must comply with a LOS D mobility standard for signalized and unsignalized intersections.

Peak seasonal intersection operations can be seen in Table A2.

Table A2: Intersection Operations (2011 p.m. peak)

Intersection	Mobility Standard	v/c Ratio	Peak Seasonal LOS	Delay
Signalized Intersections under ODOT Jurisdiction				
OR 99E/Dunes Drive	v/c 1.10	0.65	B	19.9
OR 99E/I-205 WB Ramps	v/c 0.85	**0.95**	C	29.9
OR 99E/I-205 EB Ramps	v/c 0.85	**0.99**	D	54.3
OR 213/Beavercreek Road	v/c 0.99	0.83	D	40.7
OR 213/Caufield-Glen Oak Road	v/c 0.99	0.79	C	23.7
Signalized or All-way Stop Intersections under Oregon City or Clackamas County Jurisdiction				
High Street/2nd Street*	LOS D	0.70	C	15.0
Molalla Avenue/Division Street	LOS D	0.62	A	3.5
South End Road/Warner Parrott Road*	LOS D	0.85	C	23.5
Molalla Avenue/Clairmont Way	LOS D	0.55	B	16.3
Molalla Avenue/Gaffney Lane	LOS D	0.67	C	27.2
Maple Lane Road/Beavercreek Road	LOS D	0.65	C	32.8
Unsignalized Intersections under Oregon City or Clackamas County Jurisdiction**				
Main Street/14th Street	LOS D	0.64	A/D	34.8
Washington Street/12th Street	LOS D	0.88	**A/F**	83.0
7th Street-Singer Hill/High Street	LOS D	0.14	A/B	13.4
Taylor Street/7th Street	LOS D	0.53	A/D	26.4
South End Road/Lafayette Avenue-Partlow Road	LOS D	0.40	A/D	25.2
Central Point Road/Warner Parrott Road	LOS D	0.33	**A/F**	61.1
Molalla Avenue/Fir Street	LOS D	0.24	A/C	15.7
Maple Lane Road/Thayer Road	LOS D	0.17	A/C	16.6
Maple Lane Road/Walnut Grove Way	LOS D	0.06	A/B	14.0
Beavercreek Road/Glen Oak Road	LOS D	0.07	A/D	23.5

*All-way stop controlled intersection
**V/C ratio, LOS and delay reported for the worst stop controlled approach
Bolded Red and Shaded indicates intersection exceeds mobility standard

2011 HCM Capacity Analysis Results (30HV)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	5	90	240	20	65	65	1265	150	140	1490	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.89		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1645	1495		1767	1612		1719	4913		1770	4800	
Flt Permitted	0.69	1.00		0.67	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1200	1495		1253	1612		1719	4913		1770	4800	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	36	5	93	247	21	67	67	1304	155	144	1536	186
RTOR Reduction (vph)	0	70	0	0	51	0	0	10	0	0	10	0
Lane Group Flow (vph)	36	28	0	247	37	0	67	1449	0	144	1712	0
Confl. Peds. (#/hr)	10		2	2		10	3					3
Heavy Vehicles (%)	9%	0%	8%	2%	12%	0%	5%	4%	3%	2%	6%	6%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	26.5	26.5		26.5	26.5		7.2	56.5		13.5	62.8	
Effective Green, g (s)	27.0	27.0		27.0	27.0		7.2	57.5		13.5	63.8	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.07	0.52		0.12	0.58	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.3	4.8		2.3	4.8	
Lane Grp Cap (vph)	295	367		308	396		113	2568		217	2784	
v/s Ratio Prot		0.02			0.02		0.04	c0.30		0.08	c0.36	
v/s Ratio Perm	0.03			c0.20								
v/c Ratio	0.12	0.08		0.80	0.09		0.59	0.56		0.66	0.62	
Uniform Delay, d1	32.3	31.9		39.0	32.1		50.0	17.8		46.1	15.1	
Progression Factor	1.00	1.00		1.00	1.00		0.71	0.69		1.00	1.00	
Incremental Delay, d2	0.1	0.1		13.6	0.1		3.8	0.5		6.3	1.0	
Delay (s)	32.4	32.0		52.5	32.1		39.3	12.8		52.4	16.1	
Level of Service	C	C		D	C		D	B		D	B	
Approach Delay (s)		32.1			47.2			14.0			18.9	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Highway 99E & I-205 SB Ramps

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	920	360	1170	560	500	1320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.91	1.00	1.00	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3367	1553	4988	1568	1736	4988
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3367	1553	4988	1568	1736	4988
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	979	383	1245	596	532	1404
RTOR Reduction (vph)	0	1	0	431	0	0
Lane Group Flow (vph)	979	382	1245	165	532	1404
Heavy Vehicles (%)	4%	4%	4%	3%	4%	4%
Turn Type	NA	pm+ov	NA	Perm	Prot	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4		6		
Actuated Green, G (s)	34.3	67.5	30.0	30.0	33.2	67.2
Effective Green, g (s)	34.3	67.5	30.5	30.5	33.2	67.7
Actuated g/C Ratio	0.31	0.61	0.28	0.28	0.30	0.62
Clearance Time (s)	4.0	4.0	4.5	4.5	4.0	4.5
Vehicle Extension (s)	2.3	2.3	4.7	4.7	2.3	4.7
Lane Grp Cap (vph)	1050	1009	1383	435	524	3070
v/s Ratio Prot	c0.29	0.11	c0.25		c0.31	0.28
v/s Ratio Perm		0.13		0.11		
v/c Ratio	0.93	0.38	0.90	0.38	1.02	0.46
Uniform Delay, d1	36.7	10.7	38.3	32.1	38.4	11.3
Progression Factor	1.00	1.00	0.43	1.42	0.83	0.35
Incremental Delay, d2	14.2	0.1	5.2	1.3	40.0	0.4
Delay (s)	50.9	10.8	21.8	46.8	71.8	4.4
Level of Service	D	B	C	D	E	A
Approach Delay (s)	39.7		29.9			23.0
Approach LOS	D		C			C

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	660	485	1245	790	390	1850
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	5036	1583	1736	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	5036	1583	1736	5085
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	688	505	1297	823	406	1927
RTOR Reduction (vph)	0	0	0	450	0	0
Lane Group Flow (vph)	688	505	1297	373	406	1927
Heavy Vehicles (%)	2%	2%	3%	2%	4%	2%
Turn Type	NA	pm+ov	NA	Perm	Prot	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4		6		
Actuated Green, G (s)	43.3	69.3	26.7	26.7	26.0	56.7
Effective Green, g (s)	44.3	69.3	27.7	27.7	26.0	57.7
Actuated g/C Ratio	0.40	0.63	0.25	0.25	0.24	0.52
Clearance Time (s)	5.0	4.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	2.3	2.3	4.8	4.8	2.3	4.8
Lane Grp Cap (vph)	713	1055	1268	399	410	2667
v/s Ratio Prot	c0.39	0.11	c0.26		c0.23	0.38
v/s Ratio Perm		0.21		0.24		
v/c Ratio	0.96	0.48	1.02	0.94	0.99	0.72
Uniform Delay, d1	32.1	10.8	41.1	40.3	41.9	20.0
Progression Factor	1.00	1.00	1.11	1.80	1.15	1.26
Incremental Delay, d2	25.0	0.2	27.7	25.6	36.2	1.3
Delay (s)	57.1	11.0	73.5	98.0	84.6	26.5
Level of Service	E	B	E	F	F	C
Approach Delay (s)	37.6		83.0			36.6
Approach LOS	D		F			D

Intersection Summary			
HCM Average Control Delay	54.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	30	400	60	55	370	10	40	50	105	5	30	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	34	455	68	62	420	11	45	57	119	6	34	28
Pedestrians		7			4			5			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)									5			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		179										
pX, platoon unblocked												
vC, conflicting volume	434			528			1165	1121	498	1168	1149	435
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	434			528			1165	1121	498	1168	1149	435
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			94			65	69	79	94	81	95
cM capacity (veh/h)	1135			1045			130	185	562	96	179	621

Direction, Lane #	SE 1	SE 2	NW 1	NE 1	SW 1
Volume Total	34	523	494	222	68
Volume Left	34	0	62	45	6
Volume Right	0	68	11	119	28
cSH	1135	1700	1045	348	231
Volume to Capacity	0.03	0.31	0.06	0.64	0.30
Queue Length 95th (ft)	2	0	5	104	30
Control Delay (s)	8.3	0.0	1.7	34.8	27.0
Lane LOS	A		A	D	D
Approach Delay (s)	0.5		1.7	34.8	27.0
Approach LOS				D	D

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	10	40	125	5	20	40	80	510	5	60	650	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	42	132	5	21	42	84	537	5	63	684	11
Pedestrians		1						1			3	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1578	1527	691	1672	1530	542	696			542		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1578	1527	691	1672	1530	542	696			542		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	58	71	84	79	92	91			94		
cM capacity (veh/h)	61	101	447	33	100	543	890			1037		

Direction, Lane #	SE 1	NW 1	NE 1	NE 2	SW 1	SW 2
Volume Total	184	68	84	542	63	695
Volume Left	11	5	84	0	63	0
Volume Right	132	42	0	5	0	11
cSH	208	153	890	1700	1037	1700
Volume to Capacity	0.88	0.45	0.09	0.32	0.06	0.41
Queue Length 95th (ft)	173	51	8	0	5	0
Control Delay (s)	83.0	46.5	9.5	0.0	8.7	0.0
Lane LOS	F	E	A		A	
Approach Delay (s)	83.0	46.5	1.3		0.7	
Approach LOS	F	E				

Intersection Summary			
Average Delay	12.1		
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	60	35	40	385	480	40
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	38	43	418	522	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		1				
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)				424	1279	
pX, platoon unblocked	0.93					
vC, conflicting volume	1049	543	565			
vC1, stage 1 conf vol	543					
vC2, stage 2 conf vol	505					
vCu, unblocked vol	1013	543	565			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	93	96			
cM capacity (veh/h)	459	543	1017			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	103	43	418	565
Volume Left	65	43	0	0
Volume Right	38	0	0	43
cSH	727	1017	1700	1700
Volume to Capacity	0.14	0.04	0.25	0.33
Queue Length 95th (ft)	12	3	0	0
Control Delay (s)	13.4	8.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.4	0.8		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	125	210	470	5	105	5	150	30	5	5	50	95
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	130	219	490	5	109	5	156	31	5	5	52	99

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	349	490	120	193	156
Volume Left (vph)	130	0	5	156	5
Volume Right (vph)	0	490	5	5	99
Hadj (s)	0.22	-0.68	0.01	0.15	-0.32
Departure Headway (s)	6.0	5.1	6.1	6.3	6.0
Degree Utilization, x	0.58	0.70	0.20	0.34	0.26
Capacity (veh/h)	583	685	540	523	552
Control Delay (s)	15.9	17.7	10.7	12.6	11.1
Approach Delay (s)	17.0		10.7	12.6	11.1
Approach LOS	C		B	B	B

Intersection Summary			
Delay	15.0		
HCM Level of Service	C		
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	160	25	585	140	50	680
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	168	26	616	147	53	716
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			None
Median storage veh)			2			
Upstream signal (ft)			97			
pX, platoon unblocked	0.82	0.82			0.82	
vC, conflicting volume	1511	689			763	
vC1, stage 1 conf vol	689					
vC2, stage 2 conf vol	821					
vCu, unblocked vol	1513	508			598	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	47	94			93	
cM capacity (veh/h)	318	465			808	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	168	26	763	53	716
Volume Left	168	0	0	53	0
Volume Right	0	26	147	0	0
cSH	318	465	1700	808	1700
Volume to Capacity	0.53	0.06	0.45	0.07	0.42
Queue Length 95th (ft)	73	4	0	5	0
Control Delay (s)	28.5	13.2	0.0	9.8	0.0
Lane LOS	D	B		A	
Approach Delay (s)	26.4		0.0	0.7	
Approach LOS	D				

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	0	0	0	725	105	0	830	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)								4.0			4.0	
Lane Util. Factor								1.00			1.00	
Frpb, ped/bikes								1.00			1.00	
Flpb, ped/bikes								1.00			1.00	
Frt								0.98			1.00	
Flt Protected								1.00			1.00	
Satd. Flow (prot)								1784			1839	
Flt Permitted								1.00			1.00	
Satd. Flow (perm)								1784			1839	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	0	0	0	0	797	115	0	912	11
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0	0	909	0	0	923	0
Confl. Peds. (#/hr)			5	5			14		5	5		14
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	4%	7%	0%	3%	12%
Turn Type								NA			NA	
Protected Phases								6			2	
Permitted Phases												
Actuated Green, G (s)								42.1			42.1	
Effective Green, g (s)								42.1			42.1	
Actuated g/C Ratio								0.83			0.83	
Clearance Time (s)								4.0			4.0	
Vehicle Extension (s)								0.2			0.2	
Lane Grp Cap (vph)								1473			1518	
v/s Ratio Prot								c0.51			0.50	
v/s Ratio Perm												
v/c Ratio								0.62			0.61	
Uniform Delay, d1								1.6			1.6	
Progression Factor								1.00			1.00	
Incremental Delay, d2								1.9			1.8	
Delay (s)								3.5			3.4	
Level of Service								A			A	
Approach Delay (s)		0.0			0.0			3.5			3.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	3.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	51.0	Sum of lost time (s)	8.9
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	45	5	165	50	80	15	145	130	110	305	50
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	27	49	5	181	55	88	16	159	143	121	335	55

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	82	236	88	319	456	55
Volume Left (vph)	27	181	0	16	121	0
Volume Right (vph)	5	0	88	143	0	55
Hadj (s)	0.03	0.42	-0.68	-0.22	0.15	-0.67
Departure Headway (s)	8.1	7.7	6.6	6.7	6.7	5.9
Degree Utilization, x	0.19	0.51	0.16	0.60	0.85	0.09
Capacity (veh/h)	393	438	512	508	520	587
Control Delay (s)	12.9	17.2	9.7	19.2	36.1	8.3
Approach Delay (s)	12.9	15.1		19.2	33.1	
Approach LOS	B	C		C	D	

Intersection Summary			
Delay	23.5		
HCM Level of Service	C		
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	5	10	5	80	5	35	10	230	90	95	335	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	6	89	6	39	11	256	100	106	372	11
Pedestrians		3										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		4.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	961	970	381	928	925	306	386			356		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	961	970	381	928	925	306	386			356		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	95	99	60	98	95	99			91		
cM capacity (veh/h)	204	230	669	221	244	732	1180			1209		

Direction, Lane #	SE 1	NW 1	NW 2	NE 1	SW 1
Volume Total	22	89	44	367	489
Volume Left	6	89	0	11	106
Volume Right	6	0	39	100	11
cSH	265	221	586	1180	1209
Volume to Capacity	0.08	0.40	0.08	0.01	0.09
Queue Length 95th (ft)	7	46	6	1	7
Control Delay (s)	19.8	31.9	11.6	0.3	2.5
Lane LOS	C	D	B	A	A
Approach Delay (s)	19.8	25.2		0.3	2.5
Approach LOS	C	D			

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	295	30	330	395	20	200
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	331	34	371	444	22	225
Pedestrians				1	5	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			370		1539	354
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			370		1539	354
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			69		74	67
cM capacity (veh/h)			1194		86	688

Direction, Lane #	EB 1	WB 1	WB 2	NE 1	NE 2
Volume Total	365	371	444	22	225
Volume Left	0	371	0	22	0
Volume Right	34	0	0	0	225
cSH	1700	1194	1700	86	688
Volume to Capacity	0.21	0.31	0.26	0.26	0.33
Queue Length 95th (ft)	0	33	0	24	35
Control Delay (s)	0.0	9.4	0.0	61.1	12.7
Lane LOS		A		F	B
Approach Delay (s)	0.0	4.3		17.1	
Approach LOS				C	

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	60	560	10	15	675	120	75	25	60	15	35	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96		1.00	0.94		0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.96	1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00		0.99	
Satd. Flow (prot)	1805	1875		1805	1863	1542		1753	1475		1704	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.64	1.00		0.94	
Satd. Flow (perm)	1805	1875		1805	1863	1542		1167	1475		1609	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	589	11	16	711	126	79	26	63	16	37	37
RTOR Reduction (vph)	0	0	0	0	0	20	0	0	55	0	26	0
Lane Group Flow (vph)	63	600	0	16	711	106	0	105	8	0	64	0
Confl. Peds. (#/hr)	7		13	13		7	27		10	10		27
Heavy Vehicles (%)	0%	1%	0%	0%	2%	1%	0%	0%	3%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases						2	8		8	4		
Actuated Green, G (s)	8.0	80.9		2.8	75.7	75.7		13.3	13.3		13.3	
Effective Green, g (s)	8.0	81.4		2.8	76.2	76.2		13.8	13.8		13.8	
Actuated g/C Ratio	0.07	0.74		0.03	0.69	0.69		0.13	0.13		0.13	
Clearance Time (s)	4.0	4.5		4.0	4.5	4.5		4.5	4.5		4.5	
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0		2.5	2.5		2.5	
Lane Grp Cap (vph)	131	1388		46	1291	1068		146	185		202	
v/s Ratio Prot	0.03	c0.32		0.01	c0.38							
v/s Ratio Perm						0.07		c0.09	0.01		0.04	
v/c Ratio	0.48	0.43		0.35	0.55	0.10		0.72	0.04		0.32	
Uniform Delay, d1	49.0	5.5		52.7	8.4	5.6		46.2	42.3		43.8	
Progression Factor	1.12	0.90		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	1.7	0.8		3.3	1.7	0.2		14.6	0.1		0.7	
Delay (s)	56.6	5.7		56.0	10.1	5.8		60.8	42.4		44.5	
Level of Service	E	A		E	B	A		E	D		D	
Approach Delay (s)		10.6			10.3			53.9			44.5	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	50	415	155	165	525	60	35	60	45	130	70	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00	0.95		0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			0.98	1.00
Frt	1.00	0.96		1.00	1.00	0.85		0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.97	1.00
Satd. Flow (prot)	1805	1784		1787	1845	1509		1702			1779	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.80			0.63	1.00
Satd. Flow (perm)	1805	1784		1787	1845	1509		1371			1164	1615
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	437	163	174	553	63	37	63	47	137	74	189
RTOR Reduction (vph)	0	11	0	0	0	14	0	16	0	0	0	148
Lane Group Flow (vph)	53	589	0	174	553	49	0	131	0	0	211	41
Confl. Peds. (#/hr)	9		16	16		9			16	16		
Heavy Vehicles (%)	0%	0%	1%	1%	3%	2%	0%	6%	2%	1%	2%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases						2	8			4		4
Actuated Green, G (s)	7.0	52.1		21.8	66.9	66.9		23.1			23.1	23.1
Effective Green, g (s)	7.0	52.6		21.8	67.4	67.4		23.6			23.6	23.6
Actuated g/C Ratio	0.06	0.48		0.20	0.61	0.61		0.21			0.21	0.21
Clearance Time (s)	4.0	4.5		4.0	4.5	4.5		4.5			4.5	4.5
Vehicle Extension (s)	2.5	3.0		2.5	3.0	3.0		2.5			2.5	2.5
Lane Grp Cap (vph)	115	853		354	1130	925		294			250	346
v/s Ratio Prot	0.03	c0.33		0.10	c0.30							
v/s Ratio Perm						0.03		0.10			c0.18	0.03
v/c Ratio	0.46	0.69		0.49	0.49	0.05		0.44			0.84	0.12
Uniform Delay, d1	49.7	22.4		39.2	11.8	8.5		37.5			41.4	34.8
Progression Factor	1.00	1.00		0.80	0.50	0.32		1.00			1.00	1.00
Incremental Delay, d2	2.1	4.6		0.7	1.3	0.1		0.8			21.8	0.1
Delay (s)	51.8	26.9		32.0	7.2	2.8		38.3			63.2	34.9
Level of Service	D	C		C	A	A		D			E	C
Approach Delay (s)		28.9			12.3			38.3			49.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	27.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	70	550	35	45	655
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	31	73	573	36	47	682
Pedestrians	6		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	1		0			
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						481
pX, platoon unblocked	0.83					
vC, conflicting volume	1374	597			615	
vC1, stage 1 conf vol	597					
vC2, stage 2 conf vol	777					
vCu, unblocked vol	1349	597			615	
tC, single (s)	6.4	6.2			4.3	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.4	
p0 queue free %	91	85			95	
cM capacity (veh/h)	349	498			878	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	104	609	47	682
Volume Left	31	0	47	0
Volume Right	73	36	0	0
cSH	441	1700	878	1700
Volume to Capacity	0.24	0.36	0.05	0.40
Queue Length 95th (ft)	23	0	4	0
Control Delay (s)	15.7	0.0	9.3	0.0
Lane LOS	C		A	
Approach Delay (s)	15.7	0.0	0.6	
Approach LOS	C			

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	540	620	70	150	375	405	40	705	145	700	1240	610
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3497		3502	3610	1583	1703	3505	1599	3433	3505	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3497		3502	3610	1583	1703	3505	1599	3433	3505	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	581	667	75	161	403	435	43	758	156	753	1333	656
RTOR Reduction (vph)	0	8	0	0	0	290	0	0	113	0	0	345
Lane Group Flow (vph)	581	734	0	161	403	145	43	758	43	753	1333	311
Confl. Peds. (#/hr)	2		11	11		2	2		1	1		2
Heavy Vehicles (%)	2%	1%	3%	0%	0%	2%	6%	3%	1%	2%	3%	2%
Turn Type	Prot	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4		3	8	8	1	6	6	5	2	2
Permitted Phases												
Actuated Green, G (s)	19.2	28.3		6.1	15.2	15.2	3.1	27.4	27.4	24.9	49.2	49.2
Effective Green, g (s)	20.7	29.8		7.6	16.7	16.7	4.6	30.4	30.4	26.4	52.2	52.2
Actuated g/C Ratio	0.19	0.27		0.07	0.15	0.15	0.04	0.28	0.28	0.24	0.47	0.47
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	7.0	7.0	5.5	7.0	7.0
Vehicle Extension (s)	2.3	2.3		2.3	2.3	2.3	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	645	946		242	547	240	71	967	441	822	1660	750
v/s Ratio Prot	c0.17	0.21		0.05	c0.11	0.09	0.03	0.22	0.03	c0.22	c0.38	0.20
v/s Ratio Perm												
v/c Ratio	0.90	0.78		0.67	0.74	0.60	0.61	0.78	0.10	0.92	0.80	0.41
Uniform Delay, d1	43.7	37.1		50.1	44.7	43.7	51.9	36.9	29.7	40.8	24.6	19.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.6	3.8		5.8	4.7	3.3	10.9	4.8	0.2	14.6	3.3	0.7
Delay (s)	59.4	40.9		55.8	49.3	47.0	62.8	41.6	29.9	55.4	27.9	19.7
Level of Service	E	D		E	D	D	E	D	C	E	C	B
Approach Delay (s)		49.0			49.4			40.7			33.5	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	40.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	355	915	115	15	520	60	215	90	50	65	65	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.98		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3479		1805	3491		1805	1799		1805	1900	1577
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3479		1805	3491		1805	1799		1805	1900	1577
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	378	973	122	16	553	64	229	96	53	69	69	207
RTOR Reduction (vph)	0	6	0	0	5	0	0	15	0	0	0	95
Lane Group Flow (vph)	378	1089	0	16	612	0	229	134	0	69	69	112
Confl. Peds. (#/hr)			1	1			2					2
Heavy Vehicles (%)	2%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	2%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		8	8		4	4	5
Permitted Phases												4
Actuated Green, G (s)	29.2	71.7		1.8	44.3		19.4	19.4		9.5	9.5	38.7
Effective Green, g (s)	29.2	72.2		1.8	44.8		19.9	19.9		10.0	10.0	38.7
Actuated g/C Ratio	0.24	0.60		0.02	0.37		0.17	0.17		0.08	0.08	0.32
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.0
Vehicle Extension (s)	2.5	4.0		2.5	4.0		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	431	2095		27	1304		300	299		151	158	509
v/s Ratio Prot	c0.21	c0.31		0.01	0.18		c0.13	0.07		c0.04	0.04	0.05
v/s Ratio Perm												0.02
v/c Ratio	0.88	0.52		0.59	0.47		0.76	0.45		0.46	0.44	0.22
Uniform Delay, d1	43.6	13.8		58.7	28.5		47.8	45.1		52.4	52.3	29.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	17.7	0.9		25.8	1.2		10.5	0.8		1.6	1.4	0.2
Delay (s)	61.4	14.7		84.5	29.7		58.2	45.8		54.0	53.7	29.7
Level of Service	E	B		F	C		E	D		D	D	C
Approach Delay (s)		26.7			31.1			53.4			39.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	119.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	55	5	405	100	10	270
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	58	5	426	105	11	284
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			391			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	784	479			532	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	759	444			498	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	99			99	
cM capacity (veh/h)	361	598			1040	

Direction, Lane #	WB 1	NE 1	SW 1	SW 2
Volume Total	63	532	11	284
Volume Left	58	0	11	0
Volume Right	5	105	0	0
cSH	373	1700	1040	1700
Volume to Capacity	0.17	0.31	0.01	0.17
Queue Length 95th (ft)	15	0	1	0
Control Delay (s)	16.6	0.0	8.5	0.0
Lane LOS	C		A	
Approach Delay (s)	16.6	0.0	0.3	
Approach LOS	C			

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	20	5	370	40	5	260
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	5	389	42	5	274
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			982			
pX, platoon unblocked						
vC, conflicting volume	695	411			432	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	695	411			432	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	95	99			100	
cM capacity (veh/h)	392	645			1139	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	26	432	279
Volume Left	21	0	5
Volume Right	5	42	0
cSH	425	1700	1139
Volume to Capacity	0.06	0.25	0.00
Queue Length 95th (ft)	5	0	0
Control Delay (s)	14.0	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	14.0	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	5	5	15	5	140	5	620	20	165	1175	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.98			1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1638			1830	1599	1357	1804		1805	1835	
Flt Permitted		0.77			0.84	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1312			1593	1599	1357	1804		1805	1835	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	26	5	5	16	5	147	5	653	21	174	1237	37
RTOR Reduction (vph)	0	5	0	0	0	137	0	1	0	0	0	0
Lane Group Flow (vph)	0	31	0	0	21	10	5	673	0	174	1274	0
Heavy Vehicles (%)	4%	0%	50%	0%	0%	1%	33%	5%	0%	0%	3%	6%
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4						
Actuated Green, G (s)		8.2			8.2	8.2	1.6	83.1		19.2	100.7	
Effective Green, g (s)		8.7			8.7	8.7	1.6	85.1		19.2	102.7	
Actuated g/C Ratio		0.07			0.07	0.07	0.01	0.68		0.15	0.82	
Clearance Time (s)		4.5			4.5	4.5	4.0	6.0		4.0	6.0	
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.5		2.3	4.5	
Lane Grp Cap (vph)		91			111	111	17	1228		277	1508	
v/s Ratio Prot							0.00	0.37		c0.10	c0.69	
v/s Ratio Perm		c0.02			0.01	0.01						
v/c Ratio		0.34			0.19	0.09	0.29	0.55		0.63	0.84	
Uniform Delay, d1		55.4			54.8	54.5	61.1	10.2		49.6	6.5	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.26	2.11	
Incremental Delay, d2		1.7			0.6	0.3	5.6	1.8		3.1	5.2	
Delay (s)		57.1			55.4	54.7	66.7	11.9		65.7	19.0	
Level of Service		E			E	D	E	B		E	B	
Approach Delay (s)		57.1			54.8			12.3			24.6	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Volume (veh/h)	685	110	25	310	50	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	721	116	26	326	53	26
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			837		1158	779
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			837		1158	779
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		75	93
cM capacity (veh/h)			806		210	393

Direction, Lane #	SE 1	NW 1	NW 2	NE 1	NE 2
Volume Total	837	26	326	53	26
Volume Left	0	26	0	53	0
Volume Right	116	0	0	0	26
cSH	1700	806	1700	210	393
Volume to Capacity	0.49	0.03	0.19	0.25	0.07
Queue Length 95th (ft)	0	3	0	24	5
Control Delay (s)	0.0	9.6	0.0	27.8	14.8
Lane LOS		A		D	B
Approach Delay (s)	0.0	0.7		23.5	
Approach LOS				C	

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

Section E

MODEL ASSUMPTIONS

Future forecasting is an important step in the transportation planning process and provides estimates of future travel demand. This memorandum describes the forecasting methodology that will be used to project transportation growth and provide traffic volumes for study intersections in the 2035 TSP horizon year. This memorandum describes the assumptions used to project transportation growth through the 2035 horizon year.

Introduction

The travel demand model is based on the Metro regional travel demand model. The Oregon City TSP model applies trip generation and trip distribution data directly taken from the Metro model, but adds additional detail to more accurately represent local travel conditions and routing alternatives within the city. The Oregon City TSP model will include additional (mostly collector) roadways and refine how the regional model loads trips onto the travel network.

The following sections detail the travel forecast methodology. These components include the roadway network, transportation analysis zones (TAZs), land use, and travel demand.

Roadway Network

The VISUM[1] roadway network obtained from the Metro Regional Travel Demand Forecast Model includes regional level arterial streets, both within and outside of Oregon City.[2] The Oregon City model will be expanded to include all arterial and collector streets within the Oregon City City Limits and Urban Growth Boundary (UGB) at a minimum. The model will include regional roadways outside of the Oregon City UGB that influence study area travel, including the entire Portland metropolitan region, extending as south past Canby and Mulino and east past Estacada.

An existing model roadway network will be refined using Metro's regional model as the initial base. Network elements will be confirmed based on an existing conditions inventory of posted speeds, traffic control, lane geometries, and number of travel lanes. The existing conditions network is the starting point for development of the future model. The Metro 2010 model network is shown in Figure 1.

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[1] VISUM is a transportation travel demand modeling software developed by PTV Vision.

[2] Model data provided by Metro, November 2011.

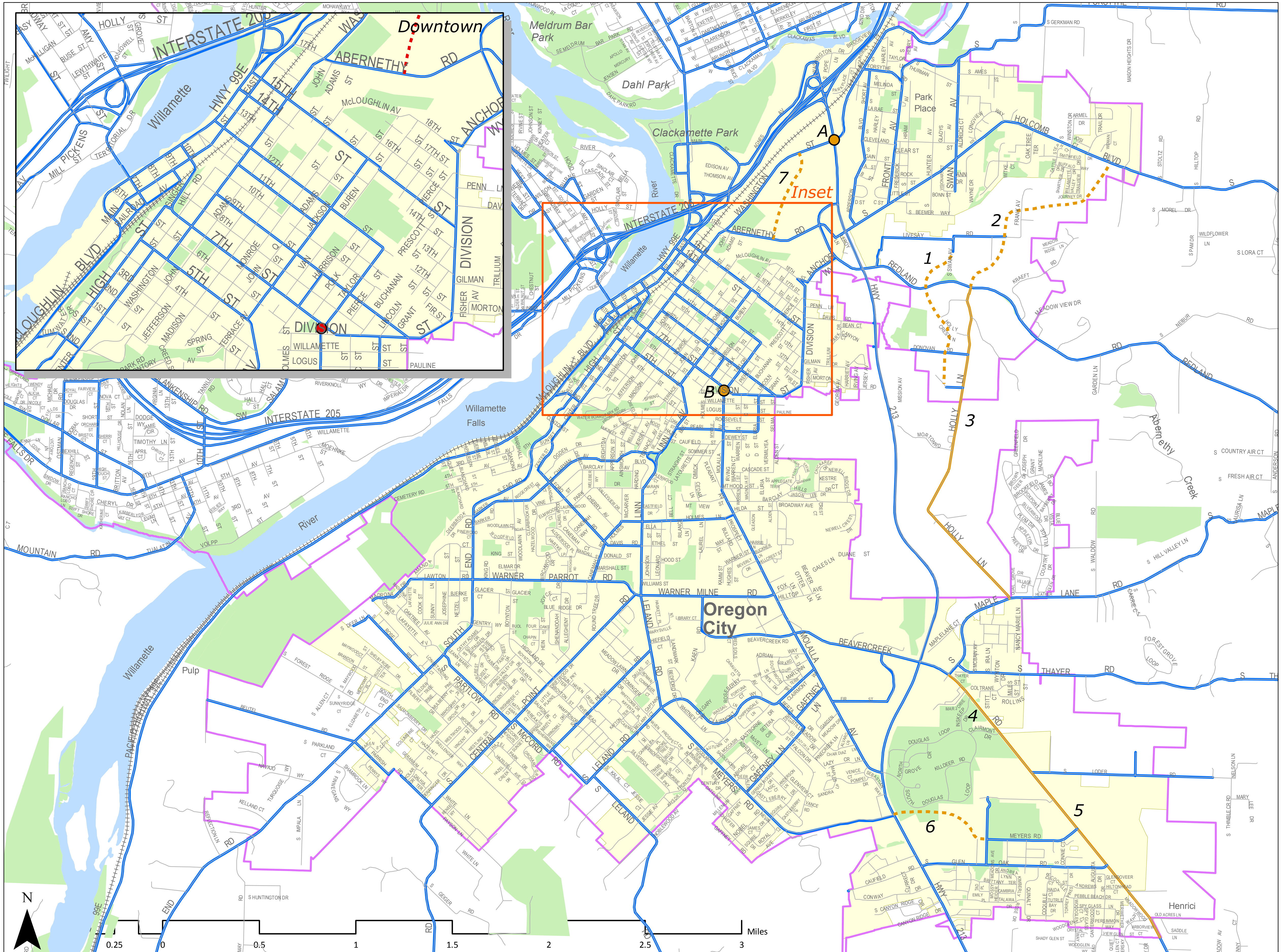
The 2035 future year baseline roadway network will be developed to use for the 2035 No-Build analysis. This network includes new roadways or roadway capacity improvement projects that have identified funding or are included in the following:

- Statewide Transportation Improvement Program (STIP)
- Metro Regional Transportation Plan (RTP – Financially Constrained)
- Oregon City Capital Improvement Plan (specifically identified projects only)

Additional scenarios will be developed to test the various transportation alternatives that will be considered for the Oregon City TSP Update. Table 1 summarizes roadway and intersection improvements that will be assumed in the 2035 network and Figure 1 shows the proposed Oregon City model 2035 base network.

Table 1: Oregon City CIP Financially Constrained Motor Vehicle Projects

Project ID	Source	Project/ Program Name	Start Location	End Location	Description
Roadway Segment Improvements					
1	RTP	Swan Extension	Livesay Rd	Holly Ln	Through lanes, sidewalks, bike lanes, turn lanes to serve UGB expansion area
2	RTP	Holly Lane	Redland Rd	Holcomb Rd	Through lanes, sidewalks, bike lanes, turn lanes to serve UGB expansion area
3	RTP	Holly Lane	Redland Rd	Maple Ln	Turn lanes, bike lanes, sidewalks, intersection improvements, bridge replacement
4	RTP	Beavercreek Rd Improvements Phase 2	Maple Lane	Clackamas Community College	Widen to 5 lanes with sidewalks and bike lanes
5	RTP	Beavercreek Rd Improvements Phase 3	Clackamas Community College	UGB	Widen to 4 lanes with sidewalks and bike lanes
6	City TSP	Meyers Road	High School Avenue	Beavercreek Road	Extension from current terminus at High School Avenue to Beavercreek Road
7	City TSP	Washington – Abernethy Connector	Abernethy Road	Washington Street	Extension from stub south of Washington to Abernethy Road
Intersection Improvements					
A	STIP/ City TSP	Jughandle at OR 213/Washington Street	-	-	Construct Jughandle Intersection at Washington Street
B	RTP	Molalla Avenue Roundabout (Taylor/Division)	-	-	Reconfigure intersection for safety and LOS into roundabout



OREGON CITY TRANSPORTATION PLAN

FIGURE 1

Existing and Future Model Street Network

Legend

2010 Street Network

- Roadway Segment Included in Model Street Network

2035 Model Street Network Improvements

- Intersection Improvement
- Roadway Improvement
- Roadway Extensions
- # Project ID from Technical Memorandum #5

- River
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary

Transportation Analysis Zones

For transportation modeling purposes, the Metro travel demand model has divided the entire Portland metropolitan region into transportation analysis zones (TAZs). These TAZs represent the sources of vehicle trip generation within the region. Metro travel demand model TAZ boundaries do not align directly with the city limits or the Urban Growth Boundary (UGB). For purposes of identifying land use changes from 2010 to 2035, the model study area is defined by the Metro TAZs that most closely match with the UGB. There are approximately 28 Metro TAZs included in the model study area are illustrated in Figure 2. In addition to those 28 Metro TAZs, other Metro TAZs in the regional model were included as well since they directly or indirectly influence traffic on roadways in Oregon City.

Transportation analysis zones are most effective when they represent homogeneous land use (i.e. retail employment or households) and access to the street network. To more effectively distribute traffic onto the Oregon City street network, a number of Metro's TAZs are proposed to be disaggregated, or broken from larger (parent) to smaller (child) TAZs to more accurately reflect the existing and planned land uses in Oregon City. The proposed disaggregation is also shown in Figure 2. Land use data associated with Metro's model is approved at the regional level and in order to be consistent with Metro, land use assumptions for each Metro TAZ must be maintained, as a control total. Updates to this land use data occur very infrequently and changes to this data would not occur once the modeling work has commenced.

Centroids represent the land use and trip generation associated with each TAZ. Centroid connectors are the means (links) by which that trip generation is loaded onto the street network in the model. For regional modeling purposes, where the concern is for regionally significant transportation facilities, relatively few centroid connectors are used. In addition to the TAZ disaggregation proposed, additional centroid connectors will be added to more accurately reflect land use access to the street network in Oregon City.

For the Oregon City TSP model, eight Metro TAZs are proposed to be subdivided into nine additional smaller zones. These disaggregated zones maintain the boundaries of the 'parent' Metro TAZs, but better represent homogeneous land use and traffic loading onto the model's more detailed roadway network. The disaggregated TAZ boundaries for the Oregon City TSP are shown in Figure 2, along with the original Metro TAZ system. The model network also retains TAZs external to Oregon City, but important in the relationship between Oregon City land use and that in the greater Portland metropolitan region, accounting for vehicle trips entering and exiting the TSP study area.

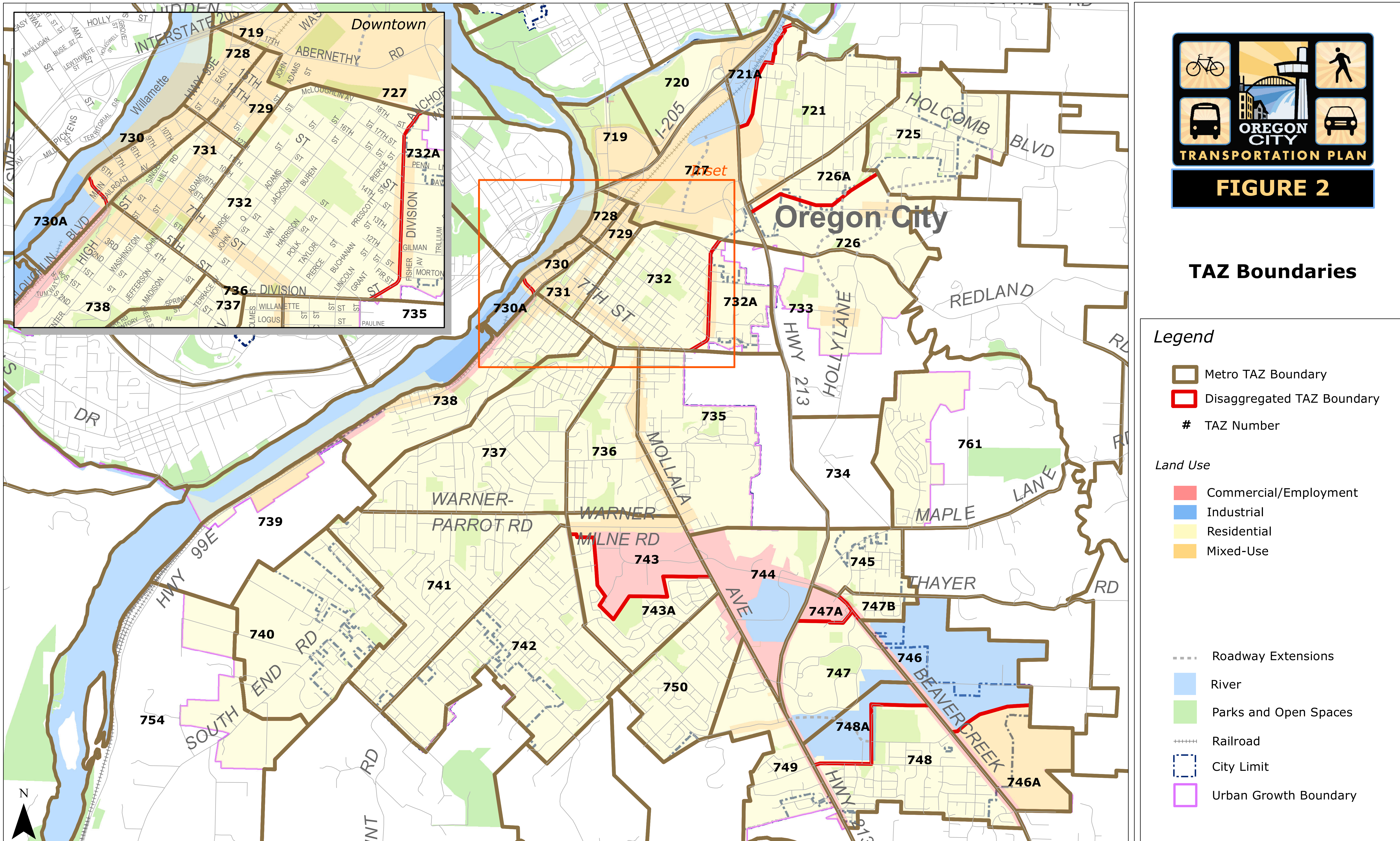


FIGURE 2

TAZ Boundaries

Land Use

Land use is a key factor affecting the traffic demands placed on Oregon City's transportation system. The location, density, type, and mixture of land uses have a direct impact on traffic levels and patterns. Existing 2010 land use inventories and future 2035 land use projections were provided by Metro.

The existing 2010 land use inventory approximated the number of households and the amount of retail employment, service employment, and other employment that currently exist in each Metro TAZ. The Metro land use data will then be split into the smaller TAZ system identified for the Oregon City TSP model. Control totals for the 'parent' Metro TAZ will be maintained for the sum of the 'child' disaggregated TAZs. The allocation of land use totals between disaggregated TAZs will be based on existing aerial photography, tax lot data, and knowledge from previous studies in Oregon City.

The future 2035 land use projection is an estimate of the amount of each land use that the TAZ could accommodate at expected build-out of vacant or underdeveloped lands assuming Comprehensive Plan designations. The allocation of future growth to Metro TAZs was modified based on input from City of Oregon City Staff. However, the control total was maintained for the sum of TAZs within the UGB area (as identified in Figure 2). Existing land use estimates and future projections for the UGB area are listed in Table 2.

Table 2: Oregon City UGB Area Land Use Summary

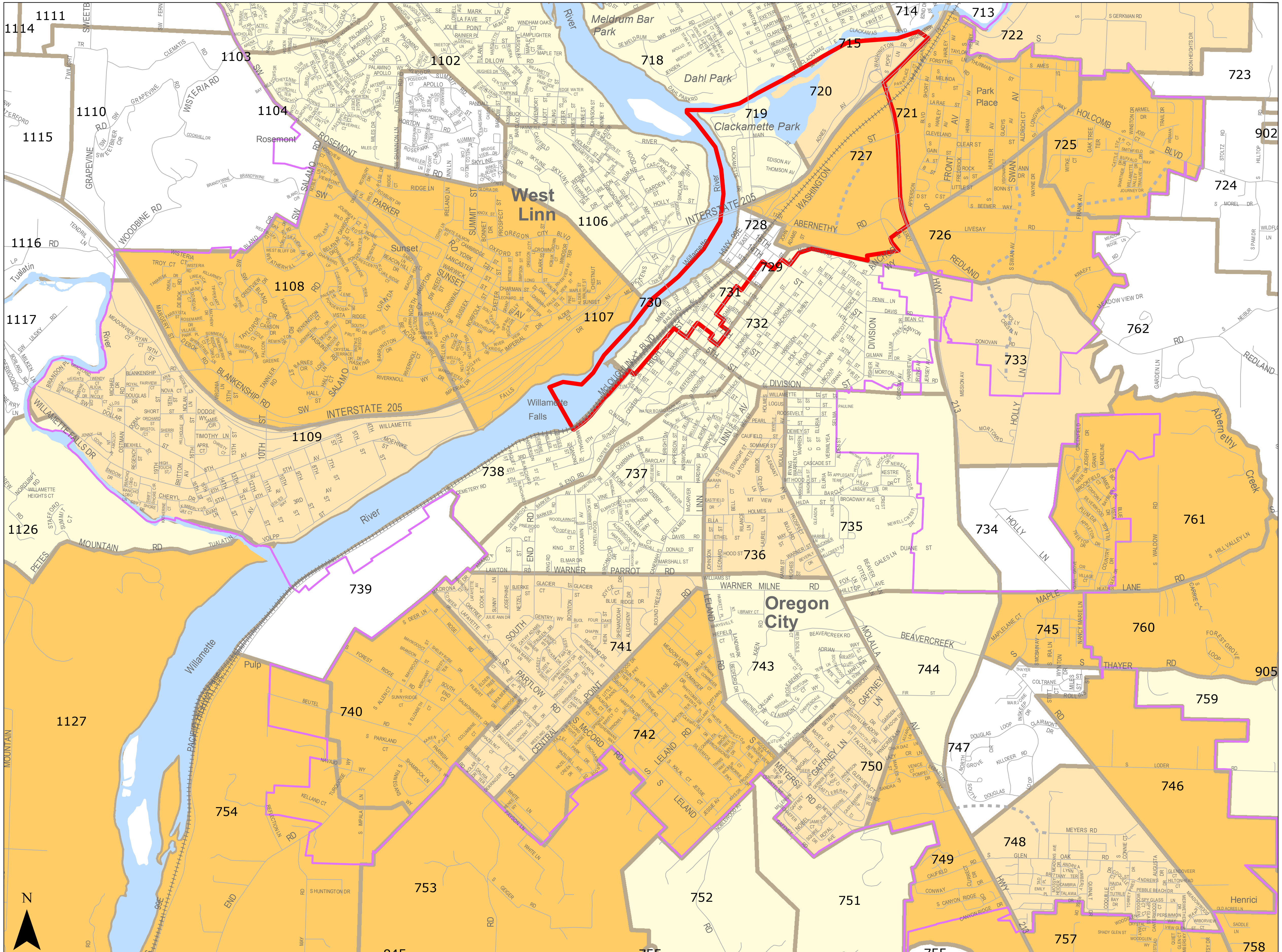
Land Use	2010 Land Use	Projected Growth from 2010 to 2035	Projected 2035 Land Use	Percent Growth (2010 – 2035)
Households				
Total Households	**13,022**	**7,963**	**20,985**	**61%**
Employees				
Retail Employees	3,089	2,052	5,141	66%
Service Employees	3,718	3,255	6,973	88%
Other Employees	7,914	3,300	11,214	42%
Total Employees	**14,721**	**8,607**	**23,328**	**58%**

A full set of detailed land use data by TAZ cannot be provided in this memo due to confidentiality of employment information. However, projected growth for households and employment (retail, service and other employment) is provided for each model TAZ in the Appendix. This information is summarized in Figures 3 through 6.

OREGON CITY TRANSPORTATION PLAN

FIGURE 3

Household Growth by TAZ (2010 - 2035)



Legend

Household Change by TAZ between 2010 and 2035

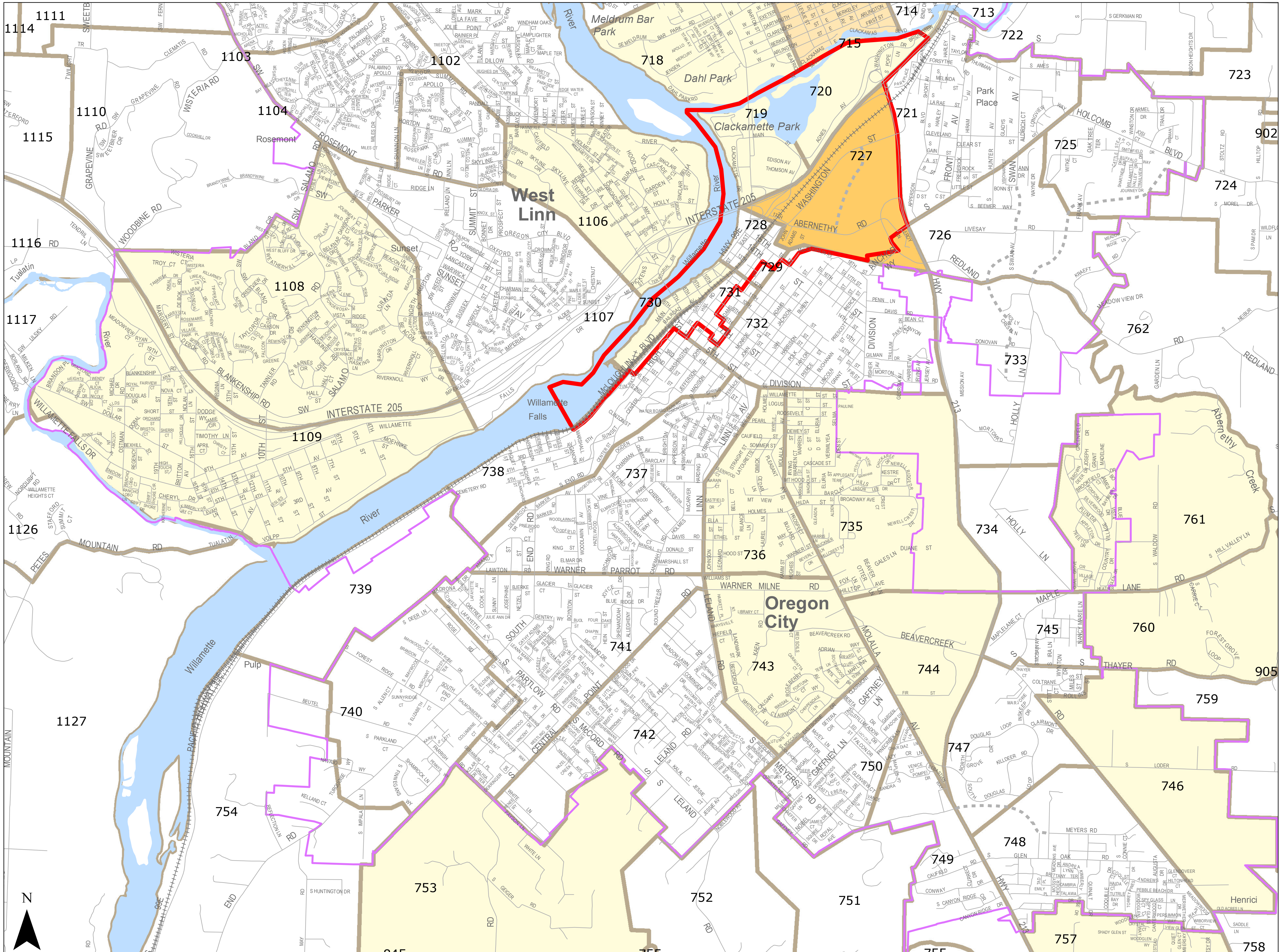
- 0 - 50 Households
- >50 - 150 Households
- >150 - 300 Households
- >300 Households

- # TAZ Number
- Oregon City Regional Center
- River
- Planned Roadways
- Railroad
- Urban Growth Boundary

OREGON CITY TRANSPORTATION PLAN

FIGURE 4

Retail Employment Growth by TAZ (2010 - 2035)



Legend

Service Employment Change by TAZ between 2010 and 2035

- 0 - 50 Employees
- >50 - 150 Employees
- >150 - 300 Employees
- >300 Employees

- # TAZ Number
- Oregon City Regional Center
- River
- Planned Roadways
- Railroad
- Urban Growth Boundary

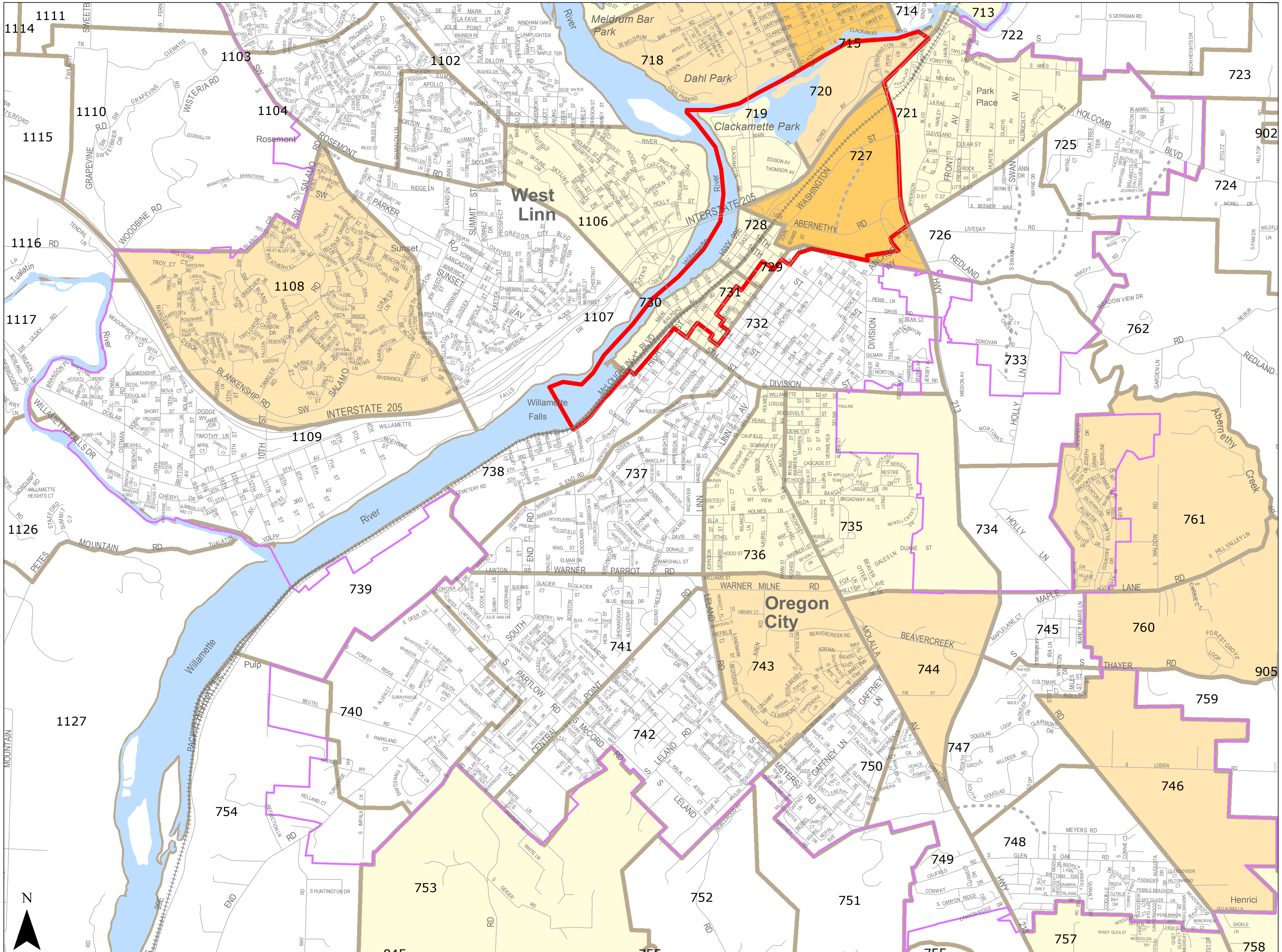


FIGURE 5

Service Employment Growth by TAZ (2010 - 2035)

Legend

Service Employment Change by TAZ between 2010 and 2035

- 0 - 50 Employees
- >50 - 150 Employees
- >150 - 300 Employees
- >300 Employees

- # TAZ Number
- Oregon City Regional Center
- River
- Planned Roadways
- Railroad
- Urban Growth Boundary

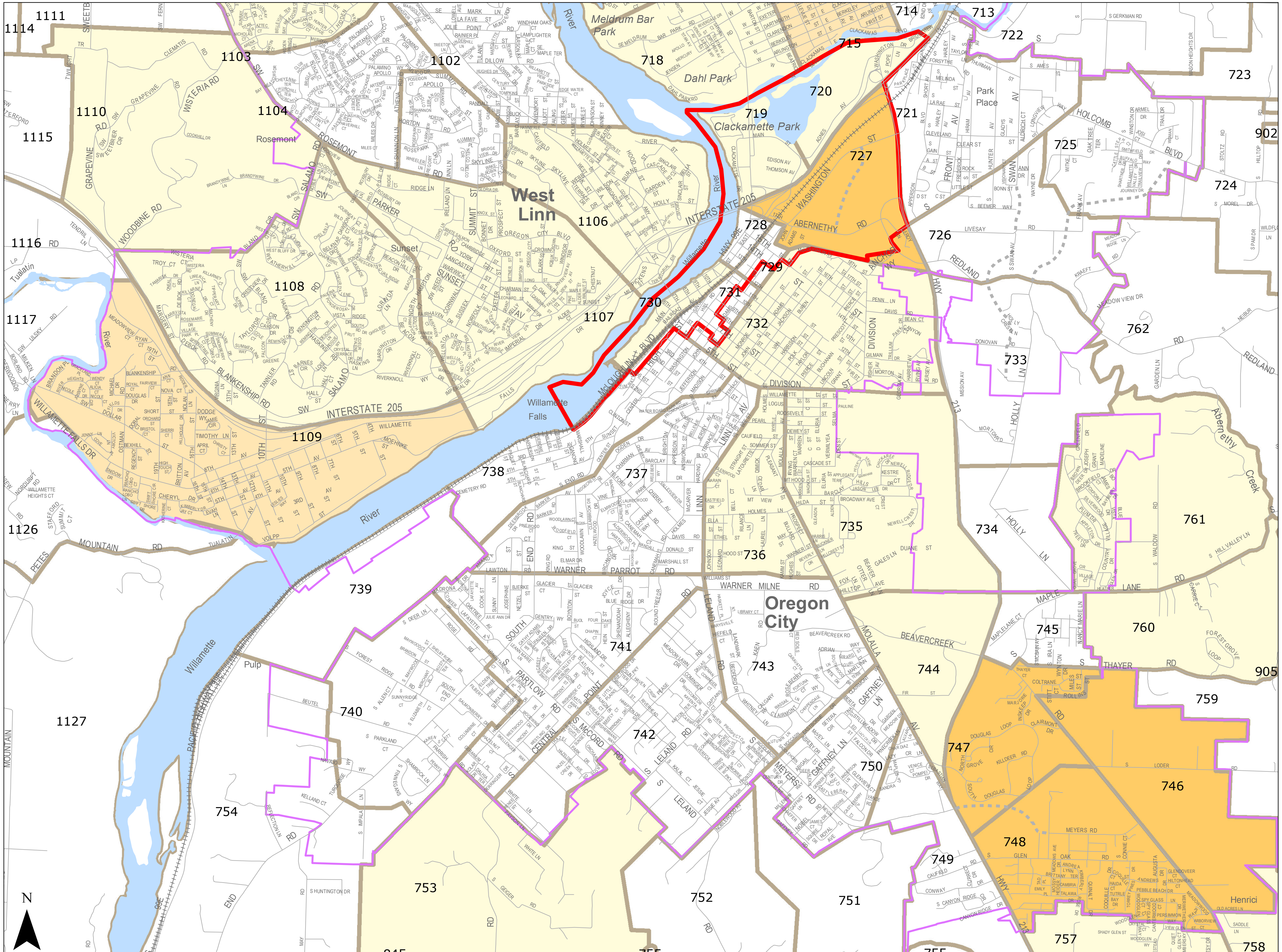


FIGURE 6

Other Employment Growth by TAZ (2010 - 2035)

Legend

Other Employment Change by TAZ between 2010 and 2035

- 0 - 50 Employees
- >50 - 150 Employees
- >150 - 300 Employees
- >300 Employees

- # TAZ Number
- Oregon City Regional Center
- River
- Planned Roadways
- Railroad
- Urban Growth Boundary

Travel Demand

Future year (2035) travel demand on roadways and at intersections in Oregon City will be estimated based on the Oregon City TSP models for 2010 and 2035. Travel demand will be estimated for the weekday PM peak hour for both 2010 and 2035, consistent with the ODOT Analysis Procedures Manual,[3] which documents the typically accepted method of developing future forecasts from model volumes in Oregon. The purpose of the 2010 model is to calibrate the network in preparation for developing the 2035 model. The calibration process may include adjustments to street network elements (connectivity, capacities, speeds, etc.) or centroid connectors (reflecting how the land use accesses the street network). Similar adjustments would be considered for the 2035 model. In addition, the 2010 model will be used as baseline for estimating growth in the 2035 model.

Traffic forecasts will be based on using model post-processing, as identified in the ODOT Analysis Procedures Manual. This approach is derived from methodologies outlined in National Cooperative Highway Research Program Report 255, *Highway Traffic Data for Urbanized Area Project Planning and Design*. This process is based on adding the increment of growth identified between the base and future year PM peak travel demand models to PM peak hour intersection turn movements derived from traffic counts. The method creates future year forecasts that are calibrated to actual data.

The travel demand analysis includes the translation of Metro land use information into motor vehicle trips. This was done for each Oregon City TAZ based on the existing and projected land uses described previously in the Land Use section of this memorandum. This section of the memorandum describes the methodology used to determine how the trips were distributed and assigned to the roadway network.

Motor Vehicle Trip Generation and Distribution

Trip quantities for the Oregon City TSP models were derived directly from Metro's travel demand models for 2010 and 2035. Metro model trip tables will be used as a basis for the Oregon City TSP model. The initial number of trips in the Oregon City TSP model will be consistent with the Metro travel demand model for both external and internal zones. Trip totals identified for Metro TAZs were split proportionally into the disaggregated TAZ system based on land use data and aggregate Metro model trip rates. The sum of the trip totals for disaggregated 'child' zones equaled the trips for each Metro 'parent' zone. Further refinements to trip generation may be made to calibrate the base year Oregon City model to traffic counts. The growth in demand (difference between 2010 and 2035) identified in Metro's travel demand models will be maintained, as identical adjustments to demand will also be applied to the future year model, if need be.

By utilizing trip tables directly from the Metro travel demand models as a basis, the initial distribution of trips will be retained. Relative trip distribution for disaggregated 'child' TAZs reflect the distribution identified for the 'parent' Metro TAZ.

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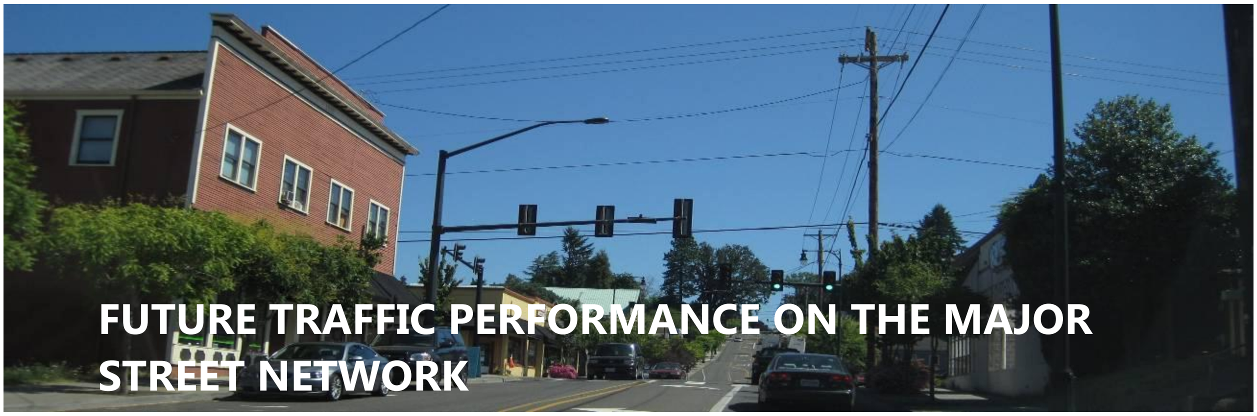
[3] *Analysis Procedures Manual (APM)*, Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU), Last Updated June 2010.

Trip Assignment

Trip assignment involves the determination of the specific travel routes taken for all trips within the transportation network. Both the Oregon City TSP model and the Metro regional model perform trip assignment using VISUM. Model inputs included the transportation network (i.e., road and intersection locations and characteristics, as determined from maps and field inventories) and a trip distribution table (determined using methodology described previously in this memorandum). Iterated equilibrium assignment will be performed using estimated travel times along roadways as well as mid-block and approach capacities at intersections. The path choice for each trip will be based on minimal travel times available between locations in the model. Model outputs will include traffic volumes on roadway segments and at intersections. Model outputs will be reviewed for reasonableness and post-processed (as described previously) to develop forecasts.

Section F

FUTURE TRAFFIC PERFORMANCE ON THE MAJOR STREET NETWORK



FUTURE TRAFFIC PERFORMANCE ON THE MAJOR STREET NETWORK

Oregon City, like many jurisdictions, faces the challenge of accommodating future population and employment growth while keeping acceptable service levels on its transportation network. Oregon City is aware of this challenge and strives to keep the City's Transportation System Plan (TSP) up to date in an effort to prepare for and accommodate the future growth in the most efficient manner possible. Without the big picture that the TSP provides, maintaining acceptable street network performance could not be achieved in an efficient manner. For this reason, the City updated its forecast by reviewing the existing transportation network with growth through 2035 to better understand how the street network would be expected to operate. Using the existing zoning designations, this document explores the expected conditions of the Oregon City street network in 2035, assuming improvements are not pursued to accommodate future growth. Although this document focuses on the future growth and performance of the street system for driving, the forecasting process for future travel demand assumes increased travel via walking, biking and transit, in addition to driving. These modes will be further reviewed in Technical Memorandum #7.

Estimating Future Growth

Before we determine what investments are needed for a transportation network for all modes, we must first look at the existing travel conditions, and then use the latest planning assumptions to forecast what future growth and travel trends might look like in the planning horizon of 2035. This helps to establish future baseline street network conditions that show what the future might look like if no new improvements are made to accommodate growth in the community.

The Traffic Forecasting Process

A determination of future street network needs in Oregon City requires the ability to accurately forecast travel demand resulting from estimates of future population and employment for the City. A primary objective of the transportation planning process is to provide the information necessary for making decisions on when and where improvements should be made to the transportation system to meet travel demand as developed in an urban area travel demand model as part of the Regional Transportation Plan update process. Metro uses VISUM, a computer based program for transportation planning, to process the large amounts of data for the Portland Metropolitan area. The traffic forecasting process can be summarized in six steps (see Figure 1):

1. **Update street network data:** The street network for the Metro Travel Demand Model was expanded to include all arterial and collector streets in Oregon City. The model had previously included most major roadways in the region. The existing model street network was also refined based on the existing conditions inventory of posted speeds, traffic control, lane geometries, and number of travel lanes. The existing model street network was utilized as the starting point for the 2035 Baseline model. Projects with secured funding or that are reasonably likely to be funded by 2035 were added to the street network.

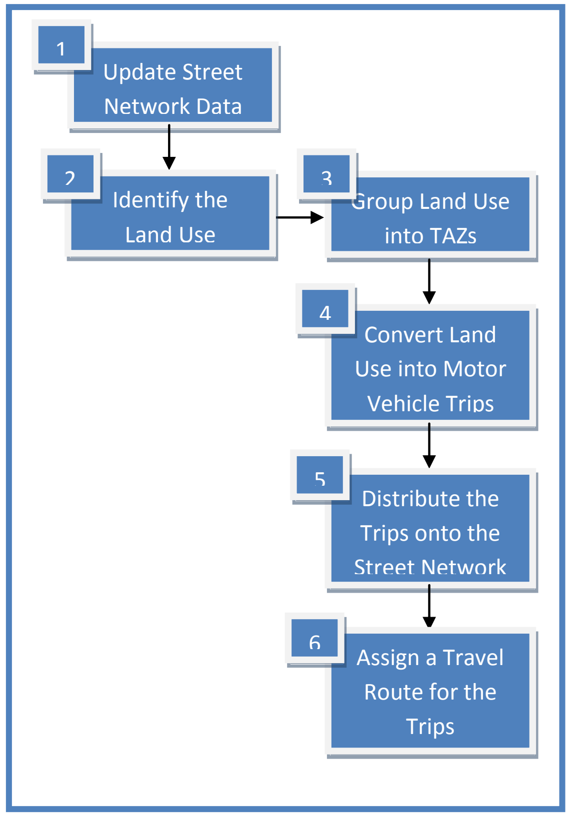


Figure 1: The Traffic Forecasting Process

2. **Identify the land use:** Based on 2010[1] and 2035 land use, growth for Oregon City and the surrounding region was estimated.
3. **Group the land use data based on location:** The land use data was split into geographical areas called transportation analysis zones (TAZs), which represent the sources of vehicle trip generation. There are 31 Metro TAZs within or adjacent to the Oregon City. These TAZs were further subdivided into 40 TAZs to better represent land use in Oregon City. The TAZs in Oregon City are shown in Figure A1 in the appendix.
4. **Convert the land use to motor vehicle trips:** The existing and projected land use is converted into motor vehicle trips. The trip generation process translates existing and projected land use quantities (number of dwelling units, retail, and other employment) into vehicle trip ends (number of vehicles entering or leaving a TAZ) using trip generation rates established during the model verification process.
5. **Distribute the trips onto the street network:** This step estimates how many trips travel from one TAZ in the model to any other TAZ. Distribution is based on the number of vehicles entering or leaving each TAZ pair, and on factors that relate the likelihood of travel between any two zones to the travel time between zones.
6. **Assign a travel route to the trips:** In this process, trips from one TAZ to another are assigned to specific travel routes on the street network, and resulting trip volumes are accumulated on links of the network until all trips are assigned.

[1] 2010 land use is based on the most current inventory by Metro

Once the traffic forecasting process is complete, we utilize the 2035 traffic volumes to determine the areas of the street network that are expected to be congested and that may need future investments to accommodate growth.

Baseline Street Network Performance

Baseline reflects the street network performance assuming we build the transportation projects that already have secured funding or are reasonably likely to be funded but assumes no additional improvements. Major projects that are included in the Baseline street network are (see Table A1 in the appendix for more detail):

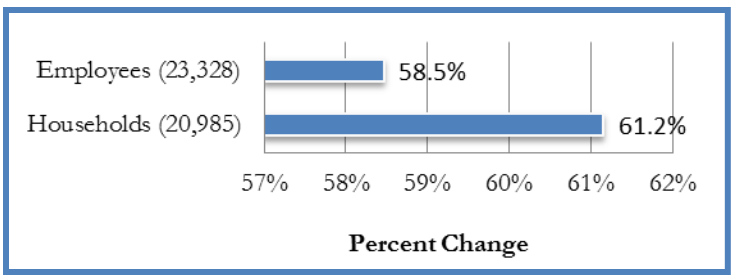
- Swan Avenue extension from Livesay Road to Holly Lane
- Holly Lane extension from Redland Road to Holcomb Boulevard
- Holly Lane improvements from Redland Road to Maple Lane Road
- Beavercreek Road widening from Maple Lane Road to Henrici Road
- Meyers Road extension from OR 213 to High School Avenue
- A roadway connection between Washington Street and Abernethy Road
- Intersection re-configuration at OR 213/Washington Street
- A roundabout at the Molalla Avenue/Division-Taylor Street intersection

Snapshot of Oregon City in 2035

Highlights of the 2035 Baseline performance are discussed below. While these summaries detail land use and growth in Oregon City, the travel demand forecasts that have been evaluated reflect the regional land use growth throughout the Portland metropolitan area.

More People, More Jobs

Today, Oregon City and the adjacent area are home to over 13,000 households and accounts for over 14,500 jobs. Between now and 2035, household growth is expected to increase nearly 2.4 percent a year, slightly outpacing the rate of job growth over the same period.[2] Oregon City and the adjacent area are expected to be home to 23,328 jobs by 2035, a



Oregon City and Adjacent Area Total Households and Employees in 2035 and Percent Change From 2010

[2] Household and Employment growth was estimated by Metro using 2010 and 2035 zoning data

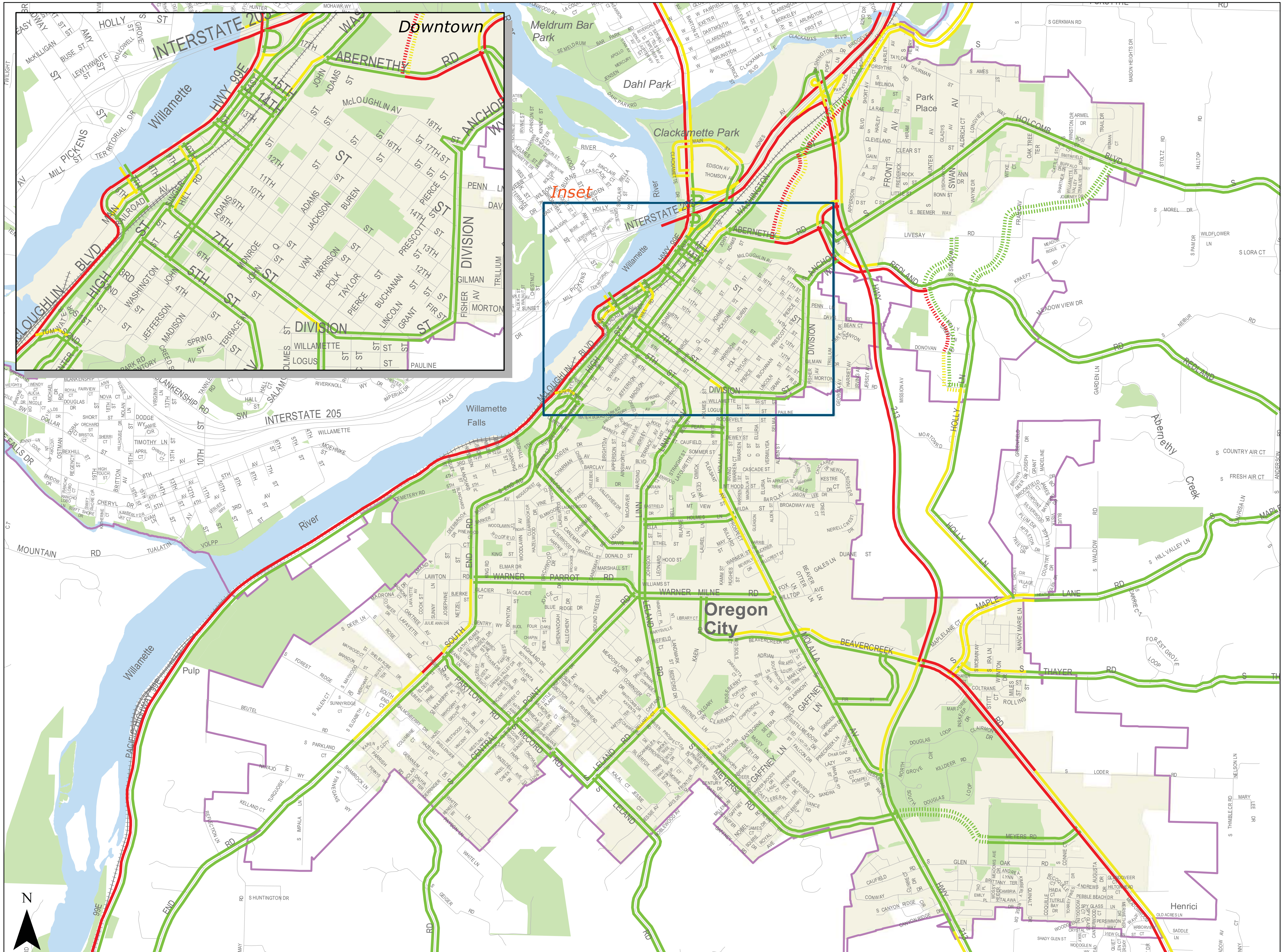
58 percent increase from 2010, or an average of 2.3 percent growth a year. Households are expected to grow to 20,985 by 2035, a 61 percent increase from 2010. With more people and more jobs in and around Oregon City, the street network will face increased demand through 2035. More detail on the land use by TAZ can be found in Table A3 in the appendix.

More Travel

With more jobs and people, the street network in Oregon City will face an additional 21,000 motor vehicle trips during the evening peak hour (see Table A2 in the appendix). Today, the street network in Oregon City is generally able to handle the estimated 33,000 evening peak hour trips. However, the evening peak hour motor vehicle trips are expected to increase 3 percent a year, surpassing 54,000 trips by 2035. Figure 2 shows the estimated increase in motor vehicle trips on the street network during the evening peak hour. As shown, much of the increased demand is expected along the regional roadways, such as I-205, OR 99E and OR 213. These roadways generally connect the Portland Metropolitan area to the employment areas in Oregon City. Other roadways that are expected to see significant traffic increases (according to the Metro travel demand model) include Abernethy Road, Beavercreek Road, Holly Lane, Maple Lane Road, Molalla Avenue, Redland Road and South End Road. Each of these roadways connects a major residential and/or employment growth area in the City to the regional roadway network.

More Congestion

More travel means more congestion. Travel activity as reflected by evening peak hour motor vehicle trips is expected to increase by 75 percent through 2035. Figure 3 shows the expected locations of congestion on the street network in Oregon City. As shown, most of the congestion is expected to be along the regional roadways that would experience the highest growth in evening peak hour motor vehicle volumes, such as I-205, OR 99E and OR 213. Congestion on I-205 and OR 213 would generally have less of an impact on Oregon City compared to that on OR 99E. When OR 99E is congested it has more of an impact on surface street circulation around Downtown Oregon City and could potentially detract from shopping or other retail uses in the area. Other roadways that are expected to experience congestion during the evening include Redland Road and Washington Street. It should be noted that major intersections along the congested roadways could potentially have operational issues based on this analysis. A detailed review of these intersections is forthcoming in Technical Memorandum #7.



OREGON CITY TRANSPORTATION PLAN

FIGURE 2

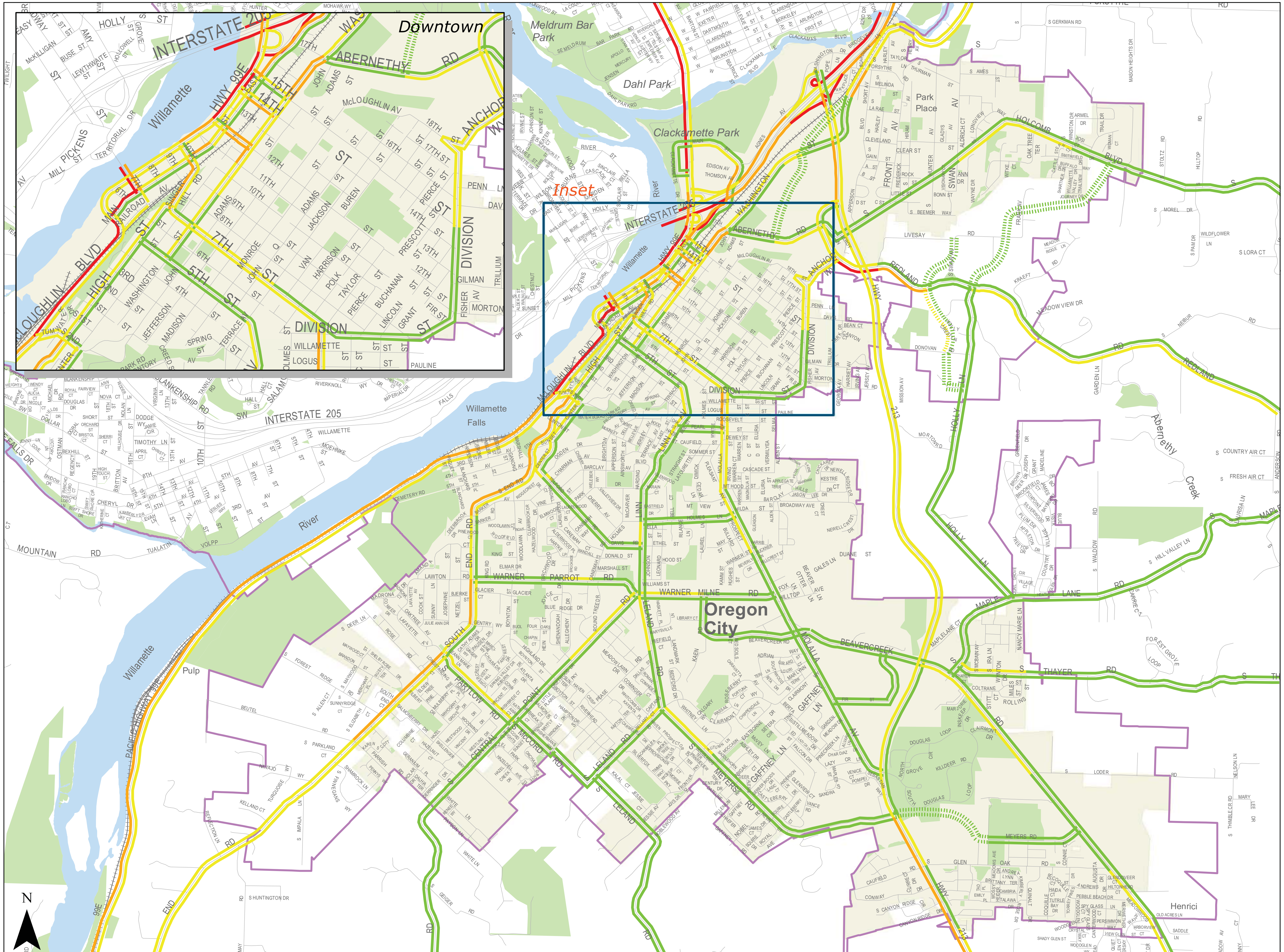
Motor Vehicle Travel Growth (P.M. Peak)

Legend

Roadway Travel Volume Increase between 2010 and 2035

- Highest Growth in Traffic Volumes (increase of more than 500 vehicles during the p.m. peak hour)
- Higher Growth in Traffic Volumes (increase between 250 and 500 vehicles during the p.m. peak hour)
- Smallest Growth in Traffic Volumes (less than 250 additional vehicles during the p.m. peak hour)

- River
- Parks and Open Spaces
- Planned Roadways
- Railroad
- City Limit
- Urban Growth Boundary



TRANSPORTATION PLAN

OREGON CITY

FIGURE 3

2035 Motor Vehicle Congestion (P.M. Peak)

Legend

Roadway Traffic Volume compared to Available Capacity

- Congested, over capacity
- More Congestion, nearing capacity
- Slightly more Congestion, well under capacity
- Uncongested, well under capacity

- River
- Parks and Open Spaces
- Planned Roadways
- Railroad
- City Limit
- Urban Growth Boundary

Appendix

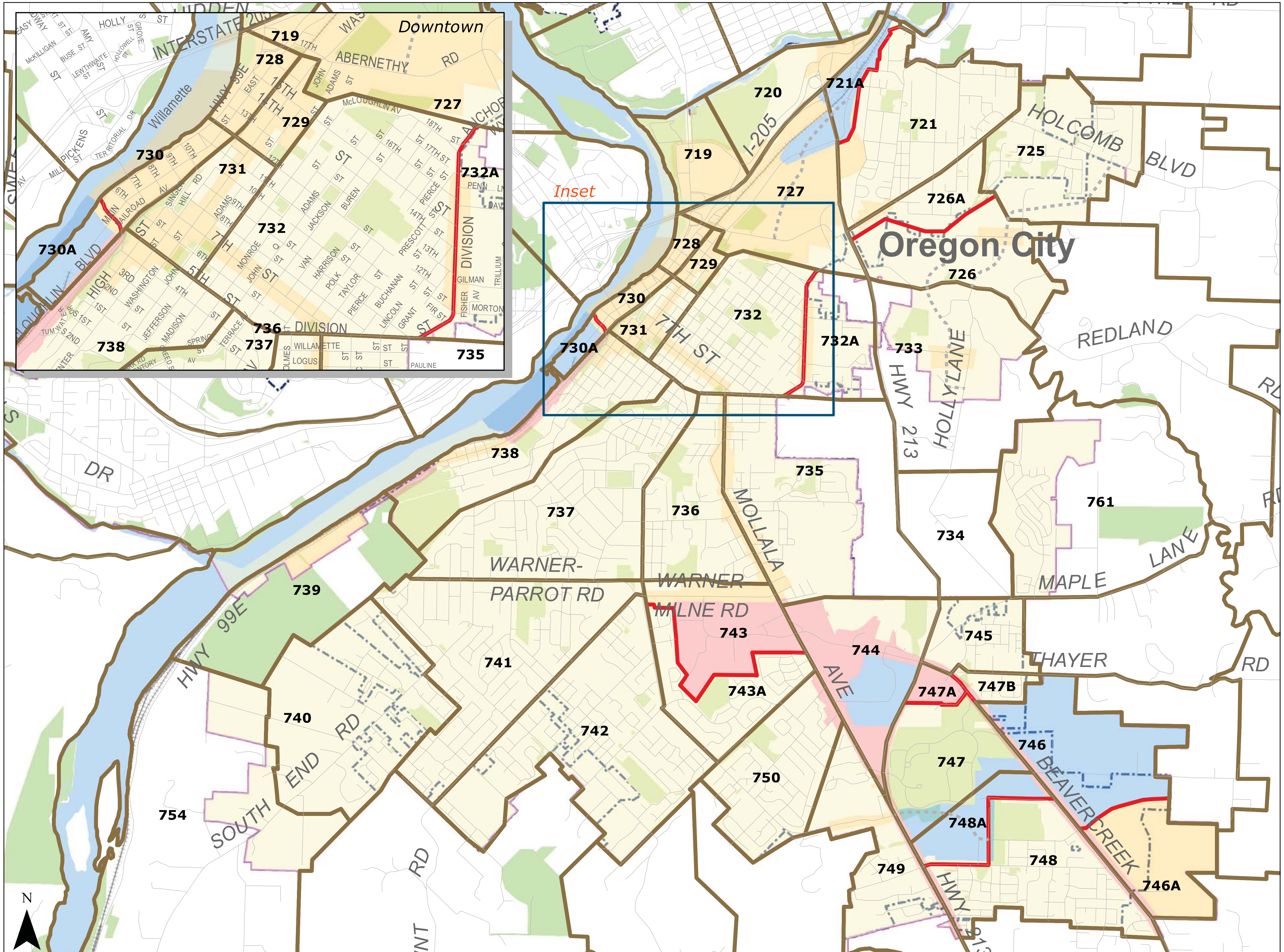
Table A1: Oregon City CIP Financially Constrained Motor Vehicle Projects

Project ID	Source	Project/ Program Name	Start Location	End Location	Description
Roadway Segment Improvements					
1	RTP	Swan Extension	Livesay Rd	Holly Ln	Through lanes, sidewalks, bike lanes, turn lanes to serve UGB expansion area
2	RTP	Holly Lane	Redland Rd	Holcomb Rd	Through lanes, sidewalks, bike lanes, turn lanes to serve UGB expansion area
3	RTP	Holly Lane	Redland Rd	Maple Ln	Turn lanes, bike lanes, sidewalks, intersection improvements, bridge replacement
4	RTP	Beavercreek Rd Improvements Phase 2	Maple Lane	Clackamas Community College	Widen to 5 lanes with sidewalks and bike lanes
5	RTP	Beavercreek Rd Improvements Phase 3	Clackamas Community College	UGB	Widen to 4 lanes with sidewalks and bike lanes
6	City TSP	Meyers Road	High School Avenue	Beavercreek Road	Extension from current terminus at High School Avenue to Beavercreek Road
7	City TSP	Washington – Abernethy Connector	Abernethy Road	Washington Street	Extension from stub south of Washington to Abernethy Road
Intersection Improvements					
A	STIP/ City TSP	Jughandle at OR 213/Washington Street	-	-	Construct Jughandle Intersection at Washington Street
B	RTP	Molalla Avenue Roundabout (Taylor/Division)	-	-	Reconfigure intersection for safety and LOS into roundabout

OREGON CITY TRANSPORTATION PLAN

FIGURE A1

TAZ Boundaries



Legend

- Metro TAZ Boundary
- Modified TAZ Boundary
- # TAZ Number

Land Use

- Commercial/Employment
- Industrial
- Residential
- Mixed-Use

- Roadway Extensions
- River
- Parks and Open Spaces
- Railroad
- City Limit
- Urban Growth Boundary

Table A2: Oregon City Trip Generation by TAZ

	2010			2035			
TAZ	Trips Leaving	Trips Arriving	Total Trips	Trips Leaving	Trips Arriving	Total Trips	Change in Total Trips (2035-2010)
719	574	387	962	857	605	1,462	500
720	59	23	81	418	280	698	617
721	265	400	665	568	583	1,151	486
721A	137	73	209	103	315	417	208
725	185	307	492	424	824	1,248	755
726	30	62	92	165	330	495	403
726A	74	134	208	90	202	292	84
727	449	289	738	3,286	2,027	5,312	4,574
728	100	73	173	242	170	412	240
729	150	95	245	266	175	441	197
730	290	239	529	556	228	784	255
730A	362	94	456	280	235	515	58
731	275	242	517	390	329	719	202
732	904	1,170	2,074	1,435	786	2,221	147
732A	987	325	1,312	513	804	1,318	6
733	103	117	220	203	326	529	310
734	29	53	82	34	63	98	16
735	752	855	1,607	1,031	1,048	2,079	472
736	700	751	1,451	933	922	1,856	405
737	640	1,038	1,678	716	1,144	1,861	183
738	289	402	691	371	492	862	172
739	27	14	41	43	44	87	46
740	311	513	823	761	1,421	2,183	1,360
741	580	1,154	1,734	701	1,407	2,109	374
742	481	942	1,423	922	1,850	2,772	1,348
743	2,547	961	3,507	1,852	1,711	3,563	56
743A	468	889	1,357	1360	375	1,735	378
744	1,504	880	2,383	2,038	1,207	3,246	862

Table A2: Oregon City Trip Generation by TAZ

	2010			2035			
TAZ	Trips Leaving	Trips Arriving	Total Trips	Trips Leaving	Trips Arriving	Total Trips	Change in Total Trips (2035-2010)
745	119	144	263	369	701	1,070	807
746	47	44	91	1,101	672	1,772	1,682
747	897	300	1,197	952	764	1,717	520
747A	683	453	1136	773	399	1172	36
747B	192	294	486	570	128	697	211
748	384	663	1,047	642	571	1,213	166
748A	93	26	119	99	347	446	327
749	522	693	1,215	710	1,044	1,755	540
750	503	735	1,238	655	977	1,632	394
754	84	183	267	406	903	1,309	1,043
761	77	126	202	564	650	1,213	1,011
Total	**16,872**	**16,140**	**33,012**	**27,400**	**27,061**	**54,461**	**21,449**

Table A3: Oregon City TAZ Land Use Growth, 2010 to 2035

TAZ	Household Growth	Employment Growth
719	150	306
720	193	384
721	428	136
725	593	12
726	397	-1
727	370	3112
728	48	148
729	43	128
730	58	208
731	54	121
732	114	17
733	237	16
735	90	275
736	152	197
737	119	31
738	88	69
740	996	13
741	194	1
742	1055	11
743	79	-40
744	78	527
745	660	-15
746	355	1639
747	4	473
748	188	347
749	474	26
750	238	80
761	507	384
Subtotal	**7,962**	**8,605**

Source: Metro