City of Gladstone

TRANSPORTATION SYSTEM PLAN UPDATE

Volume 1: Transportation System Plan

Prepared for:
City of Gladstone
525 Portland Avenue
Gladstone, Oregon 97027
503.650.8398

Prepared by:
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland, Oregon 97205
503.228.5230

City of
Gladstone
Oregon

City of Gladstone
Transportation System Plan

Gladstone, Oregon

Prepared For:
City of Gladstone
525 Portland Avenue
Gladstone, OR 97027
(503) 650-8398

Prepared By:
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland, OR 97205
(503) 228-5230

Project Manager: Matt Bell
Project Analyst: Molly McCormick
Project Principal: Matt Hughart

December 2017

ACKNOWLEDGEMENTS

The production of the 2017 Gladstone Transportation System Plan (TSP) has been the collective effort of the following people:

City Council Members

- Mayor Tammy Stempel
- Councilor Michael Milch
- Councilor Linda Neace
- Councilor Matt Tracy
- Councilor Neal Reisner
- Councilor Patrick McMahon
- Councilor Thomas Mersereau
- *Former Councilor Kim Sieckmann*
- *Former Councilor Steve Johnson*

Planning Commission Members

- Malachi de AElfweald
- William Preble
- Libby Wentz
- Les Poole
- Natalie Smith
- Randy Rowlette
- Patrick Smith
- *Former Commissioner Dennis McCarty*

Policy Advisory Committee (PAC) Members

- Melinda (Mindy) Garlington
- Linda Cosgrove
- Mandy Flett
- Susan Liston
- Bill Osburn
- Kim Sieckmann

Technical Advisory Committee (TAC) Members

- Jeff Jolley, *Gladstone Police*
- Mike Funk, *Gladstone Fire Department*
- Bob Stewart, *Gladstone School District*
- Pat Sisul, *Gladstone On-call Engineer*
- Vanessa Vissar, *TriMet*
- Chris Myers, *Metro*
- Karen Buehrig, *Clackamas County*
- Laura Terway, *Oregon City*

Project Management Team (PMT) Members

- Jim Whynot, *Gladstone*
- Jacque Betz, *Gladstone*
- Eric Swanson, *Gladstone*
- Carolyn Gray, *Gladstone*
- Gail Curtis, *Oregon Dept of Transportation*
- Matt Bell, *Kittelson & Associates*
- Molly McCormick, *Kittelson & Associates*
- Mat Hughart, *Kittelson & Associates*
- Darci Rudzinski, *Angelo Planning Group*
- Clinton Doxsee, *Angelo Planning Group*

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 (ODOT) and the Oregon Department of Land Conservation and Development (DLCD). This TGM grant is financed, in part, by federal Fixing America’s Surface Transportation Act (“FAST Act”), Federal Transit Administration, and State of Oregon funds. The contents of this document do not necessarily reflect views or policies of the State of Oregon.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1 INTRODUCTION

INTRODUCTION

The City of Gladstone Transportation System Plan (TSP) is a long range plan that establishes a system of transportation facilities and services to meet state, regional, and local needs. The plan also serves as the Transportation Element of the Gladstone Comprehensive Plan. The purpose of the 2017 TSP update is to address growth in Gladstone and its surrounding communities as well as address regulatory changes that have occurred in the region since 1995.

This update of the TSP is consistent with the Metro 2040 Regional Transportation Plan (RTP) and the 2012 Regional Transportation Functional Plan (RTFP). The TSP fulfills the Transportation Planning Rule (TPR) requirements for comprehensive transportation planning in Oregon cities, and presents the investments and priorities for the Pedestrian, Bicycle, Transit, and Motor Vehicle systems. The TSP also supports transportation policies in the City of Gladstone’s Comprehensive Plan.

HISTORY OF TRANSPORTATION IN GLADSTONE

The City of Gladstone has a long history of providing different transportation modes to the area. Before the City was founded, the area’s Native American population operated a ferry across the Clackamas River to facilitate trade at the iconic “Pow-Wow” tree. When the early settlers of the area arrived in the mid 1800’s, the ferry was replaced by a toll bridge where the Park Place Bridge stands today. This bridge was washed out by the flood of 1856, but was rebuilt in 1861 and operated as a toll bridge.

The City was formally incorporated in 1911. Soon after, the railroad and street cars brought people from Portland and other towns and communities to Gladstone for concerts, ball games, and other events. What is perhaps most notable about Gladstone in those early days is the transportation system that provided access to, and from, the city. When the railroad bridge over the Clackamas River was completed in 1869, rail transport became a popular mode of travel. Upon the establishment of the Chautauqua Park, Southern Pacific erected a station at the junction of Oatfield and River Roads and called it “Chautauqua.”

Another very important mode of transportation was the electric streetcar. Built in 1893, it ran from Portland to Oregon City along what is now known as the Trolley Trail. In Gladstone, streetcars ran along Portland Avenue to the Trolley Trail Bridge and Dartmouth Street to the entrance of the Chautauqua Park on Oatfield Road. The train and the streetcar supplemented the private conveniences of horse-drawn vehicles. Much of the buggy and wagon, and later the automobile, traffic used the wagon bridge, originally built over the Clackamas River in 1860.

Many of the same roads and bridges used in the early days of Gladstone are still in place today and continue to serve the multimodal needs of local residents as well as visitors.

TSP ORGANIZATION AND METHODOLOGY

The TSP is organized into chapters that address each individual mode of transportation available and its network in the overall Gladstone transportation system. **Chapter 2** presents the goals and objectives along with the evaluation criteria used to evaluate and prioritize projects and programs. **Chapters 3 through 8** present the transportation system improvement projects identified by the project team to address needs and deficiencies in the City's transportation system. **Chapter 9** presents the funding, implementation, and monitoring plan for the TSP update, including existing and potential future funding sources to finance the identified transportation system improvements. Volume II: Technical Appendix contains the Technical Memorandums completed throughout the TSP update process, which showcase the inventory, analysis, and project list identification efforts.

Preliminary cost estimates for the list of TSP programs and projects exceed what the City can fund with existing or forecasted revenue. Therefore, the TSP includes a "fiscally constrained" plan, which identifies the top priority projects that can be completed within the 23 -year planning horizon based on the projected available funding. These projects address existing and projected deficiencies in the transportation system per local, regional, and state standards and targets.

TSP UPDATE PROCESS

The TSP Update process began with a review of local, regional, and statewide plans and policies that guide land use and transportation planning in the City. Goals and objectives and evaluation criteria were then developed to guide the evaluation of existing and project future transportation system conditions as well as the development of planned improvements.

An inventory of the multimodal transportation system was conducted to serve as the basis for the existing and future conditions analyses. The existing and future conditions analyses focused on identifying gaps and deficiencies in the multimodal transportation system based on current and forecast future performance. For each gap and deficiency, several solutions were evaluated to address the system needs. This process led to the development of a large number of plans, programs, and projects. The plans, programs, and projects were then prioritized using the project evaluation criteria and organized into planned and financially constrained project lists.

The culmination of the TSP Update process is this document, which presents the plans, programs, and projects identified to address the existing and future gaps and deficiencies in the City's transportation system.

COMMITTEES

The project team developed the TSP update in close coordination with city staff along with key representatives from surrounding communities. Two formal committees participated in the TSP update, including a Technical Advisory Committee (TAC) and a Policy Advisory Committee (PAC). The TAC consisted of representatives from Gladstone, Oregon City, Clackamas County, Metro, Oregon Department of Transportation (ODOT), and TriMet. The TAC provided technical guidance and coordination throughout the project. TAC members reviewed and commented on technical memorandums and participated in committee meetings, community meetings and workshops. The PAC consisted of local residents with an interest in transportation who applied and were appointed to serve on the PAC. The PAC served as the voice of the community and the caretakers of the goals and objectives of the TSP update. Much like the TAC, PAC members reviewed and commented on technical memorandums and participated in committee meetings, community meetings and workshops.

PUBLIC INVOLVEMENT

Public involvement was integral to the TSP Update process. Public involvement consisted of continuous web-based communications about upcoming meeting, workshops, and community meetings via the project website (www.gladstonetsp.com). The project website also included an interactive project map that allowed anyone with access to a computer to click on a map and provide comments to the project team about issues or ideas about how to address issues within the community. The project team met with the project advisory committees seven times throughout the TSP update process (three TAC meetings, four PAC meetings). Each meeting was open to the general public. The project team also hosted two community-wide community meetings (one at the Gladstone Senior Center and one at Gladstone City Hall during Bike Night). Both community meetings were accompanied by an online community meeting that offered participants the same opportunities to provide input on community concerns related to the transportation system. Additionally, the project team also met with the Planning Commission and City Council several times throughout the planning process (one joint training session, two joint workshops, and two hearings). Each meeting/workshop/hearing was open to the general public. The goal of the public involvement process was to develop a TSP update that addressed the gaps and deficiencies in the transportation system while meeting the needs of the community.

PLAN AREA

Gladstone is located in the northwest corner of Clackamas County, near the southern boundary of the Metro Service District. The City is generally bounded by unincorporated Clackamas County to the north, the Clackamas River to the south, and the Willamette River to the west. OR 99E travels north-south along the western boundary of the City, connecting Gladstone to Oregon City across to the Clackamas River to the south and Milwaukie and Portland to the north. I-205 travels north-south along the eastern boundary of the City, connecting Gladstone to Oregon City and West Linn across the Clackamas and Willamette Rivers to the south and to several other communities to the north. Figure 1 illustrates the study area for this update of the TSP.

LAND USE

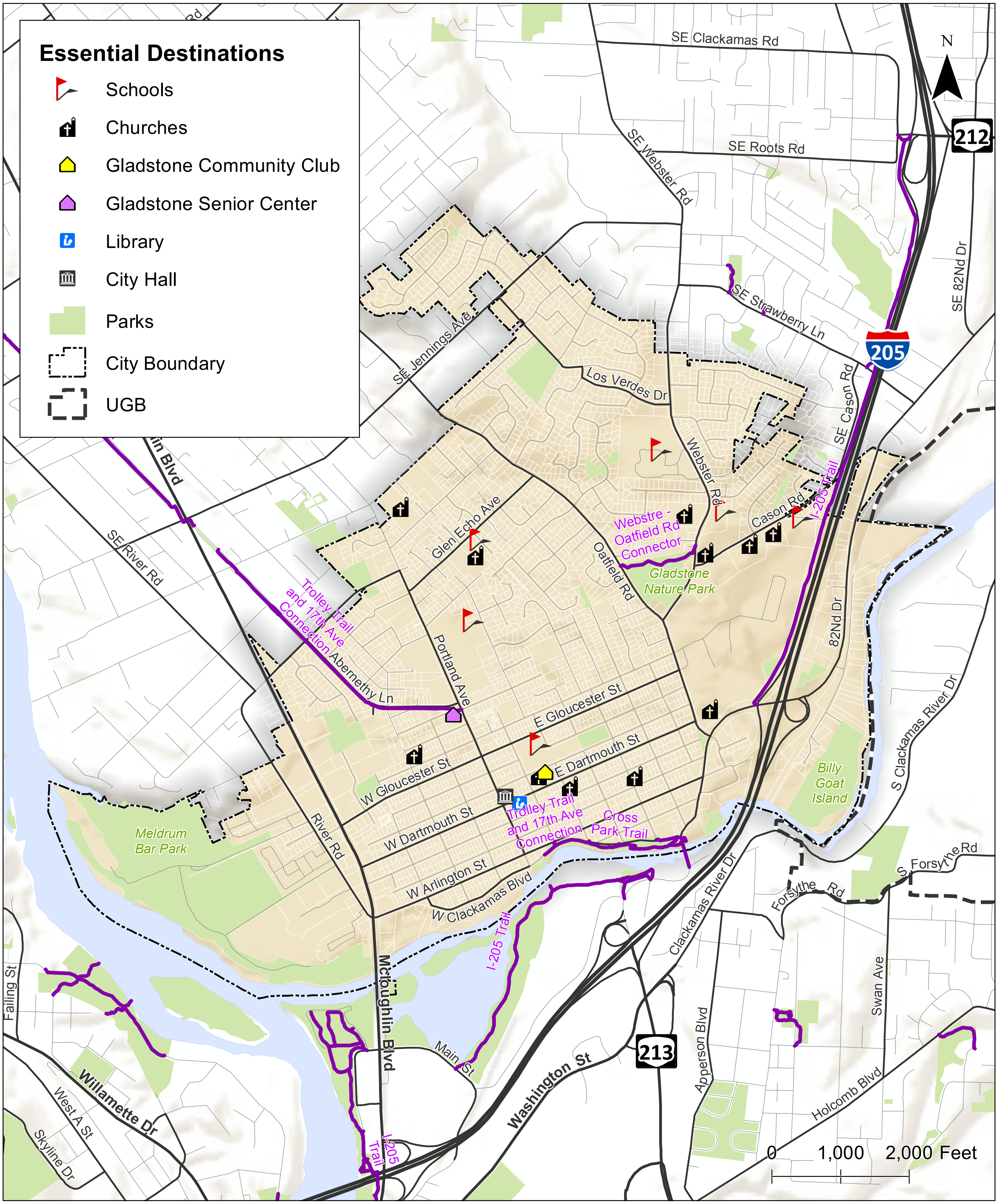
Land use plays an important role in developing a comprehensive transportation system. The amount of land that is planned to be developed, the type of land uses, and how the land uses are mixed together have a direct impact on how the transportation system will be used in the future. Understanding land use is critical to taking actions to maintain or enhance the transportation system.

Land use data for Gladstone was provided by Metro. The data includes base year 2010 and forecast year 2040 population, household, and employment estimates for the city by Transportation Analysis Zone (TAZ). There are 11 TAZs that cover the city limits of Gladstone. Figures 2 and 3 illustrate the TAZs and the household and employment changes expected between base year 2010 and forecast year 2040. Table 1 summarizes the TAZ data for base year 2010 and forecast year 2040 conditions. As shown in Table 1, the growth in population and households over the 30 year period is expected to be less than 1% per year while the growth in employment is expected to be more than 2% per year.

Table 1: Gladstone Land Use Summary

Land Use	2010	2040	Change	Percent Change
Population	16,006	18,691	+2,685	+16.8%
Households	6,847	8,105	+1,258	+18.4%
Employment	3,062	4,912	+1,850	+60.4%

As land uses change in proportion to each other (i.e. there is a significant increase in employment relative to household growth), there will be a shift in the overall operation of the transportation system. Retail land uses generate a higher number of trips per acre of land than residential and other land uses. The location and design of retail land uses in a community can greatly affect transportation system operation. Additionally, if a community is homogeneous in land use character (i.e. all employment or all residential), the transportation system must support significant trips coming to or from the community rather than within the community. Typically, there should be a mix of residential, commercial, and employment type land uses so that some residents may work and shop locally, reducing the need for residents to travel long distances. The data shown in Table 1 indicates that significant growth is expected in Gladstone in the coming years, particularly employment opportunities. The transportation system should be monitored to make sure that land uses in the plan are balanced with transportation system capacity.

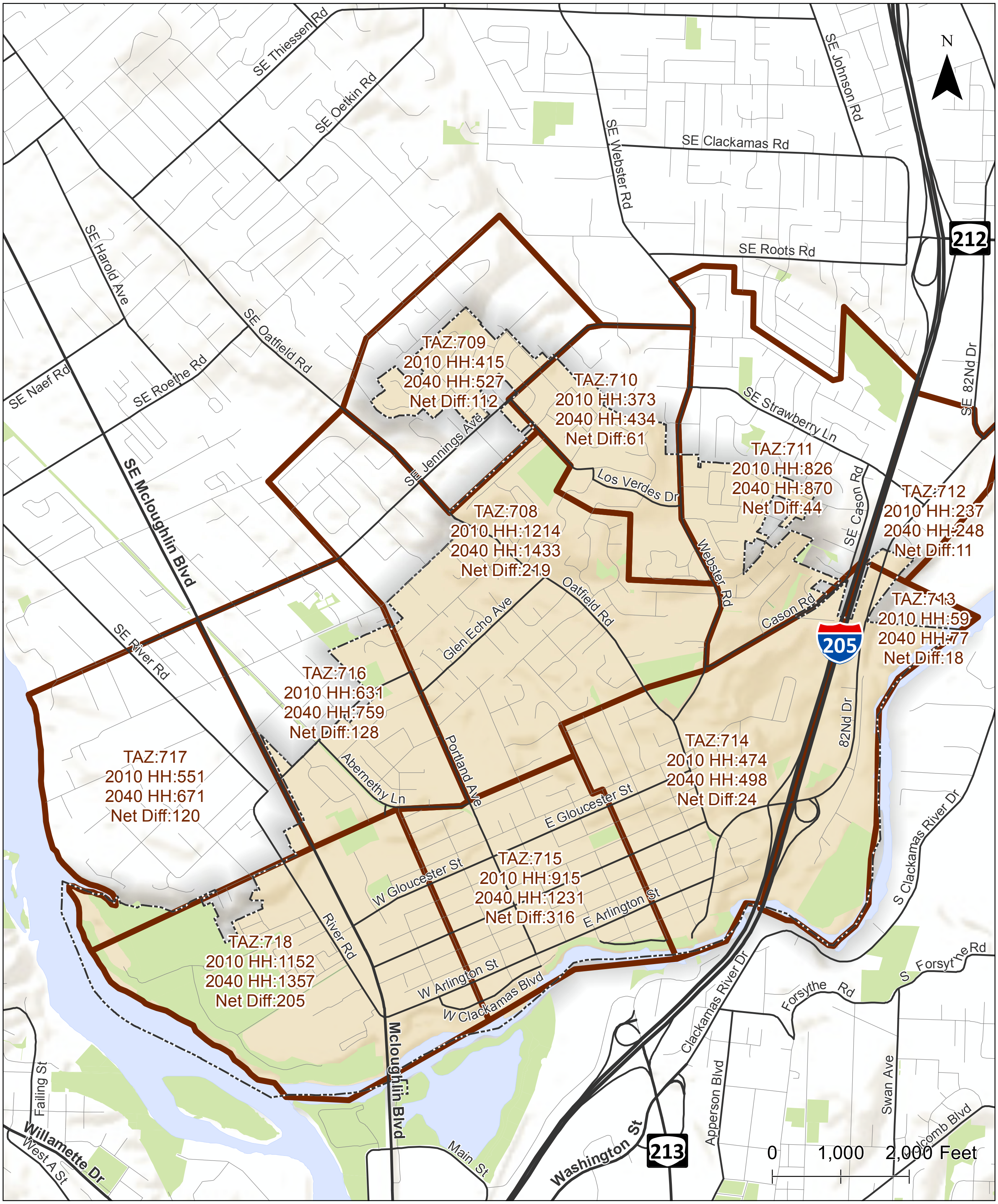


Study Area
Gladstone, Oregon

Figure
1

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

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\01 Study Area.mxd - mbell - 7:09 AM 1/11/2018

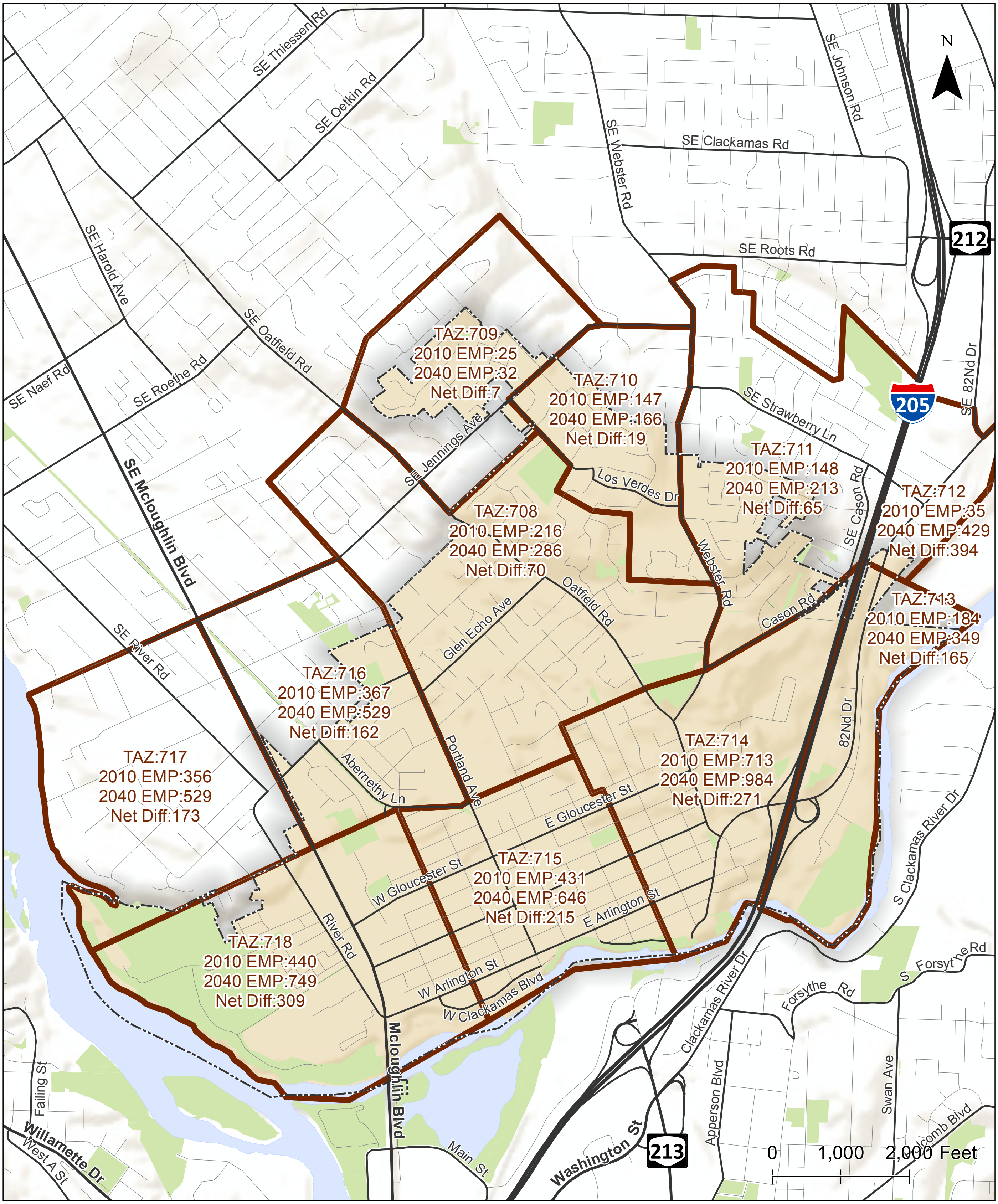


H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\02 TAZ Households.mxd - mbell - 7:09 AM 1/11/2018

Net Difference in Households by TAZ (2010 to 2040)
Gladstone, Oregon

Figure
2

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



Net Difference in Employment by TAZ (2010 to 2040)
Gladstone, Oregon

Figure
3

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

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\03 TAZ Employment.mxd - mbell - 7:09 AM 1/11/2018

CHAPTER 2 GOALS AND OBJECTIVES

GOALS AND OBJECTIVES

The project team developed goals and objectives for the TSP update to help guide the review and documentation of existing and future transportation system needs, the development and evaluation of potential solutions to address the needs, and the selection and prioritization of preferred solutions for inclusion in the TSP update. The goals and objectives also inform recommendations for policy language that will serve as guidance for future land use decision making, such as approval criteria related zone change and comprehensive plan amendments. The goals and objectives will enable the City to plan for, and consistently work towards, achieving the vision of a connected community.

GOALS AND OBJECTIVES

The goals and objectives for the Gladstone TSP update are based on an evaluation of the existing goals and policies in the current Gladstone TSP and Comprehensive Plan. The goals provide direction for where the City would like to go, while the objectives provide a more detailed breakdown of the goals with specific outcomes the City desires to achieve. In order to ensure compliance with the TPR, RTP, RTFP, and other state, regional, and local planning requirements, the goals and objectives presented below tend to favor improvements in active transportation facilities and services over capacity improvements.

Goal I: Safety – Provide a safe and efficient multimodal transportation system for all members of the community.

- Objective A. Address safety issues at locations with a history of fatal, serious injury, or frequent bicycle/pedestrian-related crashes
- Objective B. Implement strategies that reduce the potential for future conflicts between travel modes

Goal II: Mobility – Provide a multimodal transportation system that is in a good state of repair and meets applicable State, regional, and local operational performance measures.

- Objective A. Maintain the existing transportation system in a state of good repair
- Objective B. Meet applicable state, regional, and local operational performance measures

Goal III: Accessibility – Provide a multimodal transportation system that is accessible to all members of the community and minimizes out of direction travel.

- Objective A. Ensure adequate access for children, disabled, low-income, or elderly people
- Objective B. Ensure adequate access for all members of the community to schools, parks, churches, and other essential destinations

Goal IV: Connectivity – Provide a multimodal transportation system that increases connections to all areas of the City and works to overcome existing barriers to regional connectivity.

- Objective A. Improve existing connections between residential areas and local schools, parks, churches, and other essential destinations
- Objective B. Create new connections between residential areas and local schools, parks, churches, and other essential destinations

Goal V: Health – Develop a transportation system that encourages active transportation and supports healthy and active choices for the community.

- Objective A. Increase the number of active transportation options available to all members of the community
- Objective B. Integrate active transportation options with other modes of travel within the community

Goal VI: Coordination – Develop a transportation system that is consistent with other state, regional, and local plans.

- Objective A. Ensure consistency with State, regional, and local planning rules and regulations
- Objective B. Coordinate land use, financial, and environmental planning to prioritize strategic transportation investments

Goal VII: Financial Responsibility – Invest in financially feasible infrastructure projects that will serve the City for years to come.

- Objective A. Ensure adequate funding is available to fund further study or implementation of the planned transportation system
- Objective B. Ensure there are no significant barriers to implementation of the planned transportation system

PROJECT SELECTION AND PRIORITIZATION

The selection and prioritization of the projects included in the TSP update was determined based on the project evaluation criteria, which are a reflection of the goals and objectives described above. A qualitative process using the project evaluation criteria was used to evaluate solutions and prioritize projects developed through the TSP update. The rating method used to evaluate the solutions is described below.

- Most Desirable: The concept addresses the criterion and/or makes substantial improvements in the criteria category. (+1)
- No Effect: The criterion does not apply to the concept or the concept has no influence on the criteria. (0)
- Least Desirable: The concept does not support the intent of and/or negatively impacts the criteria category. (-1)

Table 2 presents the project evaluation criteria that were used to qualitatively evaluate the solutions developed through the TSP update. The initial screening ratings were used to inform discussions about the benefits and tradeoffs of each solution, while the final priorities presented in the following chapters reflect input from the project, advisory committees and the general public.

Table 2: Project Evaluation Criteria

Objective	Evaluation Criteria	Evaluation Score
Goal I: Safety – Provide a safe and efficient multimodal transportation system for all members of the community.		
Objective A. Address safety issues at locations with a history of fatal, serious injury, or frequent bicycle/pedestrian-related crashes	Project could reduce the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	+1
	Project would have no impact on the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	0
	Project could increase the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	-1
Objective B. Implement strategies that reduce the potential for future conflicts between travel modes	Project could reduce potential for future conflicts between travel modes	+1
	Project would have no impact on the potential for future conflicts between travel modes	0
	Project could increase the potential for future conflicts between travel modes	-1
Goal II: Mobility – Provide a multimodal transportation system that is in a good state of repair and meets applicable State, regional, and local operational performance measures.		
Objective A. Maintain the transportation system in a good state of repair	Project could improve the state of the transportation system	+1
	Project would have no impact on the state of the transportation system	0
	Project could diminish the state of the transportation system	-1
Objective B. Meet applicable State, regional, and local operational performance measures	Project will meet applicable State, regional, and local operational performance measures	+1
	Project will not impact State, regional, and local operational performance measures	0
	Project will not meet State, regional, and local operational performance measures	-1
Goal III: Accessibility – Provide a multimodal transportation system that is accessible to all members of the community and minimizes out of direction travel.		
Objective A. Ensure adequate access for children, disabled, low-income, or elderly people	Project improves access in an area with a high concentration of children, disabled, low-income, or elderly people	+1
	Project does not improve access in an area with a high concentration of children, disabled, low-income, or elderly people	0
	Project impedes access in an area with a high concentration of children, disabled, low-income, or elderly people	-1
Objective B. Ensure adequate access for all members of the community to schools, parks, churches, and other essential destinations	Project improves access to schools, parks, churches, and other essential destinations	+1
	Project does not improve access to schools, parks, churches and other essential destinations	0
	Project impedes access schools, parks, churches, and other essential destinations	-1
Goal IV: Connectivity – Provide a multimodal transportation system that increases connections to all areas of the City and works to overcome existing barriers to regional connectivity.		
Objective A. Improve existing connections between residential areas and local school, parks, churches and other essential destinations	Project will improve an existing connection	+1
	Project will not improve an existing connection	0
	Project will impede an existing connection	-1
Objective B. Create new connections between residential areas and local school, parks,	Project will create a new connection	+1
	Project will not create a new connection	0

churches, and other essential destinations	Project will impede the creation of a new connection	-1
Goal V: Health – Develop a transportation system that encourages active transportation and supports healthy and active choices for the community.		
Objective A. Increase the number of active transportation options available to all members of the community	Project could increase the number of active transportation options	+1
	Project would not increase the number of active transportation options	0
	Project could reduce the number of active transportation options	-1
Objective B. Integrate active transportation options with other modes of travel within the community	Project could integrate active transportation options with other modes of travel	+1
	Project would not integrate active transportation options with other modes of travel	0
	Project could impede integration of active transportation options with other modes of travel	-1
Goal VI: Coordination – Develop a transportation system that is consistent with other state, regional, and local plans.		
Objective A. Ensure consistency with State, regional, and local planning rules and regulations	Project will ensure consistency with State, regional, and local planning rules and regulations	+1
	Project will not ensure consistency with State, regional, and local planning rules and regulations	0
	Project will defy State, regional, and local planning rules and regulations	-1
Objective B. Coordinate land use, financial, and environmental planning to prioritize strategic transportation investments	Project will coordinate land use, financial, and environmental planning	+1
	Project will does require coordination between land use, financial, and environmental planning	0
	Project will disrupt coordination between land use, financial, and environmental planning	-1
Goal VII: Financial Responsibility – Invest in financially feasible infrastructure projects that will serve the city for years to come.		
Objective A. Ensure adequate funding is available to fund further study or implementation of the planned transportation system	Adequate funding is currently available	+1
	Adequate funding is available through an existing grant program or other funding source	0
	Adequate funding is not available	-1
Objective B. Ensure there are no significant barriers to implementation of the planned transportation system	There are no significant barriers	+1
	There are barriers, but they can be overcome	0
	There are significant barriers	-1

CHAPTER 3 PEDESTRIAN PLAN

PEDESTRIAN PLAN

A majority of city streets currently have sidewalks on both sides of the roadway and enhanced crossings at key intersections and mid-block locations; however, there are several streets with gaps in the sidewalks and several intersections without enhanced crossing treatments. Therefore, the pedestrian plan includes several projects to fill-in the gaps in the sidewalks along the city's arterial and collector streets and a few local streets that provide access to essential destinations such as schools, parks, churches, etc. The pedestrian plan also includes several enhanced pedestrian crossings as well as multi-use paths, trails, and accessways that augment and support the pedestrian system.

PEDESTRIAN FACILITIES

Pedestrian facilities are the elements of the transportation system that enable people to walk safely and efficiently between neighborhoods, retail centers, employment areas, and transit stops. These include facilities for pedestrian movement along key roadways (e.g., sidewalks, multi-use paths, and trails) and for safe roadway crossings (e.g., crosswalks, crossing beacons, pedestrian refuge islands). Each facility plays an important role in developing a comprehensive pedestrian network. This section summarizes the solutions that are integrated into the Pedestrian Plan to address existing gaps and deficiencies in the pedestrian system and future needs. As indicated below, the most common pedestrian facilities included in the pedestrian plan include sidewalks, shared-use paths, accessways, and enhanced pedestrian crossings.

Sidewalks

Sidewalks are the fundamental building blocks of the pedestrian system. They enable people to walk comfortably, conveniently, and safely from place to place. They also provide an important means of mobility for people with disabilities, families with strollers, and others who may not be able to travel on an unimproved roadside surface. Sidewalks are usually 6 to 8-feet wide and constructed from concrete. They are also frequently separated from the roadway by a curb, landscaping, and/or on-street parking. Sidewalks are widely used in urban and suburban settings. Ideally, sidewalks could be provided along both sides of the roadway; however, some areas with physical or right-of-way constraints may require that sidewalk be located on only one side.

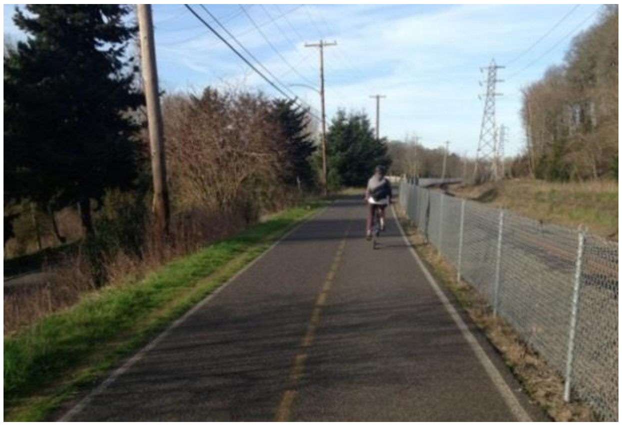
Sidewalk in Need of Improvement

Improved Sidewalk

Shared-use path

Shared-use paths are paved, bi-directional, trails that can serve both pedestrians and bicyclists. Shared-use paths and trails can be constructed adjacent to roadways where the topography, right-of-way, or other issues don't allow for the construction of sidewalks and bike facilities. A minimum width of 10 feet is recommended for low-pedestrian/bicycle-traffic contexts; 12 to 20 feet should be considered in areas with moderate to high levels of bicycle and pedestrian traffic. Shared-use paths can be used to create longer-distance links within and between communities and provide regional connections. They play an integral role in recreation, commuting, and accessibility due to their appeal to users of all ages and skill levels.

Existing Shared-use Path



Example Shared-use Path

Accessway

Non-vehicular connections between cul-de-sacs and adjacent roadways can significantly reduce travel distances for pedestrians, thereby encouraging more people to walk. Appropriate improvements should provide for more direct, convenient, and safe bicycle or pedestrian travel within and between residential areas and neighborhood activity centers. Gladstone has several existing accessways that create connections between neighborhoods and pedestrian and bicycle routes. Potential new connections could use existing City right-of-way between cul-de-sacs or unconnected roadways to provide a paved or unpaved path or trail for non-motorized use.

Existing Accessways

Future Accessway

Enhanced pedestrian crossings

Pedestrian crossing facilities enable pedestrians to safely cross streets, railroad tracks, and other transportation facilities. Planning for appropriate pedestrian crossings requires the community to balance vehicular mobility needs with providing crossing locations that the desired routes of walkers. Enhanced pedestrian crossing treatments include:

- Median refuge islands
- High visibility pavement markings and signs
- Rapid rectangular flashing beacons (RRFB)
- Pedestrian Hybrid Beacons (HAWK)
- Curb extensions
- Pedestrian signals
- Pedestrian countdown heads
- Leading Pedestrian interval

Many of the treatments listed above can be applied together at one crossing location to further alert drivers of the presence of pedestrians in the roadway.

Enhanced Pedestrian Crossing with RRFBs

Enhanced Pedestrian Crossing with Pedestrian Signal

Other Facilities

- Street Furniture and Lighting - Street furniture includes pedestrian seating, information / wayfinding structures, and trash cans while street lighting includes both street lights and pedestrian scale lighting. Street furniture and lighting can be used to enhance the pedestrian experience and encourage pedestrian activity on a street.
- Mixed-use shoulder - A mixed-use shoulder can be used to provide a separated space for cyclists and pedestrians with some separation from motorists in areas where sidewalks are not present.
- Bridge - The City has explored the possibility of constructing a pedestrian bridge crossing the Clackamas River south of Gladstone to create a connection between Gladstone and Oregon City. The previous rail bridge in the same location was demolished in 2014 after being unused for many years and becoming structurally unstable.

PEDESTRIAN PLAN

Table 3 identifies the pedestrian plan projects for the Gladstone TSP update. As shown, the projects are separated into projects on arterials, collectors, and local streets as well as projects at intersections and in other locations throughout the city. The priorities shown in Table 3 are based on the project evaluation criteria as well as input from the project team and the general public. The cost estimates are based on average unit costs for roadway improvements. Figure 4 illustrates the location of the pedestrian plan projects.

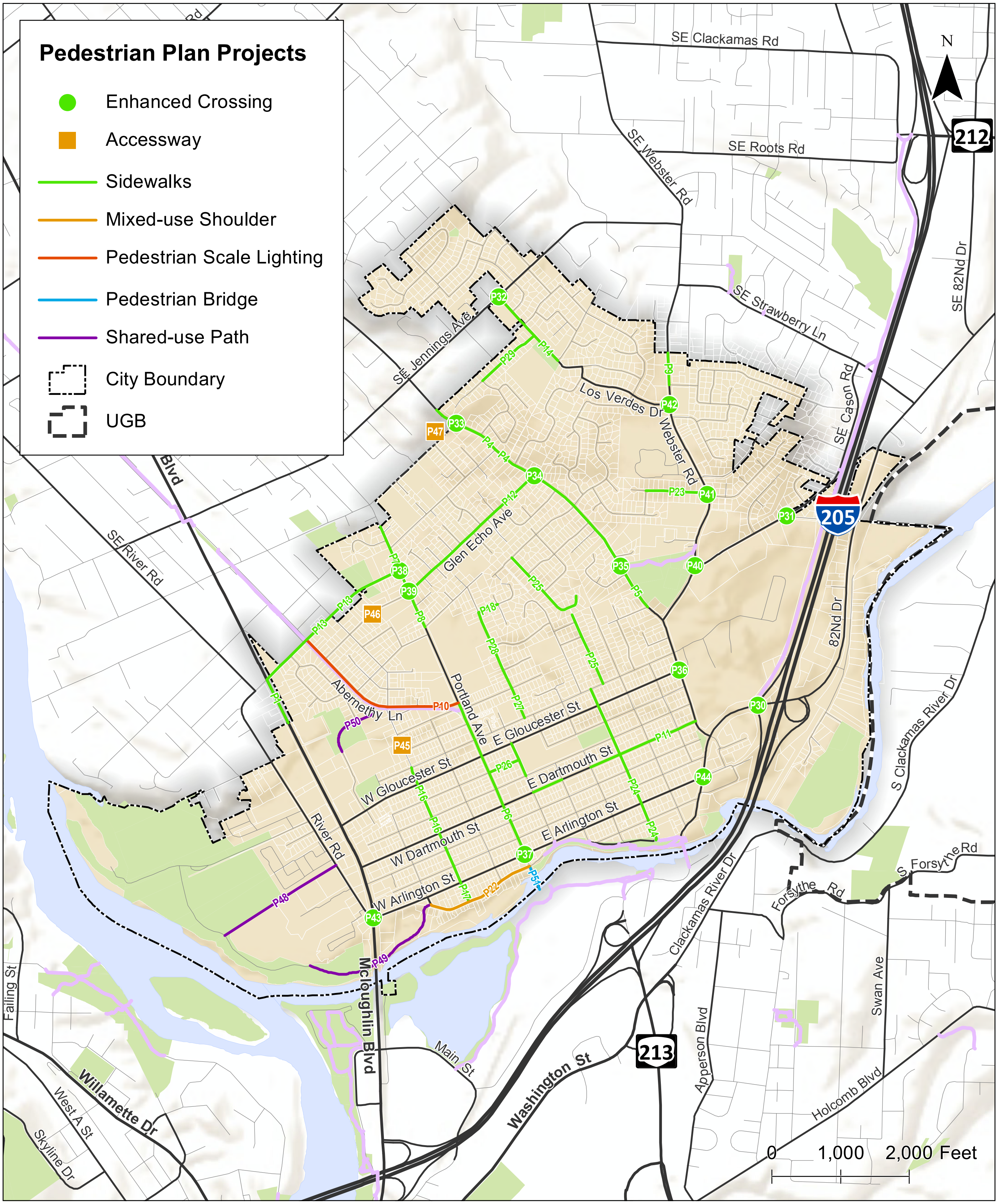
Table 3: Pedestrian Plan Improvement Projects

Location		Type	Project	Priority	Cost Estimate
Arterials					
P1	OR 99E	Sidewalks - Fill in gaps	Fill in the gap on the west side of the roadway, south of Glen Echo Avenue	Medium	$0[2]
P2[1]	OR 99E	Landscaping	Plant street trees on both sides of OR 99E within the existing landscape strips. (Note: ODOT Permits are required for street trees)	Medium	$0[2]
P3[1]	OR 99E	Speed reduction	Reduce the posted speed limit to 35 mph, subject to ODOT approval	Medium	$0[2]
P4	Oatfield Road	Sidewalks - Fill in gaps	Fill in the gaps on the north side of the roadway from Park Way to the north city limits	High	$130,000
P5	Oatfield Road	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from Kenmore Street to the north city limits	Medium	$485,000
P6	Portland Avenue	Widen sidewalks	Widen the sidewalks on both sides of the roadway from Arlington Street to Abernathy Lane	High	$0[2]
P7	Portland Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the east side of the roadway from Nelson Lane to north city limits	Low	$235,000
P8	Portland Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the west side of the roadway from Nelson Lane and north city limits	Low	$50,000
P9	Webster Road	Sidewalks - Fill in gaps	Fill in the gaps on the east side of the roadway from Charolais Drive to the north city limits	Low	$55,000
Collectors					
P10	Abernathy Lane	Lighting	Install pedestrian-scale lighting on the shared-use path	Low	$175,000
P11	Dartmouth Street	Sidewalks - Fill in gaps	Fill in the gaps on the north side of the roadway from Chicago Avenue to Harvard Street and from Yale Avenue to Oatfield Road	Low	$260,000
P12	Glen Echo Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the north side of the roadway from OR 99E to Oatfield Road	Low	$515,000
P13	Glen Echo Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from OR 99E to Oatfield Road	Low	$460,000
P14	Los Verdes Drive/Valley View Road	Sidewalks - Fill in gaps	Fill in the gaps on the north side of the roadway from Valley View Road to Jennings Avenue	Low	$120,000
P15	Los Verdes Drive/Valley View Road	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from Valley View Road to Jennings Avenue	Low	$15,000
Local Streets					
P16	Beatrice Avenue	New sidewalks	Install sidewalks on the east side of the roadway from Clackamas Boulevard to Ipswich Street	Medium	$240,000
P17	Beatrice Avenue	New sidewalks	Install sidewalks on the west side of the roadway from Clackamas Boulevard to Ipswich Street	Medium	$215,000

Location		Type	Project	Priority	Cost Estimate
P18	Beverly Lane	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from Harvard Avenue to Beverly Drive	Low	$35,000
P19	Chicago Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the east side of the roadway from Hereford Street and Exeter Street	Medium	$60,000
P20	Chicago Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the west side of the roadway from Hereford Street and Exeter Street	Medium	$95,000
P22	Clackamas Boulevard	Mixed-use shoulder	Install a mixed-use shoulder on the south side of the roadway from Portland Avenue to Arlington Street	Low	$310,000
P23	Clayton Way	Sidewalks - Fill in gaps	Fill in the gaps on both sides of the roadway from roadway terminus to Webster Road	Low	$135,000
P24	Cornell Avenue	New sidewalks	Install new sidewalks on the east side of the roadway from Clackamas Boulevard to Collins Crest Street	Medium	$390,000
P25	Cornell Avenue	New sidewalks	Install new sidewalks on the west side of the roadway from Clackamas Boulevard to Collins Crest Street	Medium	$455,000
P26	Fairfield Street	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from Portland Avenue and Chicago Avenue	Low	$50,000
P27	Harvard Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the east side of the roadway from Hereford Street and Beverly Lane and adjacent to Gladstone High School	Medium	$145,000
P28	Harvard Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the west side of the roadway from Hereford Street and Beverly Lane and adjacent to Gladstone High School	Medium	$175,000
P29	Oakridge Drive	Sidewalks - Fill in gaps	Fill in gaps on both sides of the roadway from Quail Court to Valley View Road	Low	$70,000
Intersections					
P30	SE 82nd Drive/ I-205 SB Ramp Terminal	Enhanced crossing	Install an enhanced pedestrian crossing in the southwest corner of the intersection with high visibility pavement markings and signs and RRFBs or traffic signal	High	$0[2]
P31	Cason Road/ Ohlson Road	Enhanced crossing	Install an enhanced pedestrian crossing	High	$25,000
P32	Jennings Avenue/ Valley View Road	Enhanced crossing	Install an enhanced pedestrian crossing	High	$25,000
P33	Oatfield Road/ Hull Road	Enhanced crossing	Install an enhanced pedestrian crossing with high visibility pavement markings and signs and RRFBs – Coordinate with Project P47	High	$65,000
P34	Oatfield Road/ Glen Echo Avenue	Enhanced crossing	Install an enhanced pedestrian crossing with raised median islands, high visibility pavement markings and signs, and RRFBs	High	$85,000
P35	Oatfield Road/ Shared-use Path	Enhanced crossing	Install an enhanced pedestrian crossing with raised median islands, high visibility pavement markings and signs, and RRFBs	High	$85,000
P36	Oatfield Road/ Gloucester Street	Enhanced crossing	Install an enhanced pedestrian crossing with high visibility pavement markings and signs and RRFBs	High	$65,000
P37	Portland Avenue/ Arlington Street	Enhanced crossing	Install an enhanced pedestrian crossing	High	$25,000
P38	Portland Avenue/Glen Echo Avenue (North)	Enhanced crossing	Install an enhanced pedestrian crossing – Coordinate with Project B37	High	$25,000

Location		Type	Project	Priority	Cost Estimate
P39	Portland Ave/ Glen Echo Ave (South)	Enhanced crossing	Install an enhanced pedestrian crossing – Coordinate with Project B38	High	$25,000
P40	Webster Road/ Cason Road	Enhanced crossing	Install an enhanced pedestrian crossing with raised median islands, high visibility pavement markings and signs, and RRFBs. Also, reduce curb radii in the northeast corner of the intersection	High	$85,000
P41	Webster Road/ Clayton Way	Enhanced crossing	Install an enhanced pedestrian crossing with high visibility pavement markings and signs and RRFBs	High	$65,000
P42	Webster Road/ Los Verdes Drive	Enhanced crossing	Install an enhanced pedestrian crossing with high visibility pavement markings and signs and RRFBs	High	$65,000
P43	SE 82nd Drive/ Arlington Street	Enhanced crossing	Install an enhanced pedestrian crossing with raised median islands, high visibility pavement markings and signs, and RRFBs	High	$85,000
P44	OR 99E/ Arlington Street	Enhanced crossing	Modify the signal timing to provide leading pedestrian intervals at all protected approaches	High	$0[2]
P45[1]	Portland Ave	Enhanced crossing	Install curb extensions along Portland Avenue at every major intersection and mid-block between Arlington Street and Nelson Lane (up to 15 locations)	High	$375,000
Off-street Improvements					
P45	Beatrice Avenue Accessway	Accessway	Install a new accessway that connects Beatrice Avenue from Ipswich Street to W Jersey Street	Low	$25,000
P46	Duniway Avenue Accessway	Accessway	Install a new accessway that connects Duniway Avenue (east) and Duniway Avenue (west)	Low	$25,000
P47	Hull Avenue Accessway	Accessway	Install a new accessway that connects Hull Road to Oatfield Road – Coordinate with Project P34	Low	$50,000
P48	Jenson Road Shared-use Path	Shared-use path	Maintain the shared-use path on the Jenson Road right-of-way and install wayfinding signs and pedestrian scale lighting	High	$5,000
P49	Shared-use Path under OR 99E	Shared-use path	Install a shared-use path from Clackamas Boulevard to Dahl Park Road	High	$150,000
P50	Olson Wetlands Shared-use Path	Shared-use path	Install a shared-use path from Abernathy Court to Risley Avenue.	High	$115,000
P51	Trolley Trail Bridge	Bridge	Install a pedestrian bridge across the Clackamas River to Oregon City – Coordinate with City of Oregon City on design and development of Bridge	High	$0[2]
TOTAL High Priority Costs					**$1,500,000**
TOTAL Medium Priority Costs					**$2,260,000**
TOTAL Low Priority Costs					**$2,585,000**
TOTAL Program Costs (23 years)					**$6,345,000**

1. Project not shown on Pedestrian Plan Map.
2. Project to be funded by others with potential contributions from the City.



Pedestrian Plan Projects
Gladstone, Oregon

Figure
4

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\04 Pedestrian Plan Projects.mxd - mbell - 7:10 AM 1/1/2018

CHAPTER 4 BICYCLE PLAN

BICYCLE PLAN

On-street bike lanes and other bicycle facilities are currently provided on a few major roadways within the city. Therefore, the bicycle plan includes several projects along the city's arterial and collector streets and a few local streets that provide direct access to essential destinations. The bicycle plans also includes several enhanced bicycle crossings as well as other off-street amenities that augment and support the bicycle system.

BICYCLE FACILITIES

Bicycle facilities are the elements of the transportation system that enable people to travel safely and efficiently by bike. These include facilities along key roadways (e.g., shared lane pavement markings, on-street bike lanes, and separated bike facilities) and facilities at key crossing locations (e.g., enhanced bike crossings). These also include end of trip facilities (e.g. secure bike parking, changing rooms, and showers at worksites); however, these facilities are addressed through the development code. Each facility plays a role in developing a comprehensive bicycle system. This section summarizes the solutions that are integrated into the Bicycle Plan to address existing gaps and deficiencies in the bicycle system and future needs. As indicated below, the most common bicycle facilities included in the bicycle plan include shared roadways, on-street bike lanes, separated bike lanes, and enhanced bicycle crossings.

Shared Roadways

Shared-lane pavement markings (often called "sharrows") are not a bicycle facility, but a tool designed to help accommodate bicyclists on roadways where bike lanes are desirable but infeasible to construct. Sharrows indicate a shared roadway space for cyclists and motorists and are typically centered in the roadway or approximately four feet from the edge of the travelway. Sharrows are suitable on roadways with relatively low travel speeds (<35 mph) and low ADT (<3,000 ADT); however, they may also be used to transition between discontinuous bicycle facilities. Sharrows could be applied along a variety of streets within Gladstone where room for on-street bike lanes is limited.

Shared Roadway Pavement Marking

Enhanced Shared Roadway Pavement Marking

On-street Bike Lanes

On-street bike lanes are striped lanes on the roadway dedicated for the exclusive use of cyclists. Bike lanes are typically placed at the outer edge of pavement (but to the inside of right-turn lanes and/or on-street parking). Bicycle lanes can improve safety and security of cyclists and (if comprehensive) can provide direct connections between origins and destinations. On-street bike lanes could be applied along a variety of streets within Gladstone where space allows.

On-Street Bike Lanes

Separated Bike Lanes

Separated bike facilities include buffered bike lanes and separated bike lanes, or cycle tracks. Buffered bike lanes are on-street bike lanes that include an additional striped buffer of typically 2-3 feet between the bicycle lane and the vehicle travel lane and/or between the bicycle lane and the vehicle parking lane. They are typically located along streets that require a higher level of separation to improve the comfort of bicycling. Separated bike lanes, also known as cycle tracks, are bicycle facilities that are separated from motor vehicle traffic by a buffer and a physical barrier, such as planters, flexible posts, parked cars, or a mountable curb. One-way separated bike lanes are typically found on each side of the street, like a standard bike lane, while a two-way separated bike lanes are typically found on one side of the street.

Buffered Bike Lane

One-way Cycle Track

Enhanced Bike Crossings and Protected Intersections

Enhanced bicycle crossing facilities enable cyclists to safely cross streets, railroad tracks, and other transportation facilities. Planning for appropriate bicycle crossings requires the community to balance vehicular mobility needs with providing crossing locations that the desired routes of cyclists. Enhanced bicycle crossings include:

- Bike Boxes – designated space at an intersection that allows cyclists to wait in front of motor vehicles while waiting to turn or continue through the intersection.
- Two-Stage Left-turn Boxes – designated space at a signalized intersection outside of the travel lane that provides cyclists with a place to wait while making a two-stage left-turn.
- Pavement marking through intersections – pavement markings that extend and bike lane through an intersection.
- Bike Only Signals – a traffic signal that is dedicated for cyclists
- Bicycle Detection – vehicle detection for bicycles

Bike Box

Pavement Markings Through Intersection

Other Facilities

- Alternative Routes – Designate an alternative route along a parallel street that provides a more comfortable environment for cyclists with the same level of connectivity. The alternative route could be identified by wayfinding signs, which could also be used to identify essential destinations that can be reached by the route. The alternative route may provide shared-lane pavement markings and signs, on-street bike lanes, or other bicycle facilities.
- Wayfinding Signs – Wayfinding signs are signs located along roadways or at intersections that direct bicyclists towards destinations in the area and/or to define a bicycle route. They typically include distances and average walk/cycle times. Wayfinding signs are generally used on primary bicycle routes and shared-use paths.

BICYCLE PLAN

Table 4 identifies the bicycle plan projects for the Gladstone TSP update. As shown, the projects are separated into projects on arterials, collectors, and local streets as well as projects at intersections and in other locations throughout the city. The priorities shown in Table 4 are based on the project evaluation criteria as well as input from the project team and the general public. The cost estimates are based on average unit costs for roadway improvements. Figure 5 illustrates the location of the bicycle plan projects.

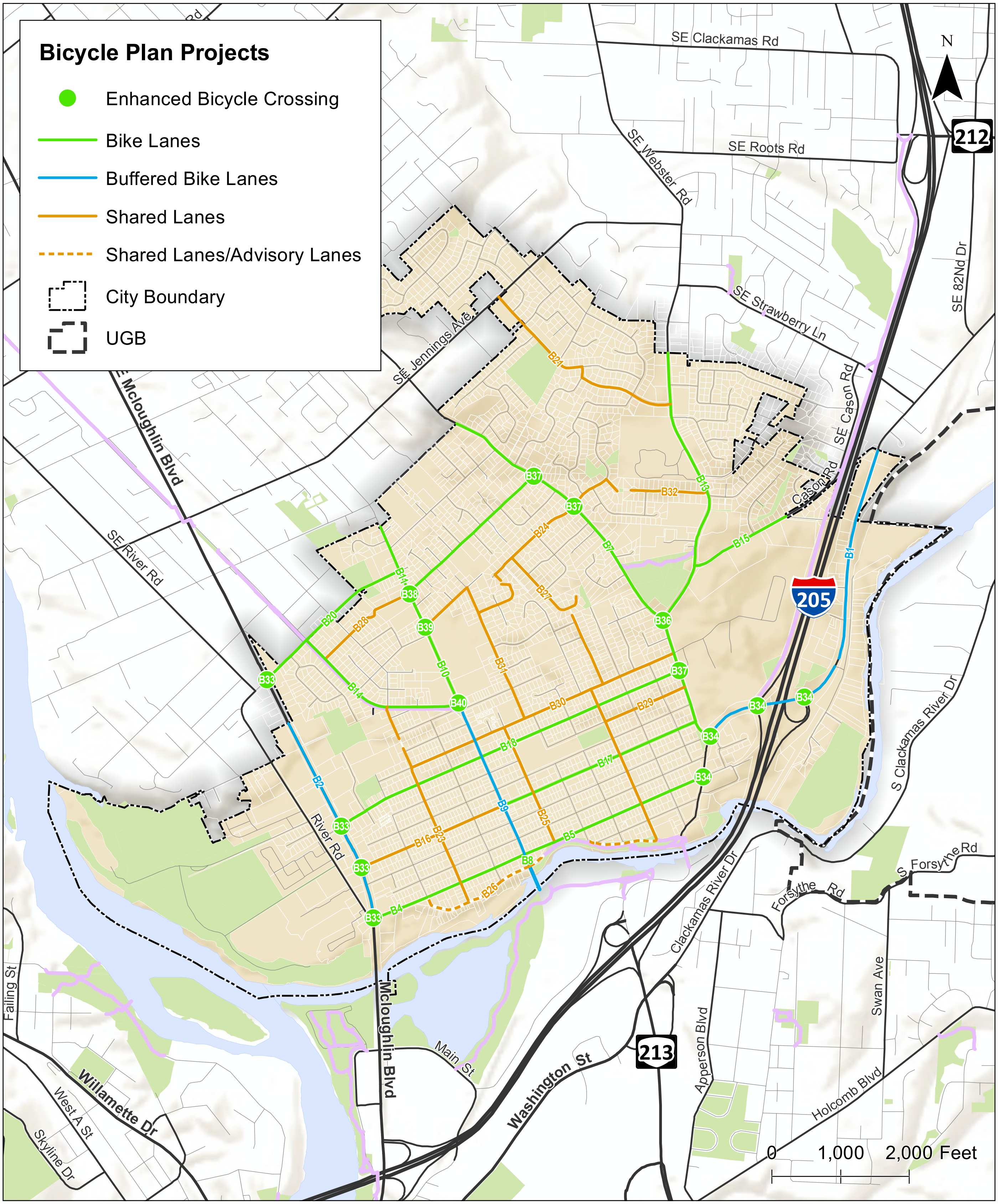
Table 4: Bicycle Plan Improvement Projects

Location		Type	Project	Priority	Cost Estimate
Arterials					
B1	SE 82nd Drive	Buffered bike lanes/Cycle Tracks	Reduce the travel lane width and install buffered bike lanes OR cycle tracks on both sides of the roadway from Oatfield Road to the north city limits	High	$0[2]
B2	OR 99E	Buffered bike lanes/Cycle Tracks	Reduce the travel lane width and install buffered bike lanes OR cycle tracks on both sides of the roadway	High	$0[2]
B3[1]	Arlington Street	Alternative route	Establish an alternative route along Clackamas Boulevard with wayfinding signs and pavement markings – this project is an interim improvement until implementation of Project B4 is	High	$5,000
B4	Arlington Street	Bike lanes	Remove parking from both sides of the roadway from OR 99E to Clackamas Boulevard and install on-street bike lanes	Medium	$10,000
B5	Arlington Street	Bike lanes	Widen the roadway OR remove on-street parking and install on-street bike lanes on both sides of the roadway from Clackamas Boulevard to SE 82nd Drive	Medium	$50,000[4]
B6[1]	Oatfield Road	Speed reduction	Reduce the posted speed limit to 30 mph	Medium	$5,000
B7	Oatfield Road	Bike lanes	Reduce the travel lane width and install wider bike lanes on both sides of the roadway	High	$75,000
B8	Portland Avenue	Bike lanes	Remove the center two-way left-turn lane and install on-street bike lanes on both sides of the roadway from Clackamas Boulevard to Arlington Street	High	$5,000
B9	Portland Avenue	Buffered bike lanes/Cycle Tracks	Remove the center two-way left-turn lane and install on-street buffered bike lanes OR cycle tracks on both sides of the roadway from Arlington Street to Abernathy Lane	High	$50,000[3]
B10	Portland Avenue	Bike lanes	Remove the center two-way left-turn lane and install on-street bike lanes on both sides of the roadway from Abernathy Lane to Nelson Lane	High	$15,000
B11	Portland Avenue	Bike lanes	Widen the roadway and install on-street bike lanes on both sides of the roadway from Nelson Lane to the north city limits	High	$265,000
B12[1]	Webster Road	Speed reduction	Reduce the posted speed limit to 30 mph	Medium	$5,000
B13	Webster Road	Bike lanes	Reduce the travel lane width and install wider bike lanes on both sides of the roadway	High	$55,000
Collectors					
B14	Abernathy Lane	Bike lanes	Install bike lanes on the north side of the roadway adjacent to the parking lane	High	$25,000
B15	Cason Road	Bike lanes	Restripe the on-street bike lanes at the east leg of the Webster Road/Cason Road intersection and install bike symbols	High	$5,000

Location		Type	Project	Priority	Cost Estimate
B16	Dartmouth Street	Shared lane	Install shared lane pavement marking and signs from OR 99E to Portland Avenue	Low	$20,000
B17	Dartmouth Street	Bike lanes	Install on-street bike lanes from Portland Avenue to Oatfield Road	High	$55,000
B18	Gloucester Street	Bike lanes	Widen the roadway OR remove on-street parking and install on-street bike lanes on both sides of the roadway	High	$70,000[4]
B19[1]	Glen Echo Avenue	Speed reduction	Reduce the posted speed limit to 25 mph	Medium	$5,000
B20	Glen Echo Avenue	Bike lanes	Widen the roadway and/or remove on-street parking and install on-street bike lanes on both sides of the roadway	High	$650,000[5]
B21	Los Verdes Drive/Valley View Road	Shared lane	Install shared lane pavement markings and signs from Webster Road to Jennings Avenue	Low	$20,000
B22[1]	River Road	Signage	Install a “Bike Lane Ends” sign at the south-eastbound approach to OR 99E	Medium	$5,000
Local Streets					
B23	Beatrice Avenue	Shared lane	Install shared lane pavement markings and signs from Abernathy Lane to Clackamas Boulevard – Coordinate with Project P43	High	$20,000
B24	Beverly Lane/Collins Crest	Shared lane	Install shared lane pavement markings and signs from Harvard Avenue to Oatfield Road	Medium	$5,000
B25	Chicago Avenue	Shared lane	Install shared lane pavement markings and signs from Hereford Street to Arlington Street	Medium	$15,000
B26	Clackamas Boulevard	Shared lane/ Advisory Lane	Install shared lane pavement markings and signs OR advisory lanes from Arlington Road to 82nd Drive	High	$15,000
B27	Cornell Avenue	Shared lane	Install shared lane markings and signs from Clackamas Boulevard to Collins Crest	High	$35,000
B28	Duniway Avenue	Shared lane	Install shared lane markings and signs from Abernathy Lane to Portland Avenue – Coordinate with Project P42	High	$5,000
B29	Fairfield Street	Shared lane	Install shared lane markings and signs from Cornell Avenue to Oatfield Road	Low	$5,000
B30	Hereford Street	Shared lane	Install shared lane markings and signs from Beatrice Avenue to Oatfield Road	Medium	$25,000
B31	Nelson Lane/Harvard Avenue	Shared lane	Install shared lane markings and signs from Portland Avenue to Hereford Street	Medium	$15,000
B32	Ridgegate Drive/Penny Court/Clayton Way	Shared lane	Install shared lane markings and signs from Oatfield Road to Webster Road	Medium	$10,000
Intersections					
B33	OR 99E	Enhanced crossing	Install skip striping along OR 99E through all major intersections with green paint in all conflict areas	High	$0[2]
B34	SE 82nd Drive	Enhanced crossing	Install skip striping along 82nd Drive through all major intersections with green paint in all conflict areas	High	$0[2]
B36	Oatfield Road/ Webster Road	Enhanced crossing	Reconfigure the intersection to facilitate bicycle turning movements. Also, reduce the curb radii in the northeast corner of the intersection.	High	$35,000
B37	Oatfield Road	Enhanced crossing	Install skip striping along Oatfield Road through all major intersections with green paint in all conflict areas	High	$15,000

Location		Type	Project	Priority	Cost Estimate
B37	Portland Ave/ Glen Echo Ave (North)	Enhanced crossing	Install an enhanced bicycle crossing to facilitate travel along Glen Echo Avenue across Portland Avenue	High	$15,000
B38	Portland Ave/ Glen Echo Ave (South)	Enhanced crossing	Install an enhanced bicycle crossing to facilitate travel along Glen Echo Avenue across Portland Avenue	High	$15,000
B39	Portland Ave/ Abernathy Ln	Enhanced crossing	Install an enhanced bicycle crossing to facilitate travel to/from the Trolley Trail along Abernathy Lane	High	$15,000
				TOTAL High Priority Costs	**$1,445,000**
				TOTAL Medium Priority Costs	**$150,000**
				TOTAL Low Priority Costs	**$45,000**
				TOTAL Program Costs (23 years)	**$1,640,000**

1. Project not shown on Bicycle Plan Map.
2. Project to be funded by others with potential contributions from the City.
3. Cost estimate assumes buffered bike lanes.
4. Cost estimate assumes removal of on-street parking.
5. Cost estimates assumes a combination of roadway widening and removal of on-street parking.



Bicycle Plan Projects
Gladstone, Oregon

Figure
5

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\05 Bicycle Plan Projects.mxd - mbell - 7:10 AM 1/11/2018

CHAPTER 5 TRANSIT PLAN

TRANSIT PLAN

Public transit can provide important connections to destinations for people that do not drive or bike and can provide an additional option for all transportation system users. Public transit complements walking, bicycling, or driving trips: users can walk to and from transit stops and their homes, shopping or work places, people can drive to park-and-ride locations to access a bus, or people can bring their bikes on transit vehicles and bicycle from a transit stop to their final destination.

Providing transit service in smaller cities is generally led by a local or regional transit agency, and relies on appropriate land uses and densities that can support transit service. The city can plan for transit-supportive land use patterns and support future transit viability by designing and building streets that will comfortably accommodate transit stops and include the right-of-way that could allow for transit stops to be located as close as possible to important destinations in the city. At a minimum, a transit stop should be well-signed and have a comfortable space to wait. Benches and shelter from the weather can improve user comfort, and including bike parking near bus stops allows people to leave their bike at one trip-end instead of taking it with them on the bus.

TRANSIT FACILITIES

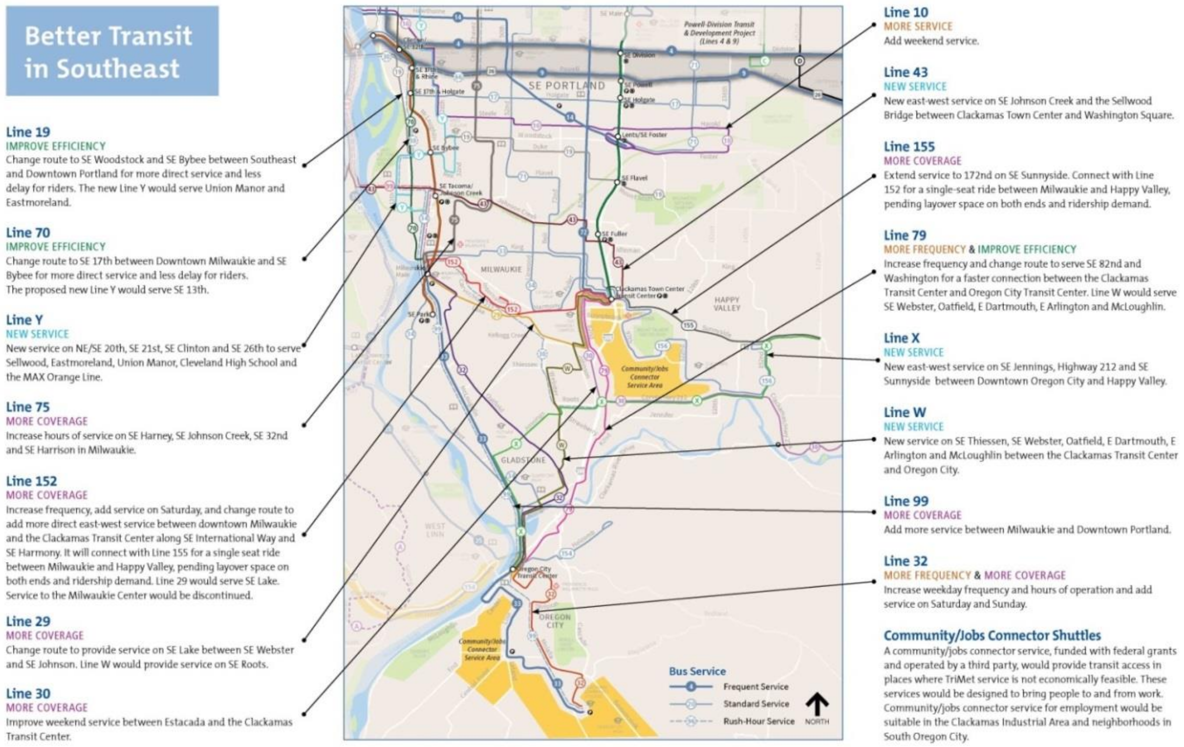
Transit facilities are the elements of the transportation system that enable people to travel safely and efficiently throughout the city and the region by transit. These include fixed-route facilities and services, transit stops, and park-and-rides. This section summarizes the solutions that are integrated into the Transit Plan to address existing gaps and deficiencies in the transit system and future needs. As indicated below, the most common transit facilities included in the Transit Plan include new or re-routed fixed route service and stop enhancements consistent with the TriMet service enhancement plan for the southeast region (See Exhibit 1 on the following page).

Fixed-Route Service

Fixed-route transit service is provided via set routes for buses, light rail, and other transit modes. Fixed routes include specified transit stops and services that normally operate on defined schedules. For the City, this service is provided by TriMet bus routes that run through Gladstone and provide connections to other parts of the region. Fixed-route service enhancement can include:

- Increase the service frequency by reducing headways or time between arrivals
- Increase hours of service by providing service earlier in the morning and/or later in the evening
- Increase service coverage by re-routing existing service or implementing new service

Exhibit 1: TriMet's Service Enhancement Plans for the Southeast Region



Better Transit in Southeast

Line 19
IMPROVE EFFICIENCY
Change route to SE Woodstock and SE Bybee between Southeast and Downtown Portland for more direct service and less delay for riders. The new Line Y would serve Union Manor and Eastmoreland.

Line 70
IMPROVE EFFICIENCY
Change route to SE 17th between Downtown Milwaukie and SE Bybee for more direct service and less delay for riders. The proposed new Line Y would serve SE 13th.

Line Y
NEW SERVICE
New service on NE/SE 20th, SE 21st, SE Clinton and SE 26th to serve Sellwood, Eastmoreland, Union Manor, Cleveland High School and the MAX Orange Line.

Line 75
MORE COVERAGE
Increase hours of service on SE Harney, SE Johnson Creek, SE 32nd and SE Harrison in Milwaukie.

Line 152
MORE COVERAGE
Increase frequency, add service on Saturday, and change route to add more direct east-west service between downtown Milwaukie and the Clackamas Transit Center along SE International Way and SE Harmony. It will connect with Line 155 for a single seat ride between Milwaukie and Happy Valley, pending layover space on both ends and ridership demand. Line 29 would serve SE Lake. Service to the Milwaukie Center would be discontinued.

Line 29
MORE COVERAGE
Change route to provide service on SE Lake between SE Webster and SE Johnson. Line W would provide service on SE Roots.

Line 30
MORE COVERAGE
Improve weekend service between Estacada and the Clackamas Transit Center.

Line 10
MORE SERVICE
Add weekend service.

Line 43
NEW SERVICE
New east-west service on SE Johnson Creek and the Sellwood Bridge between Clackamas Town Center and Washington Square.

Line 155
MORE COVERAGE
Extend service to 172nd on SE Sunnyside. Connect with Line 152 for a single-seat ride between Milwaukie and Happy Valley, pending layover space on both ends and ridership demand.

Line 79
MORE FREQUENCY & IMPROVE EFFICIENCY
Increase frequency and change route to serve SE 82nd and Washington for a faster connection between the Clackamas Transit Center and Oregon City Transit Center. Line W would serve SE Webster, Oatfield, E Dartmouth, E Arlington and McLoughlin.

Line X
NEW SERVICE
New east-west service on SE Jennings, Highway 212 and SE Sunnyside between Downtown Oregon City and Happy Valley.

Line W
NEW SERVICE
New service on SE Thiessen, SE Webster, Oatfield, E Dartmouth, E Arlington and McLoughlin between the Clackamas Transit Center and Oregon City.

Line 99
MORE COVERAGE
Add more service between Milwaukie and Downtown Portland.

Line 32
MORE FREQUENCY & MORE COVERAGE
Increase weekday frequency and hours of operation and add service on Saturday and Sunday.

Community/Jobs Connector Shuttles
A community/jobs connector service, funded with federal grants and operated by a third party, would provide transit access in places where TriMet service is not economically feasible. These services would be designed to bring people to and from work. Community/jobs connector service for employment would be suitable in the Clackamas Industrial Area and neighborhoods in South Oregon City.

Stop Enhancements

Transit stops are designated locations where residents can access local transit service. Transit stops are normally located at major intersections; however, they can be located mid-block or off-street within large public or private institutions. The types of amenities provided at each transit stop (i.e. pole, bench, shelter, ridership information, trash receptacles) tend to reflect the level of usage, as discussed in the TriMet Bus Stops Guidelines from July 2010.

- Pole and bus stop sign – All bus stops require a pole and bus stop sign to identify the bus stop location. TriMet prefers that bus signs are provided on their own dedicated TriMet pole instead of being placed on existing poles, columns, and other locations as done historically.
- Bus stop shelters – Shelters are preferred for stops with 50 or more boardings per weekday but may be considered at stops served by infrequent service that have a minimum of 35 boardings per day on routes with peak headways greater than 17 minutes.
- Seating – Seating can be considered at any stop as long as accessibility is provided, safety and accessibility are not compromised by seating placement, and ad bench placement is allowed.
- Trash cans – Trash cans are only provided at sheltered bus stops.
- Lighting – TriMet has set a goal to provide 1.5 to 2 foot-candles of light around a bus stop area.

TriMet Stop (Before)

TriMet Stop (After)

Park-and-Ride Facilities

Park-and-ride facilities provide parking for people who wish to transfer from their personal vehicle to public transportation or carpools/vanpools. Park-and-rides are frequently located near major intersections, at commercial centers, or on express and commuter bus routes. It is Oregon state policy to encourage the development and use of park-and-ride facilities at appropriate urban and rural locations adjacent to or within the highway right-of-way. Park-and-ride facilities can provide an efficient method to provide transit service to low density areas, connecting people to jobs, and providing an alternate mode to complete long-distance commutes.

Park-and-ride facilities may be either shared-use, such as at a school or shopping center, or exclusive-use. Shared-use facilities are generally designated and maintained through agreements reached between the local public transit agency or rideshare program operator and the property owner. Shared lots can save the expense of building a new parking lot, increase the utilization of existing spaces, and avoid utilization of developable land for surface parking. In the case of shopping centers, the presence of a shared-use park-and-ride has frequently been shown to be mutually beneficial, as park-and-riders tend to patronize the businesses in the center.

TriMet Stop (Before)

TriMet Stop (After)

Other Solutions

The Regional High Capacity Transit (HCT) Plan identifies several HCT corridors within the Gladstone area. While most of the corridors are conceptual at this time, there are several things the City can do to prepare for HCT. Per discussions with TriMet, the primary solutions for Gladstone include:

- Modify the development code to allow for higher densities within the City
- Coordinate with Clackamas County on priorities for HCT for the 2018 RTP update

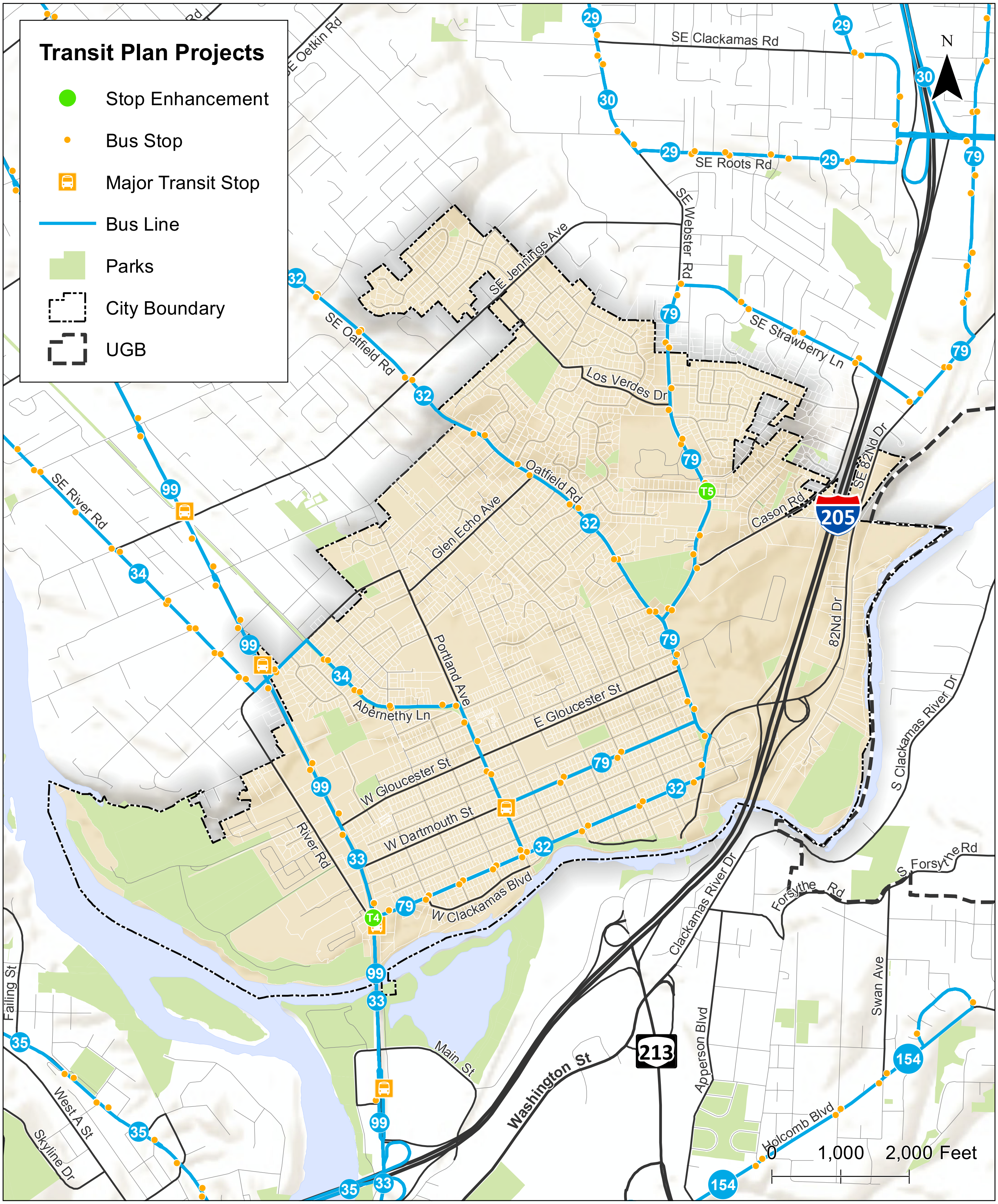
TRANSIT PLAN

Table 5 identifies the transit plan projects for the Gladstone TSP update. As shown, a majority of projects are assumed to be funded by others or require coordination with TriMet. The City of Gladstone can support improved transit service by providing easy and safe walking and bicycling connections between key roadways, neighborhoods, and local destinations; by providing amenities, such as shelters and benches, at transit stops; by encouraging an appropriate mix and density of uses that support public transit; and by providing and planning for park-and-ride locations. Figure 6 illustrates the location of the transit plan projects.

Table 5: Transit Plan

Project Number	Location	Agency Responsible	Description	Priority	Cost Estimate
T1[1]	City-wide	City/TriMet	Coordinate with TriMet on new and re-routed fixed-route service identified in the TriMet Service Enhancement Plan for Southeast	Medium	$0[2]
T2[1]	City-wide	City/TriMet	Coordinate with TriMet to install shelter and other amenities at bus stops consistent with TriMet Bus Stop Guidelines	Medium	$25,000
T3[1]	City-wide	City/TriMet	Identify a location for a new park-and-ride facility	Medium	$50,000
T4	OR 99E/Arlington Street	City/TriMet	Relocate the southbound transit stop to the far side of the intersection	Medium	<$5,000
T5	Webster Road/Clayton Way	City/TriMet	Install a no-parking/bus zone sign along the west side of Webster Road	Medium	<$5,000
				TOTAL Medium Priority Costs	**$85,000**
				TOTAL Program Costs (23 years)	**$85,000**

1. Project not shown on Bicycle Plan Map.
2. Project to be funded by others with potential contributions from the City.



Transit Plan Projects
Gladstone, Oregon

Figure
6

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\06 Transit Plan Projects.mxd - mbell - 7:11 AM 1/11/2018

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

CHAPTER 6 TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS

TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS (TSMO) PLAN

Transportation System Management and Operations (TSMO) is a set of integrated transportation solutions intended to improve the performance of existing transportation infrastructure. Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies are two complementary approaches to managing transportation and maximizing the efficiency of the existing system. TSM strategies address the *supply* of the system: using strategies to improve the system efficiency without increasing roadway widths or building new roads. TSM measures are focused on improving operations by enhancing capacity during peak times, typically with advanced technologies to improve traffic operations. TDM strategies address the *demand* on the system: the number of vehicles traveling on the roadways each day. TDM measures include any method intended to shift travel demand from single occupant vehicles to non-auto modes or carpooling, travel at less congested times of the day, etc.

TRANSPORTATION SYSTEM MANAGEMENT (TSM)

Transportation System Management (TSM) focuses on low cost strategies that can be implemented within the existing transportation infrastructure to enhance operational performance. The priority is to find ways to better manage transportation while maximizing urban mobility and treating all modes of travel as a coordinated system. The TSM strategies included in the TSP consist of traffic signal timing and phasing optimization, traffic signal coordination, and intelligent transportation systems (ITS), including transit and truck signal priority.

Signal Retiming and Optimization

Signal retiming and optimization offers a relatively low cost option to increase system efficiency. Retiming and optimization refers to updating timing plans to better match prevailing traffic conditions and coordinating signals. Timing optimization can be applied to existing systems or may include upgrading signal technology, such as signal communication infrastructure, signal controllers, or cabinets. Signal retiming can reduce travel times and be especially beneficial to improving travel time reliability. In high pedestrian or desired pedestrian areas, signal retiming can facilitate pedestrian movements through intersections by increasing minimum green times to give pedestrians time to cross during each cycle, eliminating the need to push pedestrian crossing buttons. Signals can also facilitate bicycle movements with the inclusion of bicycle detectors.

Signal upgrades often come at a higher cost and usually require further coordination between jurisdictions. However, upgrading signals provides the opportunity to incorporate advanced signal systems to further improve the efficiency of a transportation network. Strategies include coordinated signal operations across jurisdictions, centralized control of traffic signals, adaptive or active signal control, and transit or freight signal priority. These advanced signal systems can reduce delay, travel time, and the number of stops for transit, freight, and other vehicles. In addition, these systems may help reduce vehicle emissions and improve travel time reliability.

Transit signal priority

Transit signal priority systems use sensors to detect approaching transit vehicles and alter signal timings to improve transit performance. This improves travel times for transit, reliability of transit travel time, and overall attractiveness of transit. The City of Portland has the only system of bus priority in the region, which is applied on most major corridors, including OR 99E.

Truck signal priority

Truck signal priority systems use sensors to detect approaching heavy vehicles and alter signal timings to improve truck freight travel. While truck signal priority may improve travel times for trucks, its primary purpose is to improve the overall performance of intersection operations by clearing any trucks that would otherwise be stopped at the intersection and subsequently have to spend a longer time getting back up to speed. Implementing truck signal priority requires additional advanced detector loops, usually placed in pairs back from the approach to the intersection.

TSM Plan

Table 6 identifies the TSM strategies included in the Gladstone TSP update.

Table 6: Transportation System Management (TSM) Strategies

Project/Program Number	Name	Description	Priority	Cost Estimate
TSM1	Signal Retiming and Optimization	Update signal timing plans and coordinate signals to better match prevailing traffic conditions	High/Medium/Low	$5,000/year
TSM2	Transit Signal Priority	Work with ODOT to implement transit signal priority on OR 99E and SE 82nd Drive as needed	Medium	$0[1]
TSM3	Truck signal priority	Work with ODOT to implement truck signal priority on OR 99E and SE 82nd Drive as needed	Low	$0[1]
			TOTAL High Priority Costs	**$25,000**
			TOTAL Medium Priority Costs	**$25,000**
			TOTAL Low Priority Costs	**$65,000**
			TOTAL Program Costs (23 years)	**$115,000**

1. Project to be funded by others with potential contributions from the City.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

Transportation Demand Management (TDM) is a policy tool as well as a general term used to describe any action that removes single occupant vehicle trips from the roadway during peak travel demand periods. As growth in the City of Gladstone occurs, the number of vehicle trips and travel demand in the area will also increase. The ability to change a user's travel behavior and provide alternative mode choices will help accommodate this potential growth in trips.

The following section provides more detail on programming and policy strategies that may be effective for managing transportation demand and increasing system efficiency over the next 23 years.

Programming

Programming solutions can provide effective and low cost options for reducing transportation demand. Some of the most effective programming strategies can be implemented by employers and are aimed at encouraging non-single occupancy vehicle (SOV) commuting. These strategies are discussed below.

Carpool Match Services

Metro coordinates a rideshare/carpool program (see the DriveLessConnect.com website) that regional commuters can use to find other commuters with similar routes to work. The program allows commuters to connect and coordinate with others on locations, departure times, and driving responsibilities. Local employers can also play a role in encouraging carpooling by sharing information about the system, providing preferential carpool parking, and allowing employees to have flexibility in workday schedules.

Collaborative Marketing

Public agencies, local business owners and operators, developers, and transit service providers can collaborate on marketing to get the word out to residents about transportation options that provide an alternative to single-occupancy vehicles.

Policy

Policy solutions can be implemented by cities, counties, regions, or at the statewide level. Regional and state-level policies will affect transportation demand in Gladstone, but local policies can also have an impact. These policies are discussed below.

Limited and/or Flexible Parking Requirements

Cities set policies related to parking requirements for new developments. In order to allow developments that encourage multi-modal transportation, cities can set parking maximums and low minimums and/or allow for shared parking between uses. Cities can also provide developers the option to pay in-lieu fees instead of constructing additional parking. This option provides additional flexibility to developers that can increase the likelihood of development, especially on smaller lots where surface parking would cover a high portion of the total property.

Cities can also set policies that require provision of parking to the rear of buildings, allowing buildings in commercial areas to directly front the street. This urban form creates a more appealing environment for walking and window-shopping. In-lieu parking fees support this type of development for parcels that do not have rear- or side-access points.

Parking Management

Parking plays a large role in transportation demand management, and effective management of parking resources can encourage use of non-single occupancy vehicle modes. Cities can tailor policies to charge for public parking in certain areas or impose time limits on street parking in retail centers. Cities can also monitor public parking supply and utilization in order to inform future parking strategy.

TDM Plan

Table 7 identifies the TDM strategies included in the Gladstone TSP update. As with all new public and private investments, the implementation of the TDM plan is sure to draw opposition from some. Given Gladstone's lack of experience with TDM strategies, it is important that decision-makers understand their long-term costs and benefits and are able evaluate these along-side arguments from opponents in achieving outcomes that best reflect the City's vision and goals while effectively reducing travel demand.

Table 7: Transportation Demand Management (TDM) Strategies

Program/Project Number	Name	Description	Priority	Cost Estimate
TDM1	Carpool Match Services Service	Work with Metro to coordinate a rideshare/carpool program that regional commuters can use to find other commuters with similar routes to work	High/Medium/Low	$5,000/year
TDM2	Collaborative Marketing	Work with nearby cities, employers, transit service providers, and developers to collaborate on marketing for transportation options that provide an alternative to single-occupancy vehicles	High/Medium/Low	$5,000/year
TDM3	Limited and/or Flexible parking Requirements	Refine the City's current parking policy to include strategies that encourage multi-modal transportation	Low	$25,000
TDM4	Parking Management	Modify the City's current parking policy to impose time limits in commercial areas and allow for the potential to charge for parking	Low	$10,000
			TOTAL High Priority Costs	**$50,000**
			TOTAL Medium Priority Costs	**$50,000**
			TOTAL Low Priority Costs	**$165,000**
			TOTAL Program Costs (23 years)	**$265,000**

Other potential TDM projects include:

- Support continued efforts by TriMet, Metro, ODOT, and Clackamas County to develop productive TDM measures that reduce commuter vehicle miles and peak hour trips.
- Encourage the development of high speed communication in all parts of the city (fiber optic, digital cable, DSL, etc.). The objective would be to allow employers and residents the maximum opportunity to rely upon other systems for conducting business and activities than the transportation system during peak periods.
- Encourage developments that effectively mix land uses to reduce vehicle trip generation. These plans may include development linkages (particularly non-auto) that support greater use of alternative modes.

NEIGHBORHOOD TRAFFIC MANAGEMENT (NTM)

Neighborhood Traffic Management (NTM) is a term used to describe traffic control devices used in residential neighborhoods to slow traffic or possibly reduce traffic volumes. NTM is commonly referred to as traffic calming because of its ability to reduce travel speeds and improve neighborhood livability. The City of Gladstone has implemented NTM in locations throughout the city with input from the Gladstone Traffic Safety Committee; however, they do not have a formal process for implementation.

The Gladstone Traffic Safety Committee meets on a monthly basis to discuss traffic safety issues within the city. The City could work with the committee to establish a formal process for NTM implementation that starts with the identification of a concern by citizens, after which the committee could review the situation and conduct a speed/volume survey if warranted to obtain necessary data. Once the concern has been identified, the committee could review and discuss the NTM options available and recommend appropriate follow-up action for the City. There are many NTM options available to the committee, including various education, enforcement, and engineering solutions. If it is determined that an engineering solution is required, the committee could forward their information to engineering staff for follow-up and budgeting as appropriate. Implementation of the selected NTM option may be funded by the city and/or the concerned citizens. Table 8 lists several common NTM options that are typically supported by emergency response as long as minimum street criteria are met.

Table 8: Neighborhood Traffic Management (NTM) Options by Functional Classification

Traffic Calming Measures	Roadway Classifications		
	Arterial	Collector	Local Street
Curb Extensions	Supported	Supported	Traffic Calming measures are generally supported on lesser response routes that have connectivity (more than two accesses) and are accepted and field tested
Medians	Supported	Supported	
Pavement Texture	Supported	Supported	
Speed Hump	Not Supported	Not Supported	
Raised Crosswalk	Not Supported	Not Supported	
Speed Cushion	Not Supported	Not Supported	
Choker	Not Supported	Not Supported	
Traffic Circle	Not Supported	Not Supported	
Diverter (with emergency vehicle pass through)	Not Supported	Supported	
Meandering Alignments	Not Supported	Not Supported	

Note: Neighborhood Traffic Management (NTM) measures are supported with the qualification that they meet emergency response guidelines including minimum street width, emergency vehicle turning radius, and accessibility/connectivity.

While no specific NTM projects are identified in the TSP, they are an important part of the City's ongoing effort to improve livability. Any future NTM projects should include coordination with emergency service providers to ensure public safety is not compromised. NTM engineering solutions are limited to local streets. Implementation of NTM solutions that limit traffic on collector and arterial streets is counterproductive and can lead to cut through traffic onto local streets. NTM is also restricted on collector and arterial streets to avoid conflicts with emergency access/public safety as well as conflicts with public transit.

LAND USE

The types and intensities of land uses are closely correlated with travel demand. Land use patterns in many areas of the city are suburban in nature with low densities in the northern part of the city and more moderate densities in the southern part of the city near OR 99E. In the future, the city will continue to have a mixture of housing densities as well as areas of mixed use development (i.e., a mix of residential, retail, commercial and/or office uses).

Land Use Plan

Table 9 summarizes the land use strategies included in the Gladstone TSP update.

Table 9: Land Use Projects

Project Number	Name	Description	Priority	Cost Estimate
LU1	Commercial Nodes	Revise existing zoning map to include more commercial nodes in residential areas	Medium	$25,000
LU2	Mixed Use Development	Modify city policies and/or development code to encourage mixed use developments in commercial areas and/or future town centers	Medium	$25,000
LU3	Alternative Mobility Standards	Work with ODOT to develop alternative mobility standards on OR 99E and at the I-205 interchanges ramps in order to accommodate higher density development patterns along the corridors	Medium	$25,000
			TOTAL Medium Priority Costs	**$75,000**
			TOTAL Program Costs (23 years)	**$75,000**

ACCESS MANAGEMENT

Access management refers to a set of measures regulating access to streets, roads, and highways, from public roads and private driveways. Access management is a policy tool which seeks to balance the need to provide safe, efficient, and timely travel with the need to allow access to individual properties. Proper implementation of access management techniques should guarantee reduced congestion, reduced accident rates, less need for roadway widening, conservation of energy, and reduced air pollution. Measures may include but are not limited to restrictions on the type and amount of access to roadways, and use of physical controls, such as signals and channelization including raised medians, to reduce impacts of approach road traffic on the main facility.

ODOT Standards

Oregon Administrative Rule 734, Division 51 establishes procedures, standards, and approval criteria used by ODOT to govern highway approach permitting and access management consistent with Oregon Revised Statutes (ORS), Oregon Administrative Rules (OAR), statewide planning goals, acknowledged comprehensive plans, and the Oregon Highway Plan (OHP). The OHP serves as the policy basis for implementing Division 51 and guides the administration of access management rules, including mitigation and public investment, when required, to ensure highway safety and operations pursuant to this division.

Access spacing standards for approaches to state highways are based on the classification of the highway and highway designation, type of area, and posted speed. Within the Gladstone city limits, the OHP classifies OR 99E as a District Highway. Future developments along OR 99E (new development, redevelopment, zone changes, and/or comprehensive plan amendments) will be required to meet the OHP policies and standards. Table 10 summarizes ODOT's current access spacing standards for OR 99E per the OHP.

Table 10: OR 99E Access Spacing Standards

Highway Classification	Posted Speed (MPH)	Spacing Standards (Feet)[1]
District Highway	40	500

[1] These access management spacing standards do not apply to approaches in existence prior to April 1, 2000 except as provided in OAR 734-051-5120(9).

City Standards

The City's access spacing standards are intended to maintain and enhance the integrity (capacity, safety, and level of service) of city streets. Numerous driveways or street intersections increase the number of conflicts and potential for collisions and decrease mobility and traffic flow. The City of Gladstone needs a balance of streets that provide access with streets that serve mobility. Table 11 summarizes the City's access spacing standards for City streets. These standards will help to preserve transportation system investments and guard against deteriorations in safety and increased congestion.

Table 11: City Access Spacing Standards

	Mixed-use or Residential			Commercial or Industrial		
Functional Classification	Max Block Size (Street to Street)[1]	Min Block Size (Street to Street)	Min Dwy Spacing (Street to Dwy & Dwy to Dwy)[2]	Max Block Size (Street to Street)[1]	Min Block Size (Street to Street)	Min Dwy Spacing (Street to Dwy & Dwy to Dwy)[2]
Arterial	530 feet	150 feet	150 feet	530 feet	150 feet	200 feet
Collector	530 feet	150 feet	100 feet	530 feet	150 feet	150 feet
Local Street	530 feet	150 feet	50 feet	530 feet	150 feet	50 feet

1. If the maximum block size is exceeded, mid-block pedestrian and bicycle accessways must be provided at spacing of no more than 330 feet, unless the connection is impractical due to existing development, topography, or environmental constraints.
2. Single family and two-family dwellings are exempt from the driveway to driveway spacing standards.

In addition to access spacing standards shown in Table 11, the City could adopt a policy that requires access be taken from lower classification streets whenever possible.

Access Spacing Variances

Access spacing variances may be provided to parcels whose highway/street frontage, topography, or location would otherwise preclude issuance of a conforming permit and would either have no reasonable access or cannot obtain reasonable alternate access to the public road system. In such a situation, a conditional access permit may be issued by ODOT or the City, as appropriate, for a connection to a property that cannot be accessed in a manner that is consistent with the spacing standards. The permit can carry a condition that the access may be closed at such time that reasonable access becomes available to a local public street. The approval condition might also require a given land owner to work in cooperation with adjacent land owners to provide either joint access points, front and rear cross-over easements, or a rear access upon future redevelopment.

The requirements for obtaining a deviation from ODOT's minimum spacing standards are documented in OAR 734-051-3050. For streets under the City's jurisdiction, the City may reduce the access spacing standards at the discretion of the Public Works Director if the following conditions exist:

- Joint access driveways and cross access easements are provided in accordance with the standards;
- The site plan incorporates a unified access and circulation system in accordance with the standards;
- The property owner enters into a written agreement with the City that pre-existing connections on the site will be closed and eliminated after construction of each side of the joint use driveway; and/or,
- The proposed access plan for redevelopment properties moves in the direction of the spacing standards.

The Public Works Director and/or Gladstone Planning Commission may modify or waive the access spacing standards for streets under the City's jurisdiction where the physical site characteristics or layout of abutting properties would make development of a unified or shared access and circulation system impractical, subject to the following considerations:

- Unless modified, application of the access standard will result in the degradation of operational and safety integrity of the transportation system.
- The granting of the variance shall meet the purpose and intent of these standards and shall not be considered until every feasible option for meeting access standards is explored.
- Applicants for variance from these standards must provide proof of unique or special conditions that make strict application of the standards impractical. Applicants shall include proof that:
    - Indirect or restricted access cannot be obtained;
    - No engineering or construction solutions can be applied to mitigate the condition; and,

- No alternative access is available from a road with a lower functional classification than the primary roadway.

No variance shall be granted where such hardship is self-created. Consistency between access spacing requirements and exceptions in the TSP and Gladstone Municipal Code is an important regulatory solution to be addressed as part of this TSP update.

Access Consolidation through Management

From an operational perspective, access management measures limit the number of redundant access points along roadways. This enhances roadway capacity, improves safety, and benefits circulation. Enforcement of the access spacing standards should be complemented with provision of alternative access points. Purchasing right-of-way and closing driveways without a parallel road system and/or other local access could seriously affect the viability of the impacted properties. Thus, if an access management approach is taken, alternative access should be developed to avoid “land-locking” a given property.

As part of every land use action, the City should evaluate the potential need for conditioning a given development proposal with the following items in order to maintain and/or improve traffic operations and safety along the arterial and collector roadways.

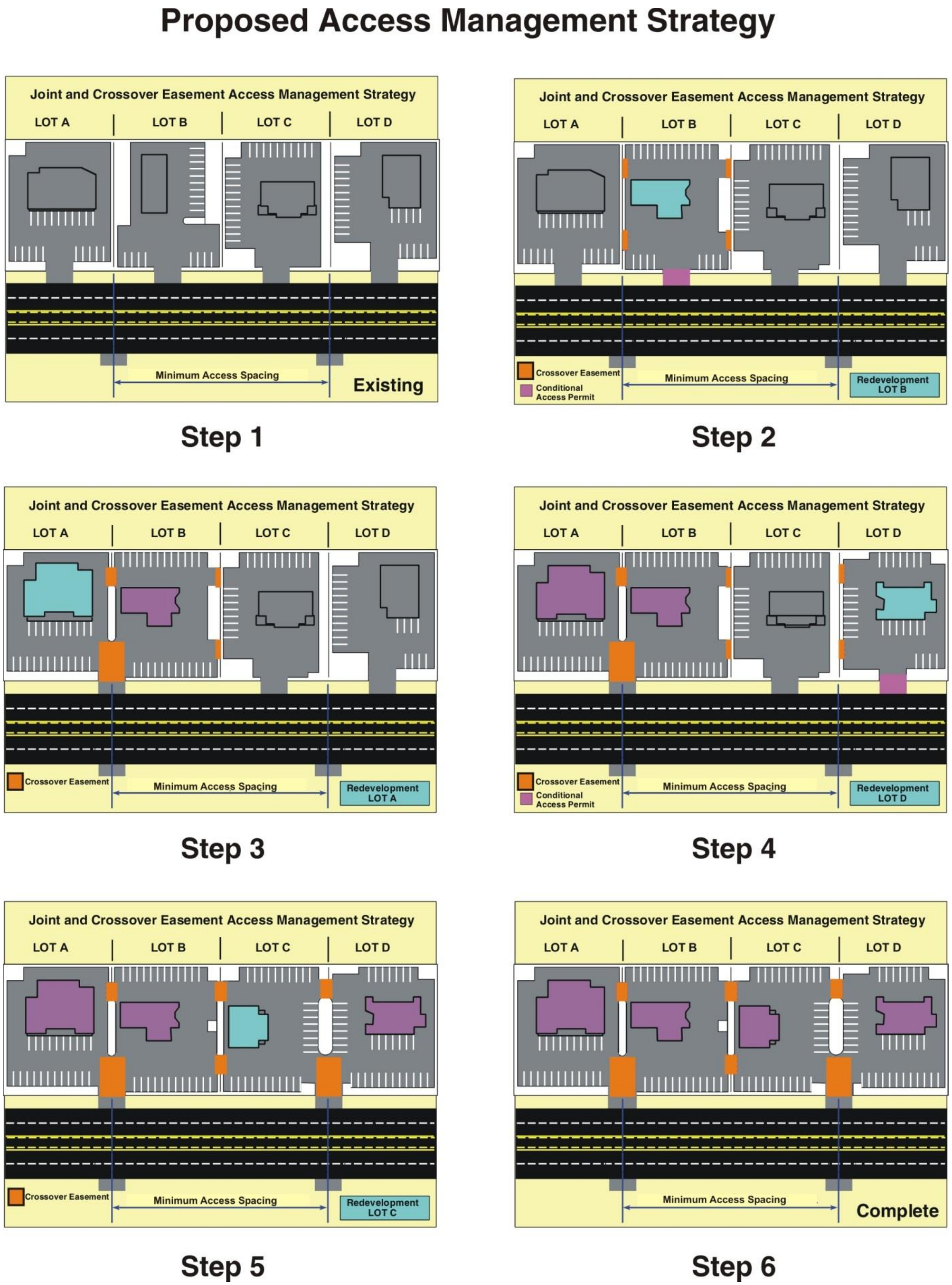
- Providing access only to the lower classification roadway when multiple roadways abut the property.
- Provision of crossover easements on all compatible parcels (considering topography, access, and land use) to facilitate future access between adjoining parcels.
- Issuance of conditional access permits to developments having proposed access points that do not meet the designated access spacing policy and/or have the ability to align with opposing driveways.
- Right-of-way dedications to facilitate the future planned roadway system in the vicinity of proposed developments.
- Half-street improvements (sidewalks, curb and gutter, bike lanes/paths, and/or travel lanes) along site frontages that do not have full build-out improvements in place at the time of development.

Exhibit 1 illustrates the application of cross-over easements and conditional access permits over time to achieve access management objectives. The individual steps are described in Table 12. As illustrated in the exhibit and supporting table, by using these guidelines, all driveways along the highways can eventually move in the overall direction of the access spacing standards as development and redevelopment occur along a given street.

Table 12: Example of Crossover Easement/Indenture/Consolidation

Step	Process
1	EXISTING – Currently Lots A, B, C, and D have site-access driveways that neither meet the access spacing criteria of 500 feet nor align with driveways or access points on the opposite side of the highway. Under these conditions motorists are into situations of potential conflict (conflicting left turns) with opposing traffic. Additionally, the number of side-street (or site-access driveway) intersections decreases the operation and safety of the highway
2	REDEVELOPMENT OF LOT B – At the time that Lot B redevelops, the City would review the proposed site plan and make recommendations to ensure that the site could promote future crossover or consolidated access. Next, the City would issue conditional permits for the development to provide crossover easements with Lots A and C, and ODOT/City would grant a conditional access permit to the lot. After evaluating the land use action, ODOT/City would determine that LOT B does not have either alternative access, nor can an access point be aligned with an opposing access point, nor can the available lot frontage provide an access point that meets the access spacing criteria set forth for segment of highway.
3	REDEVELOPMENT OF LOT A – At the time Lot A redevelops, the City/ODOT would undertake the same review process as with the redevelopment of LOT B (see Step 2); however, under this scenario ODOT and the City would use the previously obtained cross-over easement at Lot B consolidate the access points of Lots A and B. ODOT/City would then relocate the conditional access of Lot B to align with the opposing access point and provide and efficient access to both Lots A and B. The consolidation of site-access driveways for Lots A and B will not only reduce the number of driveways accessing the highway, but will also eliminate the conflicting left-turn movements the highway by the alignment with the opposing access point.
4	REDEVELOPMENT OF LOT D – The redevelopment of Lot D will be handled in same manner as the redevelopment of Lot B (see Step 2)
5	REDEVELOPMENT OF LOT C – The redevelopment of Lot C will be reviewed once again to ensure that the site will accommodate crossover and/or consolidated access. Using the crossover agreements with Lots B and D, Lot C would share a consolidated access point with Lot D and will also have alternative frontage access the shared site-access driveway of Lots A and B. By using the crossover agreement and conditional access permit process, the City and ODOT will be able to eliminate another access point and provide the alignment with the opposing access points.
6	COMPLETE – After Lots A, B, C, and D redevelop over time, the number of access points will be reduced and aligned, and the remaining access points will meet the access spacing standard.

Exhibit 1: Cross Over Easement



Access Management Plan

Table 13 identifies the access management plan projects included in the Gladstone TSP update.

Table 13: Access Management Projects

Project Number	Name	Description	Priority	Cost Estimate
AM1	Access Spacing Standard Modification	Modify city-wide access spacing standards according to a roadway's jurisdiction and functional classification	Low	$25,000
AM2	Access Variance Process	Define a variance process for when the standard cannot be met	Low	$25,000
AM3	Access Consolidation	Establish an approach for access consolidation that focuses on incremental improvements that can occur over time	Low	$25,000
TOTAL Low Priority Costs				**$75,000**
TOTAL Program Costs (23 years)				**$75,000**

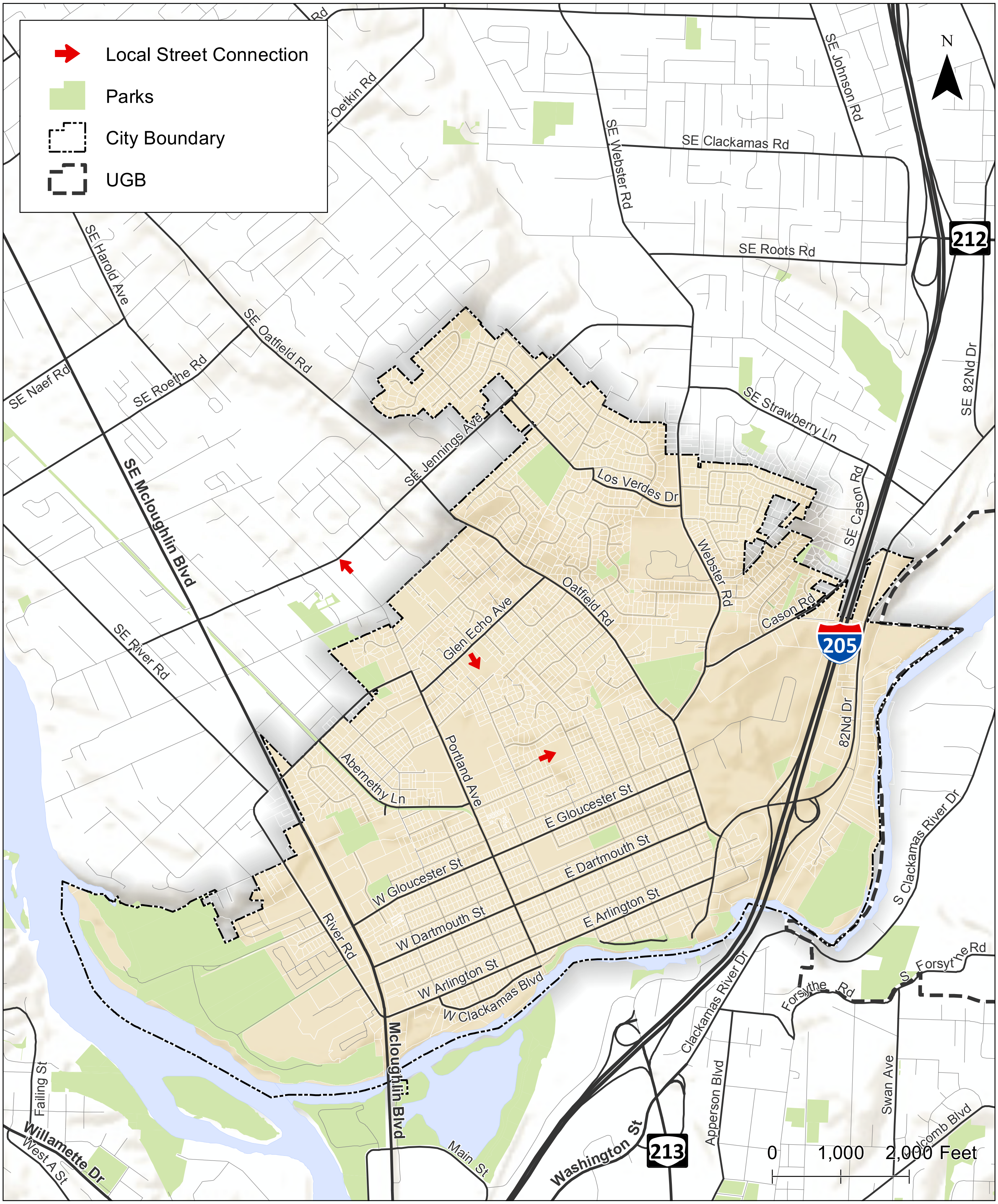
LOCAL STREET CONNECTIVITY

The street system within Gladstone is largely built-out. Therefore, there are limited opportunities for new arterial or collector streets. However, there are opportunities for new local streets in select areas throughout the city that could improve access and circulation for all travel modes.

Figure 7 illustrates the location of the local street connections identified for the Gladstone TSP update. Table 14 summarizes the connections. Costs are not provided for these projects as they are anticipated to be constructed by future development.

Table 14: Local Street Connections

Project Number	Location	Description	Priority
SC1	Portland Avenue	Extend to Jennings Avenue	Low
SC2	Tyron Court	Extend to Nelson Lane	Low
SC3	Kenmore Street	Connect two segments	Low



Local Street Connectivity Projects
Gladstone, Oregon

Figure
7

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

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\07 Local Street Connectivity Projects.mxd - mbell - 7:11 AM 1/11/2018

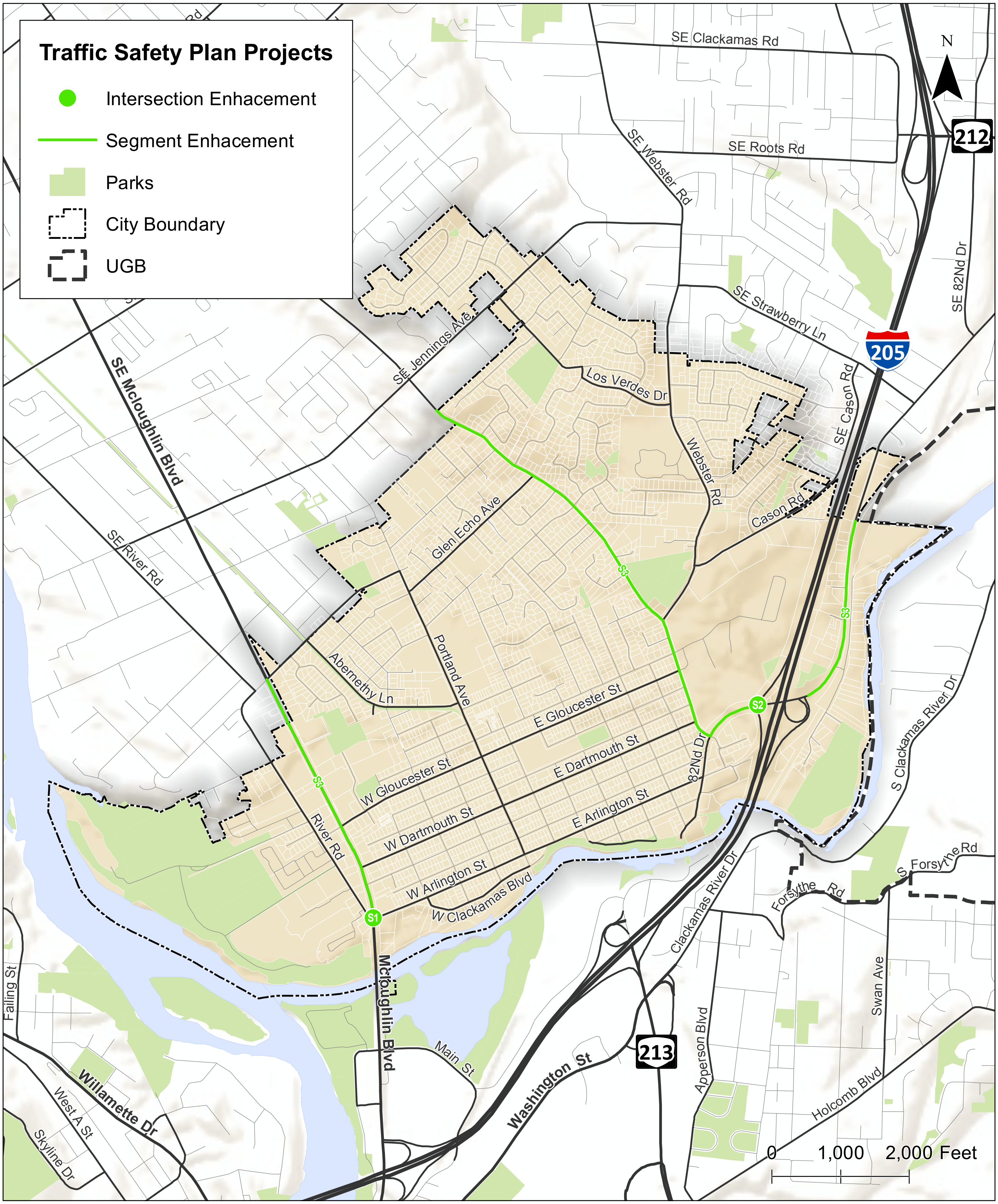
TRAFFIC SAFETY PLAN

Traffic safety has a significant impact on how people use the transportation system within Gladstone, particularly in areas where real or perceived safety risks prevent people from using more active travel modes, such as walking, biking, and taking transit. The traffic safety solutions identified in TSP update process are largely focused on systemic issues that occur along roadways and at intersections throughout the City. While projects that address these issues have not been identified for the TSP update, ODOT maintains a list of potential treatments the City can implement on a systemic basis. Table 15 identifies the traffic safety projects included in the Gladstone TSP update. Additional safety projects and improvements are identified as part of the pedestrian, bicycle, transit, and motor vehicle. Figure 8 illustrates the traffic safety plan projects.

Table 15: Traffic Safety Plan Projects

Project Number	Location	Description	Priority	Cost Estimate
S1	OR 99E/Arlington Street	Reconfigure the westbound approach to include a separate left-turn lane with protected phasing and a shared through-right-turn lane and reconfigure the eastbound approach to restrict the left-turn movement.	High	\$0[1]
S2	I-205 Southbound Ramp Terminal/SE 82nd Drive	Reconfigure the southbound approach to the intersection to improve sight distance for the southbound right-turn movement – Coordinate with Project M3	High	\$0[1]
S3	City-wide	Evaluate traffic safety along OR 99E, Oatfield Road, and SE 82nd Drive to identify appropriate countermeasures	Medium	\$50,000
			TOTAL High Priority Costs	**\$0**
			TOTAL Medium Priority Costs	**\$50,000**
			TOTAL Program Costs (23 years)	**\$50,000**

1. Project to be funded by others with potential contributions from the City.



Traffic Safety Plan Projects
Gladstone, Oregon

Figure
8

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

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\08 Traffic Safety Plan.mxd - mbell - 7:11 AM 1/11/2018

CHAPTER 7 MOTOR VEHICLE MASTER PLAN

MOTOR VEHICLE PLAN

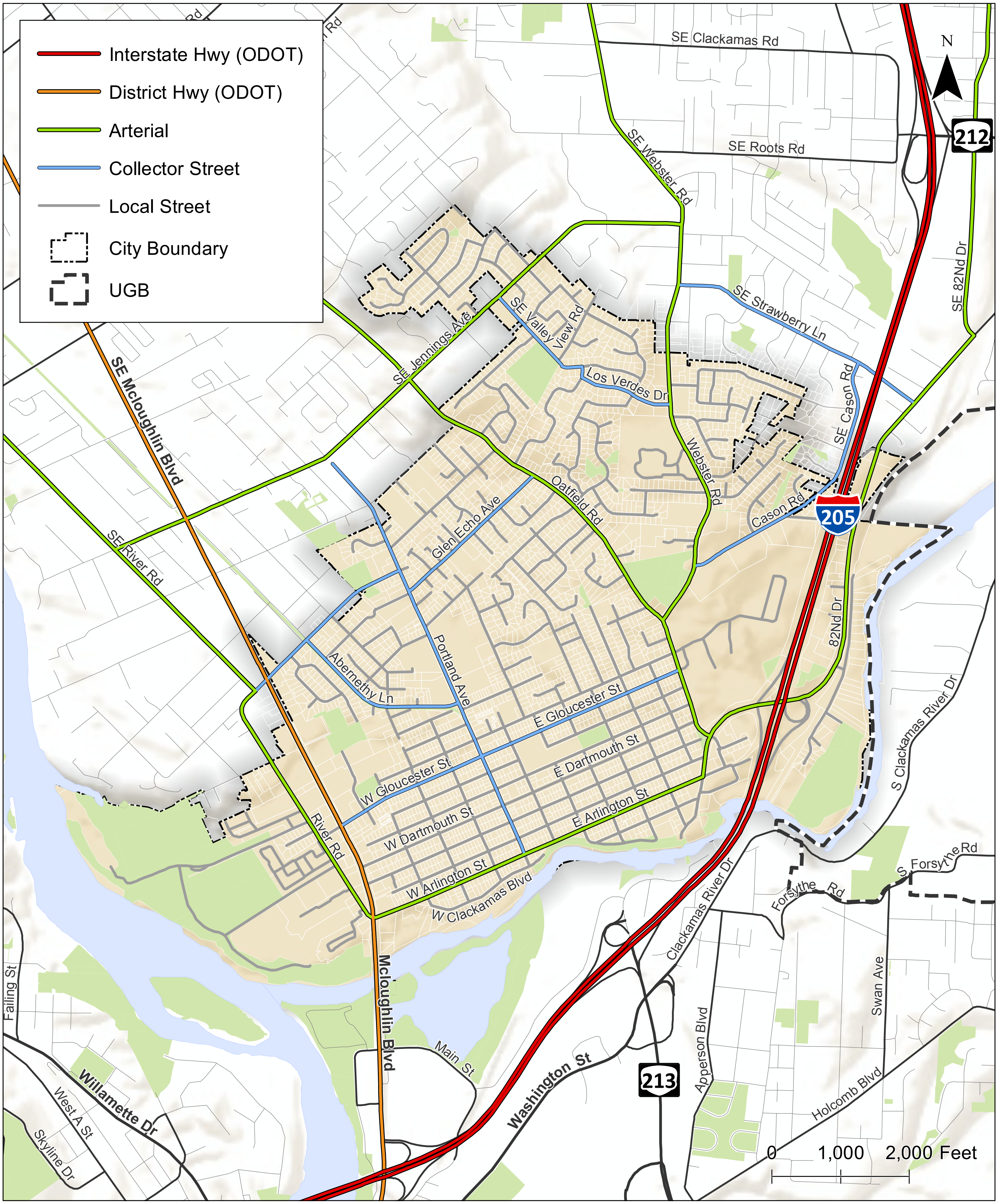
The street system within Gladstone is largely built-out and there are few opportunities to construct new roadways. There are also few operational issues under existing and projected future traffic conditions. Therefore, the Motor Vehicle Plan includes projects to increase the efficiency of the transportation system through changes in the functional classification of roadways, development of roadways standards and standard cross sections, improvements to street system connectivity, and improvements to the capacity of key intersections.

FUNCTIONAL CLASSIFICATION PLAN

A street's functional classification defines its role in the transportation system and reflects desired operational and design characteristics such as right-of-way requirements, pavement widths, pedestrian and bicycle features, and driveway (access) spacing standards. The functional classification plan includes the following designations:

- Freeways are divided highways with two or more travel lanes for exclusive use by traffic in each direction. They have uninterrupted traffic flow and allow full control of access and egress at ramps.
- Arterials carry relatively high traffic volumes and high travel speeds. They connect major traffic generators to collector streets, facilitate through traffic, and channel it around homogenous land uses. Private driveways and parking entrances are discouraged along arterials while channelization is encouraged at major intersections.
- Collector streets provide access between neighborhoods and arterials and may define neighborhood boundaries. Through traffic is discouraged along collector streets as are private residential driveways.
- Local Streets provide access to abutting properties and accommodate minor traffic volumes. Local streets should not be a route for through traffic, buses, or trucks. They should also not connect to arterials.

Figure 9 illustrates functional classifications of streets within Gladstone.



Roadway Functional Classification Plan
Gladstone, Oregon

Figure
9

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\09 Functional Classification Plan.mxd - mbell - 7:12 AM 1/11/2018

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

ROADWAY CROSS SECTION STANDARDS

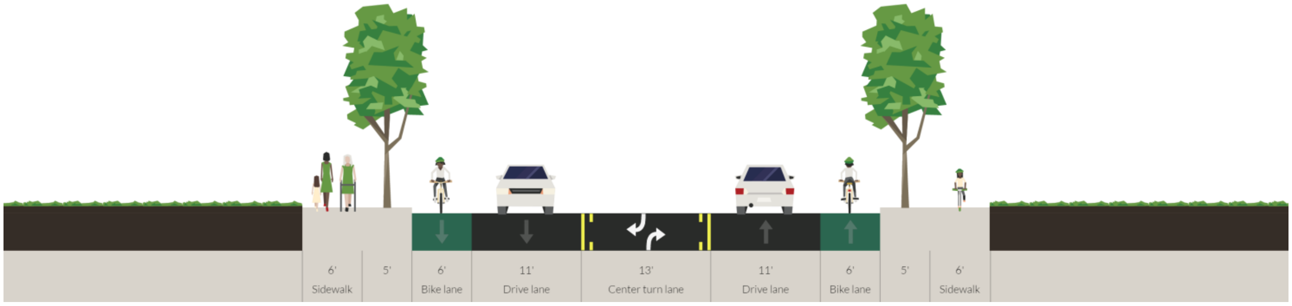
The roadway cross section standards generally reflect the characteristics of existing roadways within the city. While the actual design of roadways can (and will) vary from street to street and segment to segment due to adjacent land uses and demand, the roadway cross section standards are intended to define a system that allows standardization of key characteristics. The roadway cross section standards provide this consistency, while also allowing the design standards to be met with some flexibility in certain criteria applications. Table 16 outlines the roadway cross section standards for city streets. Exhibits 1 through 3 illustrate the cross section standards for each functional classification.

Unless prohibited by significant topographic or environmental constraint, newly constructed streets shall meet the maximum standards indicated in the cross sections. When widening an existing street, the City may use lesser standards than the maximum to accommodate physical and existing development constraints where determined to be appropriate by the Public Works Director. Examples of constrained street cross sections are shown for arterial and collector streets. These constrained cases may be applied where future daily volumes do not require center left-turn pockets or raised medians. In some locations, “green streets” (those that utilize vegetation or pervious material to manage drainage) may be appropriate due to design limitations or adjacent land use. Green street elements (as described in the notes for the cross section exhibits) may be used, where appropriate as determined by the Public Works Director.

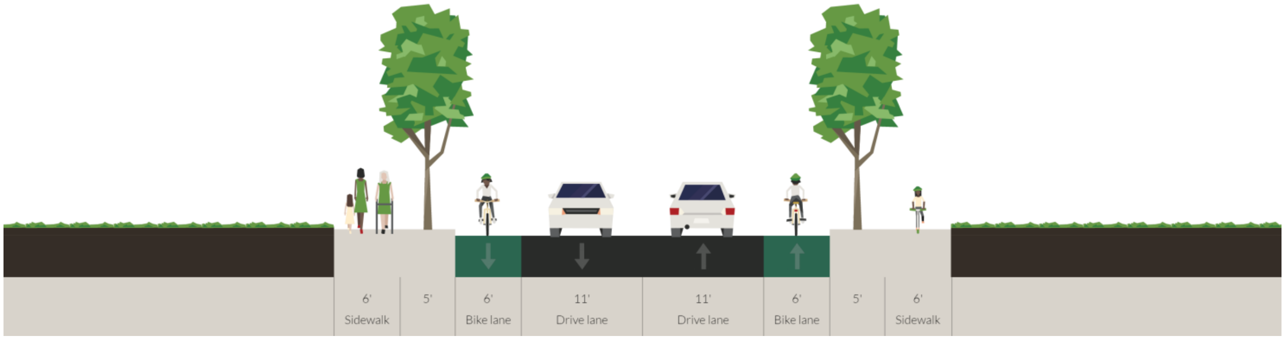
Table 16: City of Gladstone Roadway Cross Section Standards

Street Element	Characteristic	Width/Options
Right-of-way	Arterial	46-76 feet; 46-88 feet in Commercial Zones
	Collector	46-74 feet; 46-90 feet in Commercial Zones
	Local	34-64 feet
Vehicle Lane Widths (Typical widths)	Arterial	11-12 feet
	Collector	10-12 feet
	Local	10-12 feet
On-Street Parking	Arterial	7-8 feet in Commercial Zones
	Collector	7-8 feet in Commercial Zones
	Local	7-8 feet
Bike Lanes	Arterial	6-7 feet
	Collector	5-6 feet
Sidewalks	Arterial	6 feet, 10-12 feet in Commercial Zones
	Collector	6 feet, 8-20 feet in Commercial Zones
	Local	6 feet
Landscape Strips	Can be included on all streets	5-6 feet typical
Raised Medians	5-Lane	Optional
	3-Lane	Optional
	2-Lane	Consider if appropriate
Neighborhood Traffic Management (NTM)	Arterial	Not Appropriate
	Collector	Only in special circumstances
	Local	At the discretion of the Public Works Director
Transit/Freight	Arterial	Appropriate
	Collector	Only in special circumstances
	Local	Local service only

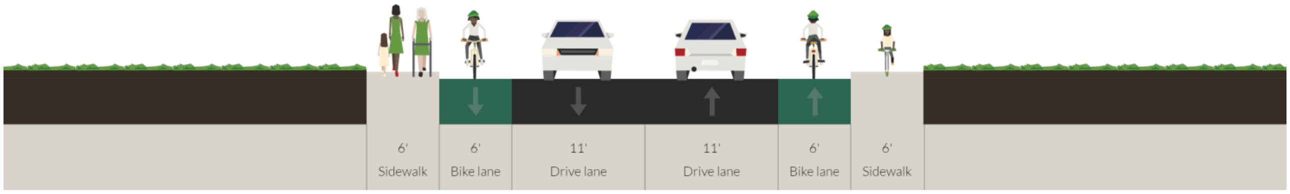
Exhibit 6: Arterial Cross Sections



Arterial with Median/Center Turn Lane



Arterial without Median/Center Turn Lane



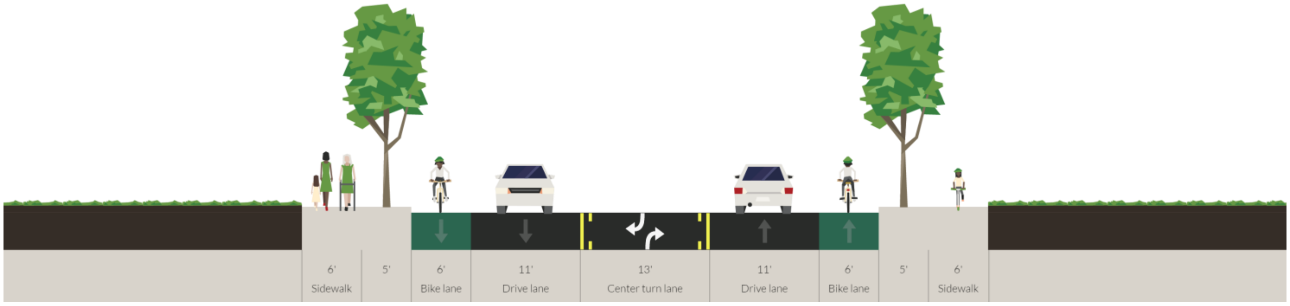
Arterial Constrained

Table 17: Arterial Cross Section Standards

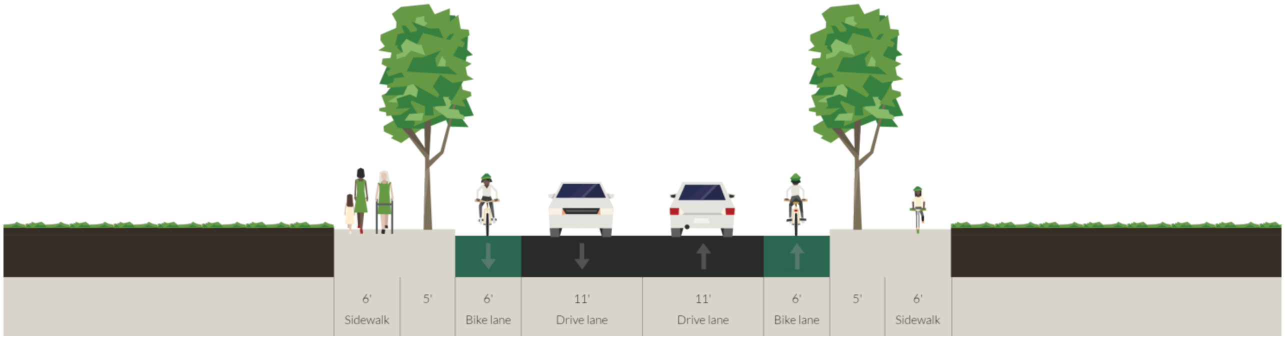
Standards	Arterial
Vehicle Lanes	11-12 feet
On-Street Parking	7-8 feet in Commercial Zones[1]
Bike Lanes	6-7 feet
Sidewalks	6 feet; 10-12 feet in Commercial Zones
Landscape Strips	5-6 feet[2, 3]
Median/Center Turn Lane	13-14 feet
Neighborhood Traffic Management	Not Appropriate

1. On-street parking shall be provided along arterials within commercial zones only and at the discretion of the Public Works Director.
2. Landscape strips may be reduced and/or removed at the discretion of the Public Works Director.
3. The Public Works Director may recommend green street variations of each cross section. These variations may include replacing the standard landscape strip with a rain garden or swale, using pervious material for the sidewalk/cycle track, and in some cases providing a sidewalk on only one side of the street.

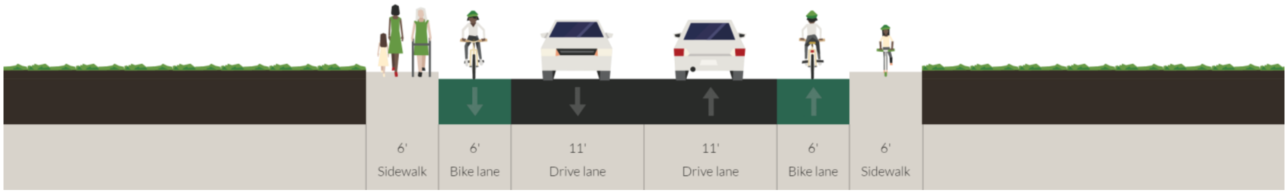
Exhibit 7: Collector Cross Sections



Collector with Median/Center Turn Lane



Collector without Median/Center Turn Lane



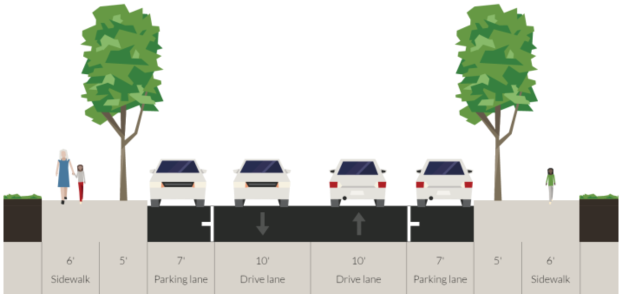
Collector Constrained

Table 18: Collector Cross Section Standards

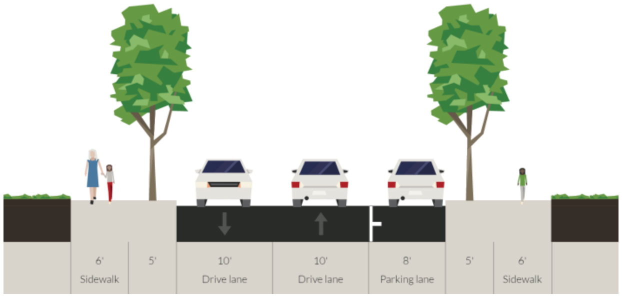
Standards	Arterial
Vehicle Lanes	10-12 feet
On-Street Parking	7-8 feet in Commercial Zones[1]
Bike Lanes	5-6 feet[2]
Sidewalks	6 feet; 8-19-feet in commercial Zones
Landscape Strips	5-6 feet[3, 4]
Median/Center Turn Lane	13-14 feet
Neighborhood Traffic Management	Only in special circumstances

1. On -street parking shall be provided along collectors within commercial zones only and at the discretion of the Public Works Director..
2. Bike lanes required where future traffic volumes > 3,000 ADT. When < 3,000 ADT, 14-foot wide travel lanes will be provided.
3. Landscape strips may be reduced and/or removed at the discretion of the Public Works Director.
4. The Public Works Director may recommend green street variations of each cross section. These variations may include replacing the standard landscape strip with a rain garden or swale, using pervious material for the sidewalk/cycle track, and in some cases providing a sidewalk on only one side of the street.

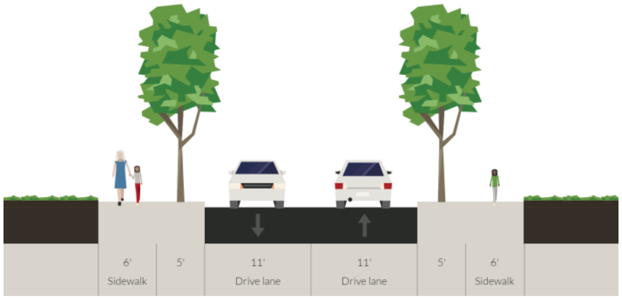
Exhibit 8: Local Street Cross Sections



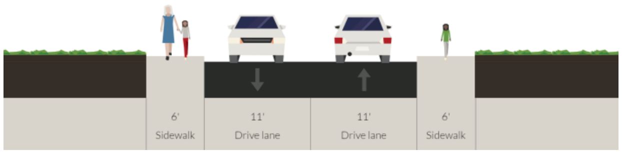
34-foot Local (Parking on Both Sides)



28-foot Local (Parking on One Side)



24-foot Local (No Parking)



Local Constrained

Table 19: Local Street Cross Section Standards

Standards[3]	Local Streets
Vehicle Lane Widths	10-12 feet
On-Street Parking	7-8 feet[1]
Sidewalks	6 feet
Landscape Strips	5-6 feet[2, 3]
Median/Turn Lane Widths	None
Neighborhood Traffic Management	At the discretion of the Public Works Director

1. On-street parking shall be provided along local streets and reflect the nature and intensity of adjacent development and physical constraints.
2. Landscape strips may be reduced and/or removed at the discretion of the Public Works Director.
3. The Public Works Director may recommend green street variations of each cross section. These variations may include replacing the standard landscape strip with a rain garden or swale, using pervious material for the sidewalk, and in some cases providing a sidewalk on only one side of the street.

MOTOR VEHICLE PLAN

Streets serve a majority of all trips within Gladstone across all travel modes. In addition to motorists, pedestrians, bicyclists, and public transit riders use streets to access areas locally and regionally. This section summarizes the types of improvements included in the Motor Vehicle Plan for the TSP update.

Street System Connectivity

Although the southern portion of Gladstone is largely built on a grid system, much of the residential neighborhood development in the northern portion has resulted in a network of cul-de-sacs and stub streets due to topography. These streets can be desirable to residents because they can limit traffic speeds and volumes on local streets, but cul-de-sacs and stub streets result in longer trip distances, increased reliance on arterials for local trips, and limited options for people to walk and bike to the places they want to go.

The future street system needs to balance the benefits of providing a well-connected grid system with the topographical challenges in the city. Incremental improvements to the street system can be planned carefully to provide route choices for motorists, cyclists, and pedestrians while accounting for potential neighborhood impacts. In addition, the quality of the transportation system can be improved by making connectivity improvements to the pedestrian and bicycle system separate from street connectivity, as discussed through solutions presented in the previous sections.

Freight Mobility and Reliability Solutions

No specific solutions have been identified to address freight mobility and reliability within the City, with the exception of the TSMO solutions identified above for truck signal priority and the capacity based solutions identified below at several key intersections along OR 99E and SE 82nd Drive.

Turn Lanes

Separate left- and right-turn lanes, as well as two-way left-turn lanes (TWLTL) can provide separation between slowed or stopped vehicles waiting to turn and through vehicles. The design of turn lanes is largely determined based on a traffic study that identifies the storage length needed to accommodate vehicle queues. Turn lanes are commonly used at intersections where the turning volumes warrant the need for separation.

Traffic Signals

Traffic signals allow opposing streams of traffic to proceed in an alternating pattern. National and state guidance indicates when it is appropriate to install traffic signals at intersections. When used, traffic signals can effectively manage high traffic volumes and provide dedicated times in which pedestrians and cyclists can cross roadways. Because they continuously draw from a power source and must be periodically re-timed, signals typically have higher maintenance costs than other types of intersection control. Signals can improve safety at intersections where signal warrants are met, however, they may result in an increase in rear-end crashes compared to other solutions. Signals have a significant range in costs depending on the number of approaches, how many through and turn lanes each approach has, and, if it is located in an urban or rural area. The cost of a new traffic signal ranges from approximately $250,000 in rural areas to $350,000 in urban areas.

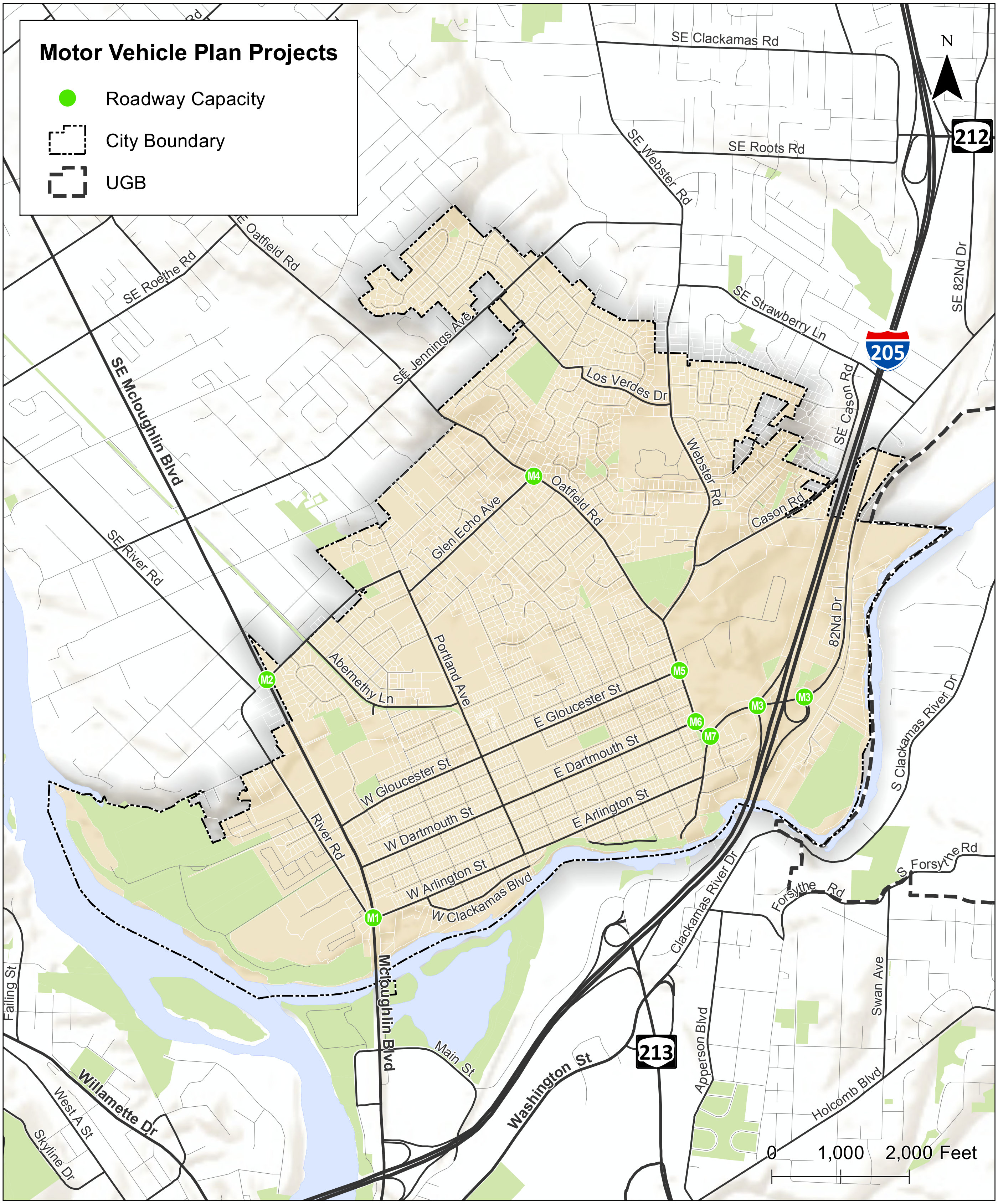
Motor Vehicle Plan

Table 20 and Figure 10 summarize the motor vehicle plan projects for the TSP update. These projects are intended to address existing and projected future transportation system needs for motor vehicles as well as all other modes of transportation that depend on the roadway system for travel, such as pedestrians, bicyclists, transit users, and freight.

Table 20: Motor Vehicle Plan Projects

Project Number	Location	Description	Priority	Cost Estimate
M1	OR 99E/ E Arlington Street	Restrict eastbound movements at the intersection (See Tech Memo 8 in the Volume II: Technical Appendix for design considerations)	Low	$0[1]
M2	OR 99E/ Glen Echo Avenue	Install a separate right-turn lane on the westbound approach	Medium	$0[1]
M3	I-205 Ramp Terminals/ SE 82nd Drive	I-205 Interchange Refinement Plan (See Tech Memo 8 in the Volume II: Technical Appendix for design considerations)	Medium	$0[1]
M4	Oatfield Road/ Glen Echo Avenue	Install a traffic signal when warranted	Medium	$250,000
M5	Oatfield Road/ Gloucester Street	Install a traffic signal when warranted	Medium	$250,000
M6	Oatfield Road/ Dartmouth Street	Install a median along Oatfield Road to restrict left-turn movements to/from Dartmouth Street as well as other local street connections – this project will require coordination with TriMet.	Medium	$35,000
M7	SE 82nd Drive/Oatfield Road	Install skip striping through the intersection to define turning paths for vehicles	High	$0[1]
M8	OR 99E	OR 99E Refinement Plan – this plan will provide a system-wide solution for OR 99E that eliminates the need for alternative mobility target at the OR 99E/Arlington Road and OR 99E/Glen Echo Road intersections (See Tech Memo 8 in the Volume II: Technical Appendix for design considerations)	Medium	$50,000
			TOTAL High Priority Costs	**$0**
			TOTAL Medium Priority Costs	**$585,000**
			TOTAL Low Priority Costs	**$0**
			TOTAL Program Costs (23 years)	**$585,000**

1. Project to be funded by others with potential contributions from the City.



Motor Vehicle Plan Projects
Gladstone, Oregon

Figure
10

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

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\10 Motor Vehicle Plan Projects.mxd - mbell - 7:12 AM 1/11/2018

CHAPTER 8 OTHER TRAVEL MODES

OTHER TRAVEL MODES

This chapter summarizes the plans for other travel modes in Gladstone such as rail, air, water, freight and pipeline.

RAIL TRANSPORTATION

There are no freight rail or passenger rail terminals located within Gladstone. The closest terminals are located to the south in Oregon City. Access to the terminals is provided via the local street network and either OR 99E or I-205.

Plan

While there are no rail transportation projects included in the Gladstone TSP, the City will continue to support and promote improvements to the local and regional transportation system to ensure adequate access for Gladstone residents to freight and passenger rail services. Gladstone advocates for good connections and service for Amtrak and other passenger rail in the region.

AIR TRANSPORTATION

There are no public or private airports located within Gladstone. The closest airports include the Portland International Airport located approximately 17 miles to the north via I-205, the Aurora State Airport located approximately 16 miles to the south via OR 99E, and the Mulino Airport located approximately 15 miles to the south via I-205 and OR 213.

Plan

While there are no air transportation projects included in the Gladstone TSP, the City will continue to support and promote improvements to the local and regional transportation system to ensure adequate access for Gladstone residents to the Portland International airport and other public and private airports within the Portland Metro area.

WATER TRANSPORTATION

Although the western boundary of Gladstone is defined by the Willamette River and the southern boundary is defined by the Clackamas River, these waterways are rarely used to support transportation. They are, however, used for recreational purposes. Access to the rivers is provided via Meldrum Bar Park, Dahl Beach Park, High Rock Park, as well as many formal and informal paths and trails located along the Willamette River and Clackamas River. These river accesses are used year-round by fishermen and experience high volumes of visitors for swimming and recreation during the summer.

Plan

While there are no water transportation projects included in the Gladstone TSP, the City will continue to support and promote improvements to the local transportation system to ensure adequate access for Gladstone residents to the Willamette River and Clackamas River for recreational purposes. The City will also continue to support and promote the implementation of a water taxi service that connects the City to West Linn, Milwaukie, and Portland further to the north.

FREIGHT TRANSPORTATION

The designation of freight routes provides for the efficient movement of goods and services while maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. Per the Oregon Highway Plan (OHP), the only designated freight routes in Gladstone include I-205 and OR 99E. Figure 11 illustrates the location of the freight routes. The City of Gladstone does not have a system of designated freight routes.

Plan

While there are no freight transportation projects included in the TSP, the City will continue to support and promote improvements to the regional transportation system that will improve freight and goods movement. The City will also encourage ODOT to monitor traffic and accident patterns along I-205, especially in the vicinity of the SE 82nd Drive interchange and will encourage measures which reduce non-local freight trips on City streets.

PIPELINE

There are three major municipal water transmission lines routed through the City of Gladstone. The Transmission lines are operated by the Clackamas Water District, the Oak Lodge Water District, and the City of Lake Oswego. There is also one high pressure gas main routed through the City, which is operated by Northwest Natural.

Plan

While there are no pipeline projects included in the TSP, the City will continue to support and promote improvements to the regional and local pipeline system to ensure adequate services for Gladstone residents.

Freight Routes and Railroads
Gladstone, Oregon

Figure
11

H:\19\19890 - Gladstone TSP Update\gis\Draft TSP\11 Freight Routes and Railroads.mxd - mbell - 7:12 AM 1/11/2018

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Merto Data Resurce Center

CHAPTER 9 FUNDING AND IMPLEMENTATION

FUNDING, IMPLEMENTATION, AND MONITORING

This section documents the City's historical revenue sources and expenditures over the last 10 year period and identifies the projected transportation funding for implementation of the TSP.

HISTORICAL REVENUE SOURCES

Historical revenue sources that have contributed to transportation funding for Gladstone include public service taxes, charges for services, grants, and miscellaneous/other. Over the last 10-year period, funding from many of these sources has remained flat, while others have increased, and others have varied considerably. The average annual revenue from each of the historical revenue sources were combined and projected out over the next 5, 10 and 23 year period to determine the total revenue that is estimated through 2040. Table 21 summarizes the potential future funding for transportation through 2040.

Table 21: Future Transportation Funding Projections

Average Annual	5-Year Forecast	10-Year Forecast	Estimated Through 2040
$1,140,000	**$5,700,000**	**$11,400,000**	**$26,220,000**

HISTORICAL EXPENDITURES

The City organizes historical expenditures into five categories, including personal service, materials and services, capital outlay, contingency, and transfers out. Over the last 10-year period, expenditures have varied considerably. The average annual expenditures were combined and projected out over the next 5, 10 and 23 year period. Table 22 summarizes the potential future expenditures for transportation through 2040.

Table 22: Future Transportation Expenditures Projections

Average Annual	5-Year Forecast	10-Year Forecast	Estimated Through 2040
$990,000	**$4,950,000**	**$9,900,000**	**$22,770,000**

PROJECTED TRANSPORTATION FUNDING AND FUNDING OUTLOOK

As shown in Tables 21 and 22, the projected funding from now through FY 2040-41 is approximately $26,220,000, and the projected expenditures are approximately $22,770,000. Based on the information provided in Tables 21 and 22, the City is expected to have approximately $3,450,000 over the next 23 years to implement the TSP. This suggests the City will have sufficient funds to implement the projects included in the financially project list; however, the City will need to identify potential revenue sources to fund all projects identified in the TSP. Two potential funding sources, right-of-way fees and gas tax, have been reviewed by the City and County, respectively. Combined, these potential funding sources could provide the City with an additional $11,400,000 over the 23 year period.

PLANNED SYSTEM COSTS

Table 23 summarizes the full cost of the planned and financially constrained transportation systems. As shown, the full cost of the planned system is approximately $9,235,000 over the net 23 year period, including $3,020,000 in high priority projects, $3,280,000 in medium priority projects, and $2,935,000 in low priority projects. Based on the anticipated funds available for capital improvement projects, **the financially constrained plan includes all of the high priority projects.** This leaves approximately $430,000 in funding for the City to complete medium and low priority projects over the 23 year period, to contribute to projects on ODOT facilities, or to provide matching funds for grants.

Table 23: Planned Transportation System Cost Summary

Project Type	High Priority (Financially Constrained Plan Projects) (0-5 years)	Medium Priority (5-10 years)	Low Priority (10-23 years)	Total
Planned Transportation System				
TSM[1]	$25,000	$25,000	$65,000	**$115,000**
TDM[1]	$50,000	$50,000	$165,000	**$265,000**
Land Use	$0	$75,000	$0	**$75,000**
Access Management	$0	$0	$75,000	**$75,000**
Safety	$0	$50,000	$0	**$50,000**
Pedestrian	$1,500,000	$2,260,000	$2,585,000	**$6,345,000**
Bicycle	$1,445,000	$150,000	$45,000	**$1,640,000**
Transit	$0	$85,000	$0	**$85,000**
Motor Vehicle	$0	$585,000	$0	**$585,000**
Total	**$3,020,000**	**$3,280,000**	**$2,935,000**	**$9,235,000**
Available Funding				
Total	$750,000	$750,000	$1,950,000	$3,450,000

TSM: Transportation System Management
TDM: Travel Demand Management
1: Includes annual costs occurred every year.

IMPLEMENTATION

The Transportation Planning Rule (TPR), as codified in Oregon Administrative Rules (OAR) 660-012-0020(2) requires that local jurisdictions identify and adopt land use regulations and code amendments needed to implement the TSP. These lane use regulations and code amendments are provided under separate cover in the staff report.

CHAPTER 10 GLOSSARY OF TERMS

GLOSSARY OF TERMS

The following terms are applicable only to the Gladstone Transportation System Plan and shall be construed as defined herein.

Access Management: Refers to measures regulating access to streets, roads and highways from public roads and private driveways. Measures may include but are not limited to restrictions on the type and amount of access to roadways, and use of physical controls such as signals and channelization including raised medians, to reduce impacts of approach road traffic on the main facility.

Accessway: Refers to a walkway that provides pedestrian and or bicycle passage either between streets or from a street to a building or other destination such as a school, park, or transit stop.

Alternative Modes: Transportation alternatives other than single-occupant automobiles such as rail, transit, bicycles and walking.

American Association of State Highway Transportation Officials (AASHTO): The American Association of State Highway and Transportation Officials (AASHTO) is a standards setting body which publishes specifications, test protocols and guidelines which are used in highway design and construction throughout the United States.

Americans with Disabilities Act (ADA): A civil rights law that prohibits discrimination against individuals with disabilities in all areas of public life, including jobs, schools, transportation, and all public and private places that are open to the general public.

Arterial (Street): A street designated in the functional class system as providing the highest amount of connectivity and mostly uninterrupted traffic flow through an urban area.

Arterial Corridor Management (ACM): a series of measures intended to improve access and circulation along arterial corridors.

Average Annual Daily Traffic (AADT): A measure used primarily in transportation planning and traffic engineering that represents the total volume of vehicular traffic on a highway or roadway for a year divided by 365 days.

Average Daily Traffic (ADT): This is the measurement of the average number of vehicles passing a certain point each day on a highway, road or street.

Bicycle Facility: Any facility provided for the benefit of bicycle travel, including bikeways and parking facilities.

Bicycle Network: A system of connected bikeways that provide access to and from local and regional destinations.

Bicycle Boulevard: Lower-order, lower-volume streets with various treatments to promote safe and convenient bicycle travel. Usually accommodates bicyclists and motorists in the same travel lanes, often with no specific vehicle or bike lane delineation. Assigns higher priority to through bicyclists, with secondary priority assigned to motorists. Also includes treatments to slow vehicle traffic to enhance the bicycling environment.

Bike Lane: Area within street right-of-way designated specifically for bicycle use.

Capital Improvement Plan (CIP): A community planning and fiscal management tool used to coordinate the location, timing and financing of capital improvements over a multi-year period.

Capacity: The maximum number of vehicles or individuals that can traverse a given segment of a transportation facility with prevailing roadway and traffic conditions.

Central Business District (CBD): This is the traditional downtown area, and is usually characterized by slow traffic speeds, on-street parking and a compact grid system.

Citizen Advisory Committee (CAC): An advisory committee consisting of volunteer citizens from the community they represent.

Collector (Street): A street designated in the functional class system that provides connectivity between local and neighborhood streets with the arterial streets serving the urban area. Usually shorter in distance than arterials, designed with lower traffic speeds and has more traffic control devices than the arterial classification.

Congestion Mitigation/Air Quality (CMAQ): A program within the federal ISTEA and TEA-21 regulations that address congestion and transportation-related air pollution.

Crosswalk: Portion of a roadway designated for pedestrian crossing and can be either marked or unmarked. Unmarked crosswalks are the national extension of the shoulder, curb line or sidewalk.

Cycle Track: An exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. A cycle track is physically separated from motor traffic and distinct from the sidewalk.

Demand Management: Refers to actions which are designed to change travel behavior in order to improve performance of transportation facilities and to reduce need for additional road capacity. Methods may include subsidizing transit for the journey to work trip, charging for parking, starting a van or car pool system, or instituting flexible work hours.

Department of Environmental Quality (DEQ): A regulatory agency whose job is to protect the quality of Oregon's environment.

Department of Land Conservation and Development (DLCD): A public agency that helps communities and citizens plan for, protect and improve the built and natural systems that provide a high quality of life.

Driveway (DWY): A short road leading from a public road to a private business or residence.

Eastbound (EB): Leading or traveling toward the east.

Employee Commute Options (ECO): rules that were passed by the Oregon Legislature in 1993 (and revised in February 2007) to help protect the health of Portland area residents from air pollution and to ensure that the area complied with the Federal Clean Air Act

Fiscal Year (FY): A year as reckoned for taxing or accounting purposes.

Geographic Information Systems (GIS): A system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data.

Grade: A measure of the steepness of a roadway, bikeway or walkway, usually expressed in a percentage form of the ratio between vertical rise to horizontal distance, (e.g. a 5% grade means that the facility rises 5 feet in height over a 100 feet in length.)

Grade Separation: The vertical separation of conflicting travelways.

Green Street: A street designed to reduce or redirect stormwater runoff quantity and/or to improve stormwater runoff quality. Green street design generally involves using rain gardens, vegetated swales and/or pervious materials (porous pavement or permeable paving) as an alternative to conventional stormwater facilities.

High-capacity Transit (HCT): A form of public transit distinguished from local service transit such as bus lines by higher speeds, fewer stops, more passengers, and more frequent service.

Highway Design Manual (HDM): A manual that provides uniform standards and procedures for the design of new roadways and the major reconstruction, rehabilitation, restoration, and resurfacing of existing roadways.

High Occupancy Vehicle (HOV): A vehicle containing two or more occupants, generally a driver and one or more passengers.

Impervious Surfaces: Hard surfaces that do not allow water to soak into the ground, increasing the amount of stormwater running into the drainage system.

Intelligent Transportation Systems (ITS): the application of advanced technologies and proven management techniques to relieve congestion, enhance safety, provide services to travelers and assist transportation system operators in implementing suitable traffic management strategies.

Level of Service (LOS): A qualitative measure describing the perception of operation conditions within a traffic steam by motorists and or passengers. An LOS rating of "A” to “F” describes the traffic flow on streets and at intersections, ranging from LOS A, representing virtually free flow conditions and no impedance to LOS F representing forced flow conditions and congestion.

Local (Street): A street designated in the functional class system that’s primary purpose is to provide access to land use as opposed to enhancing mobility. These streets typically have low volumes and are very short in relation to collectors and arterials.

Manual on Uniform Traffic Control Devices (MUTCD): A document issued by the Federal Highway Administration (FHWA) of the United States Department of Transportation (USDOT) to specify the standards by which traffic signs, road surface markings, and signals are designed, installed, and used.

Metropolitan Planning Organization (MPO): An organization in each federally recognized urbanized area (population over 50,000) designated by the Governor which has the responsibility for planning, programming and coordinating the distribution of federal transportation resources.

Metropolitan Transportation Improvement Program (MTIP): The list of projects selected by Metro to receive regional funding assistance.

Multi-Modal: Involving several modes of transportation including bus, rail, bicycle, motor vehicle etc.

Multi-Use Path: Off-street route (typically recreationally focused) that can be used by several transportation modes, including bicycles, pedestrians and other non-motorized modes (i.e. skateboards, roller blades, etc.)

National Highway System (NHS): The National Highway System is interconnected urban and rural principal arterial and highways that serve major population centers, ports, airports and other major travel destinations, meet national defense requirements and serve interstate and interregional travel.

Neighborhood Route (Street): A street designated in the functional class system that’s primary purpose is to provide access to land use, but provides more mobility than a local street. These streets typically have moderate volumes and are shorter in relation to collectors and arterials.

Neighborhood Traffic Management (NTM): Traffic control devices typically used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic.

Northbound (NB): Traveling or leading toward the north.

Oregon Administrative Rules (OAR): The official compilation of rules and regulations having the force of law in the U.S. state of Oregon. It is the regulatory and administrative corollary to Oregon Revised Statutes, and is published pursuant to ORS 183.360 (3).

Oregon Department of Transportation (ODOT): ODOT is a public agency that helps provide a safe, efficient transportation system that supports economic opportunity and livable communities throughout Oregon. ODOT owns and operates two roadways (I-205 and OR 99E) that are located in Gladstone or provide access to the city. There are street design and operational standards for these roadways which supersede Gladstone's street design and operational standards.

Oregon Highway Plan (OHP): The document that establishes long range policies and investment strategies for the state highway system in Oregon.

Oregon Revised Statutes (ORS): The codified body of statutory law governing the U.S. state of Oregon, as enacted by the Oregon Legislative Assembly, and occasionally by citizen initiative. The statutes are subordinate to the Oregon Constitution.

Peak Period or Peak Hour: The period of the day with the highest number of travelers. This is normally between 4:00 p.m. to 6:00 p.m. on weekdays.

Pedestrian Connection: A continuous, unobstructed, reasonability direct route between two points that is intended and suitable for pedestrian use. These connections could include sidewalks, walkways, accessways, stairways and pedestrian bridges.

Pedestrian District: A comprehensive plan designation or implementing land use regulation, such as an overlay zone, that establishes requirements to provide a safe and convenient pedestrian environment an area planned for a mix of uses likely to support a relatively high level of pedestrian activity.

Pedestrian Facility: A facility provided for the benefit of pedestrian travel, including walkways, crosswalks, signs, signals and benches.

Pedestrian Scale: Site and building design elements that are oriented to the pedestrian and are dimensionally less than those sites designed to accommodate automobile traffic.

Regional Transportation Functional Plan (RTFP): A planning document that contains policies and guidelines to help local jurisdictions implement the policies in the Regional Transportation Plan (RTP) and its modal plans, include those for active transportation, freight movement and high capacity transit.

Regional Transportation Plan (RTP): The transportation plan for the Portland Metro region.

Right-Of-Way (ROW or R/W): A general term denoting publicly-owned land or property upon which public facilities and infrastructure is placed.

Safety Priority Index System (SPIS): An indexing system used by Oregon Department of Transportation to prioritize safety improvements based on crash frequency and severity on state facilities.

Safe Routes to School (SRTS): Federal, state, and local programs that create safe, convenient, and fun opportunities for children to bicycle and walk to and from schools.

Shared Roadway: Roadways where bicyclists and autos share the same travel lane. May include a wider outside lane and/or bicycle boulevard treatment (priority to through bikes on local streets).

Single-Occupancy Vehicle or Single-Occupant Vehicle (SOV): A vehicle containing only a single occupant, the driver.

Southbound (SB): Traveling or leading toward the south.

Special Transportation Area (STA): An ODOT designation that allows state facilities that run through downtown business districts to have alternate mobility standards in an effort to accommodate other special needs (such as pedestrian, transit, business, etc.) in an area.

Statewide Transportation Improvement Plan (STIP): The capital improvement program that identifies founding and schedule of statewide projects.

System Development Charge (SDC): Fees that are collected when new development occurs in the city and are used to fund a portion of new streets, sanitary sewers, parks and water.

Technical Advisory Committee (TAC): An advisory committee consisting of state, county, and city staff that review and provide feedback on technical memorandums.

Technical Memorandum (TM): A document that is specifically targeted to technically capable persons, such as practicing engineers or engineering managers, who are interested in the technical details of the project or task.

Traffic Control Devices: Signs, signals or other fixtures placed on or adjacent to a travelway that regulates, warns or guides traffic. Can be either permanent or temporary.

Transportation Advisory Board (TAB): A standing advisory board made of up volunteers that comment on transportation issues within the City.

Transportation Analysis Zone (TAZ): A geographic sub-area used to assess travel demands using a travel demand forecasting model. Often defined by the transportation network and US Census blocks.

Transportation Demand Management (TDM): A policy tool as well as any action that removes single-occupant vehicle trips from the roadway network during peak travel demand periods.

Transportation and Growth Management (TGM): A program of the Oregon Department of Transportation (ODOT) that supports community efforts to expand transportation choices. By linking land use and transportation planning, TGM works in partnership with local governments to create vibrant, livable places in which people can walk, bike, take transit or drive where they want to go.

Transportation Management Area (TMA): A Transportation Management Area is an area designated by the Secretary of Transportation, having an urbanized area population of over 200,000, or upon special request from the Governor and the MPO designated for the area.

Transportation Planning Rule (TPR): A series of Oregon Administrative Rules intended to coordinate land use and transportation planning efforts to ensure that the planned transportation system supports a pattern of travel and land use in urban areas that will avoid the air pollution, traffic and livability problems faced by other large urban areas of the country through measures designed to increase transportation choices and make more efficient use of the existing transportation system.

Transportation System Management (TSM): Management strategies such as signal improvements, traffic signal coordination, traffic calming, access management, local street connectivity, and intelligent transportation systems

Transportation System Management and Operations (TSMO): An integrated program to optimize the performance of existing multimodal infrastructure through implementation of systems, services, and projects to preserve capacity and improve the security, safety, and reliability of our transportation system.

Transportation System Plan (TSP): Is a comprehensive plan that is developed to provide a coordinated, seamless integration of continuity between modes at the local level as well as integration with the regional transportation system.

Two-Way Stop Control (TWSC): An intersection, where one or more approaches is stop controlled and must yield the right-of-way to one or more approaches that are not stop controlled.

Urban Area: The area immediately surrounding an incorporated city or rural community that is urban in character, regardless of size.

Urban Growth Boundary (UGB): A regional boundary, set in an attempt to control urban sprawl by mandating that the area inside the boundary be used for higher density urban development and the area outside be used for lower density development.

Vehicle Miles Traveled (VMT): The cumulative distance a vehicle travels, regardless of number of occupants.

Volume to Capacity Ratio (V/C): A measure that reflects mobility and quality of travel of a roadways or a section of a roadways. It compares roadway demand (vehicle volumes) with roadway supply (carrying capacity).

Westbound (WB): Leading or traveling toward the west.

City of Gladstone

TRANSPORTATION SYSTEM PLAN UPDATE

Volume 2: Technical Appendix

Prepared for:

City of Gladstone
525 Portland Avenue
Gladstone, Oregon 97027
503.650.8398

Prepared by:

Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland, Oregon 97205
503.228.5230

City of
Gladstone
Oregon

City of Gladstone
Transportation System Plan

Gladstone, Oregon

Prepared For:
City of Gladstone
525 Portland Avenue
Gladstone, OR 97027
(503) 650-8398

Prepared By:
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland, OR 97205
(503) 228-5230

Project Manager: Matt Bell
Project Analyst: Molly McCormick
Project Principal: Matt Hughart

December 2017

TECHNICAL APPENDIX

Appendix A: Tech Memo #1: Policy Framework and Code Review

Appendix B: Tech Memo #2: Project Goals, Objectives, and Evaluation Criteria

Appendix C: Tech Memo #3: TSP Financial Forecast

Appendix D: Tech Memo #4: TSP Methodology and Assumptions

Appendix E: Tech Memo #5: Existing Gaps and Deficiencies

Appendix F: Tech Memo #6: Needs Analysis

Appendix G: Tech Memo #7: Regulatory Solutions

Appendix H: Tech Memo #8: TSP Solutions

Appendix I: Tech Memo #9: Planned and Financially Constrained Transportation System

APPENDIX A TECH MEMO #1: POLICY FRAMEWORK AND CODE REVIEW

TECHNICAL MEMORANDUM

Date: November 4, 2016 Project #: 19890.2

To: Project Management Team

Cc: Transportation System Plan Advisory Committees

From: Clinton "CJ" Doxsee, Kyra Schneider, Darci Rudzinski – Angelo Planning Group
Matt Bell – Kittelson & Associates, Inc.

Project: City of Gladstone Transportation System Plan Update

Subject: Final Tech Memo 1: Policy Framework and Code Review (Subtask 2.3)

PURPOSE AND CONTENT OF MEMORANDUM

This memorandum summarizes the plans, policies, targets, and standards that are applicable to the City of Gladstone's Transportation System Plan (TSP) update. It also includes an evaluation of Gladstone's land use regulations for compliance with the Transportation Planning Rule (TPR)[1] and Metro's Regional Transportation Functional Plan (RTFP)[2].

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 2040. As new strategies for addressing transportation needs are proposed, compliance and coordination with the plans, policies, and regulations described in this document will be necessary. As proposed in Tech Memo 2, evaluation criteria that will assist in transportation project selection will be informed by the plans, policies, and regulations summarized here. The City will be adopting the TSP as an element of the Comprehensive Plan through a legislative application, and reviewed by the Planning Commission and City Council. Written findings demonstrating that the updated TSP complies with applicable criteria summarized here will be necessary to support TSP adoption.

---

[1] Transportation Planning Rule, Section 660-012:
http://arcweb.sos.state.or.us/pages/rules/oars_600/oar_660/660_012.html

[2] Regional Transportation Functional Plan:
http://www.oregonmetro.gov/sites/default/files/chap308_regional_transportation_functional_plan.pdf

The following plans and policies were reviewed.

For local plans and policies, see Table 4 of this memo. This table provides a list of all local plans and policy documents that were reviewed, along with a brief description of how that document is relevant to the Gladstone TSP update.

The following review will help to guide the update process by highlighting key requirements and standards and locating gaps that need to be resolved to meet the key requirements and standards.

KEY FINDINGS

The current City of Gladstone TSP was adopted in 1995 to reflect the physical and regulatory environment during that time. This document is out of date and does not serve as an adequate policy document to guide transportation investment over the next 20 years. In addition, updates to local, region, and state policies and regulations have occurred since the TSP was adopted; the updated TSP will need to reflect and be consistent with up-to-date policies and requirements.

- The updated Oregon Highway Plan mobility policy (Policy 1F) embodies more flexibility for meeting mobility "targets" for state highways.
- Significant updates to the Oregon Bicycle and Pedestrian Plan[3] were adopted in 2016 and the Gladstone TSP update can benefit from new state policy.
- The Transportation Planning Rule has been updated since the last Gladstone TSP update.
- The Regional Transportation Plan and the Regional Transportation Functional Plan have been updated since the last Gladstone TSP update.
- The TSP update's Regulatory Review found in Table 5 and Table 6 in this memorandum assesses Gladstone's consistency with both State and regional documents and makes recommendations for policy and code language to ensure compliance.
- This TSP update will need to consider local Climate Smart Strategies that were adopted by Metro in 2014.
- There are a number of local plans that have been adopted subsequent to TSP adoption in 1995. For adopted plans that are not currently reflected in the TSP, policies, standards, and recommendations that have an impact on the transportation system will be considered for consistency as part of this TSP update. (See Table 4 in this memorandum.)

The TSP update, adopted as an element of the Comprehensive Plan, will reflect the physical and regulatory changes that have occurred since the document was last updated in 1995. The updated TSP will implement and be consistent with the State's TPR and Metro's RTFP, the overarching policy and regulatory documents for Gladstone's transportation system planning.

STATE PLANNING DOCUMENTS

OREGON TRANSPORTATION PLAN (1992, UPDATED 1999, 2006)

The Oregon Transportation Plan (OTP) is the state's long-range multimodal transportation plan that addresses the future transportation needs of the State of Oregon through the year 2030. The primary

---

[3] Oregon Bicycle and Pedestrian Plan https://www.oregon.gov/ODOT/TD/TP/Pages/bikepedplan.aspx

function of the OTP is to establish goals, policies, strategies and initiatives that are translated into a series of modal plans, such as the Oregon Highway Plan and Oregon Bike and Pedestrian Plan. The OTP considers all modes of Oregon's transportation system, including Oregon's airports, bicycle and pedestrian facilities, highways and roadways, pipelines, ports and waterway facilities, public transportation, and railroads. It assesses state, regional, and local public and private transportation facilities. In addition, the OTP provides the framework for prioritizing transportation improvements based on varied future revenue conditions, but it does not identify specific projects for development.

The OTP provides broad policy guidance and sets seven overarching goals for the state.[4] Through these goals and associated policies and strategies, the OTP emphasizes:

- Maintaining and maximizing the assets in place
- Optimizing the performance of the existing system through technology
- Integrating transportation, land use, economic development and the environment
- Integrating the transportation system across jurisdictions, ownerships and modes
- Creating sustainable funding
- Investing in strategic capacity enhancements

Applicability to Gladstone:

Consistent with OTP policy, the TSP update will seek to enhance integration of the transportation system across modes and maximize the performance of the existing transportation system by, for example, the use of technology and system management before considering larger and costlier additions to the system. The following OTP policies and strategies are considered particularly relevant to Gladstone's TSP update and transportation planning needs.

Policy 1.2 – Equity, Efficiency and Travel Choices –Promote a transportation system with multiple travel choices that are easy to use, reliable, cost-effective and accessible to all potential users, including the transportation disadvantaged.

> Strategy 1.2.1 – Develop and promote inter and intra-city public transportation by, for example, promoting frequent public transit as a method to increase ridership and decrease travel times, especially during peak travel periods and along heavily traveled highway corridors.

---

[4] The seven goals are Goal 1 – Mobility and Accessibility; Goal 2 – Management of the System; Goal 3 – Economic Vitality; Goal 5 – Sustainability; Goal 5 – Safety and Security; Goal 6 – Funding the Transportation System; Goal 7 – Coordination, Communication, and Cooperation, Oregon Transportation Plan pages 43-72.

Policy 2.1 – Capacity and Operational Efficiency – Manage the transportation system to improve its capacity and operational efficiency for the long term benefit of people and goods movement.

> Strategy 2.1.1 Promote transportation demand management and other transportation system operations techniques that reduce peak period travel and help shift traffic volumes away from the peak period and improve traffic flow.

Policy 3.2 – Moving People to Support Economic Vitality – Develop an integrated system of transportation facilities, services and information so that intrastate, interstate and international travelers can travel easily for business and recreation.

> Strategy 3.2.2 – In regional and local transportation system plans, support options for traveling to employment, services and businesses. These include, but are not limited to, driving, walking, bicycling, ride-sharing, public transportation and rail.

Policy 3.3 – Downtowns and Economic Development – Provide transportation improvements to support downtowns and to coordinate transportation and economic strategies.

> Strategy 3.3.1 – Coordinate private and public resources to provide transportation improvements and services to help stimulate active and vital downtowns, economic centers and main streets.

> Strategy 3.3.2 – Integrate transportation planning and investments with state and local economic development strategies and plans.

Policy 4.1 – Environmentally Responsible Transportation System –Provide a transportation system that is environmentally responsible and encourages conservation and protection of natural resources.

> Strategy 4.1.2 – Encourage the development and use of technologies that reduce greenhouse gases.

Policy 4.3 – Creating Communities – Increase access to goods and services and promote health by encouraging development of compact communities and neighborhoods that integrate residential, commercial and employment land uses to make shorter trips, transit, walking and bicycling feasible. Integrate features that support the use of transportation choices.

> Strategy 4.3.2 – Promote safe and convenient bicycling and walking networks in communities.

- Fill in missing gaps in sidewalk and bikeway networks, especially to important community destinations such as schools, shopping areas, parks, medical facilities, and transit facilities.
- Enhance walking, bicycling, and connections to public transit through appropriate community and main street design.
- Promote facility designs that encourage walking and biking.

1999 OREGON HIGHWAY PLAN (UPDATED 2011)

The Oregon Highway Plan (OHP) defines policies and investment strategies for Oregon's state highway system over the next 20 years by further refining the goals and policies of the OTP. The plan contains three elements: a vision element that describes the broad goal for how the highway system should look in 20 years; a policy element that contains goals, policies, and actions to be followed by state, regional, and local jurisdictions; and a system element that includes an analysis of needs, revenues, and performance measures. One of the key goals of the OHP is to maintain and improve safe and efficient movement of people and goods, while supporting statewide, regional, and local economic growth and community livability. This goal is implemented through policies and actions that guide management and investment decisions by:

- Defining a classification system for state highways;
- Setting standards for mobility;
- Employing access management techniques;
- Supporting intermodal connections;
- Encouraging public and private partnerships;
- Addressing the relationship between the highway and land development patterns; and,
- Recognizing the responsibility to maintain and enhance environmental and scenic resources.

Significant amendments to Policy 1F (which establishes mobility standards) of the OHP were adopted at the end of 2011. Those amendments were made to address concerns that state transportation policy and requirements have led to unintended consequences and inhibited economic development. Policy 1F now provides a clearer policy framework for considering measures other than volume-to-capacity (v/c) ratios for evaluating mobility performance. Also as part of these amendments, v/c ratios established in Policy 1F were changed from being standards to "targets." These targets are to be used to determine significant effect pursuant to Transportation Planning Rule, Section – 0060.

Policy 1G of the OHP requires maintaining performance and improving safety on the highway system by improving efficiency and management on the existing roadway network before adding capacity. The state's highest priority is to preserve the functionality of the existing highway system. Tools that could be employed to improve the function of the existing highways and interchanges in Gladstone include access management, transportation demand management, traffic operations modifications, and changes to local land use designations or development regulations.

After existing system preservation, the second priority is to make minor improvements to existing highway facilities, such as adding ramp signals, or making improvements to the local street network to minimize local trips in the state facility.

The third priority of Policy 1G is to make major roadway improvements such as adding lanes to increase capacity on existing roadways.

Applicability to Gladstone:

I-205 and OR 99E (McLoughlin Boulevard) are subject to the framework established in the OHP. I-205 is part of the National Highway System. Interstate Highways provide connections to major cities, regions of the state, and other states; a secondary function in urban areas is to provide connections for regional trips within the metropolitan area. I-205 is a major freight route where mobility is a priority. The States' management objective for I-205 is to provide for safe and efficient high-speed continuous-flow operation in urban and rural areas.

OR 99E is classified as a District Highway through Gladstone. The OHP definition is as follows:

> "District Highways are facilities of county-wide significance and function largely as county and city arterials or collectors. They provide connections and links between small urbanized areas, rural centers and urban hubs, and also serve local access and traffic. The management objective is to provide for safe and efficient, moderate to high-speed continuous-flow operation in rural areas reflecting the surrounding environment and moderate to low-speed operation in urban and urbanizing areas for traffic flow and for pedestrian and bicycle movements. Inside STAs, local access is a priority. Inside Urban Business Areas, mobility is balanced with local access."[5]

Per the updated mobility targets in Policy 1F, the state mobility ratio targets applicable to the state highway system in Gladstone are shown in the Table 1.[6] The targets are based on Metro design type designations established in the 2040 Growth Concept and apply to forecasted condition. If forecasted conditions exceed mobility ratio targets, then Policy 1G prioritizes the tools used for preserving the functionality of the highway system. A description of the 2040 Growth Concept is provided in the Regional Planning Documents section of this memo.

---

[5] OHP Goal 1, 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. There are currently no special highway segment designations within Gladstone, but the merits of such a designation may be explored during the TSP update process.

[6] Also Table 3.08-2 in the Regional Transportation Functional Plan.

Table 1: Volume to Capacity Ratio Targets for State Highways within the Portland Metropolitan Region

VOLUME TO CAPACITY RATIO TARGETS FOR STATE HIGHWAYS INSIDE METRO		
Location	Forecasted Condition Target	
	1st hour	**2nd hour**
Main Streets	1.1	.99
Corridors Employment Areas Neighborhoods	.99	.99
OR 99E (from Lincoln Street to OR 224 interchange)	1.1	.99
I-205	.99	.99

THE OREGON BICYCLE AND PEDESTRIAN PLAN (2016)

The intent of the Oregon Bicycle and Pedestrian Plan (OBPP) is to create a policy foundation that supports decision-making for walking and biking investments, strategies, and programs that help to develop an interconnected, robust, efficient, and safe transportation system. The OBPP establishes the role of walking and biking as essential modes of travel within the context of the entire transportation system, and recognizes the benefit to the people and places in Oregon.

The OBPP provides direction for what needs to be achieved, including 20 policies and associated strategies designed to help develop, sustain, and improve walking and biking networks. It identifies nine goals based upon the broader goals of the OTP that reflect statewide values and desired accomplishments relating to walking and biking:

- Goal 1: Safety
- Goal 2: Accessibility and Connectivity
- Goal 3: Mobility and Efficiency
- Goal 4: Community and Economic Vitality
- Goal 5: Equity
- Goal 6: Health
- Goal 7: Sustainability
- Goal 8: Strategic Investment
- Goal 9: Coordination, Cooperation, and Collaboration

The OBPP also provides background information, including relevant state and federal laws, funding opportunities, and implementation strategies proposed by ODOT to improve bicycle and pedestrian transportation. It outlines the role that local jurisdictions in the implementation of the Plan, including the development of local pedestrian and bicycle plans as stand-alone documents or within TSPs.

Applicability to Gladstone:

The policies and design guidance provided in the OBPP apply to state highway facilities in Gladstone, which include:

- I-205 (including multi-use path)
- OR 99E (McLoughlin Boulevard)

Policy and design guidance should also be considered in the TSP's local street standards and the bicycle and pedestrian system components. In addition, the bicycle and pedestrian system components of the local TSP should reflect the goals, policies, and strategies for implementation identified in the OBPP. Gladstone should work with adjacent local jurisdictions as well as regional and state agencies to help identify gaps in the regional walking and biking network and prioritize projects.

OREGON RESILIENCE PLAN (2013)

The Oregon Resilience Plan provides policy guidance and recommendations to protect lives and keep commerce flowing during and after a Cascadia earthquake and tsunami. The current seismic integrity of Oregon's multi-modal transportation – including bridges and highways, rail, airports, water ports, and public transit systems – is assessed in the plan. For transportation facilities, the study recommends prioritization of seismic lifeline routes according to tiers with associated resilience targets. The report also identifies seismic vulnerabilities of critical facilities and resources and recommends options to improve transportation facility resiliency.

Applicability to Gladstone:

I-205 in Gladstone is identified as part of the "Tier 1" transportation backbone system that allows access to all vulnerable regions, major population centers, and areas considered vital for rescue and recovery operations.[7] Resiliency targets for Tier 1 Routes are to restore minimum level of service within 1-3 days, a functional level of service within 3-7 days, and restore the facilities to 90% capacity within 1-4 weeks (see Table 2). Tier 1 Routes are considered high priority for resiliency and should be made resilient within 10 years in preparation for a catastrophic event.[8]

---

[7] See Figure 5.23 –Map of Seismic Options Program: Tier 1 Routes http://www.oregon.gov/OMD/OEM/osspac/docs/Oregon_Resilience_Plan_Final.pdf. This system was developed through an "interdependency effort" to select a multimodal transportation system that would provide the highest level of mobility to the largest area or to the highest population centers for the least cost.

[8] Oregon Resilience Plan: http://www.oregon.gov/OMD/OEM/osspac/docs/Oregon_Resilience_Plan_Final.pdf

Table 2: Regional Transportation Performance Targets

Infrastructure Facilities	Event Occurs	0-24 Hours	1-3 Days	3-7 Days	1-4 Weeks	1-3 Months	3-6 Months	6-12 Months	1-3 Years	3+ Years
Oregon State Highway System										
State Highway Systems – Tier 1 SLR (I-205)			R	Y	G			S	X	
Roadways			R	Y	G		X			
Bridges			R	Y	G		S	X		
Landslides			R	Y	G			S	X	
State Highway Systems – Other Routes					R		Y	G	S	X
Roadways					R		Y	G	X	
Bridges					R		Y	G	S	X
Landslides					R		Y	G	S	X
Minimal: (A minimum level of service is restored, primarily for the use of emergency responders, repair crews, and vehicles transporting food and other critical supplies.)										R
Functional: (Although service is not yet restored to full capacity, it is sufficient to get the economy moving again— e.g. some truck/freight traffic can be accommodated. There may be fewer lanes in use, some weight restrictions, and lower speed limits.)										Y
Operational: (Restoration is up to 90% of capacity: A full level of service has been restored and is sufficient to allow people to commute to school and to work.)										G
ESTIMATED TIME FOR RECOVERY TO 60% OPERATIONAL GIVEN CURRENT CONDITIONS:										S
ESTIMATED TIME FOR RECOVERY TO 90% OPERATIONAL GIVEN CURRENT CONDITIONS:										X

ODOT HIGHWAY DESIGN MANUAL

The Highway Design Manual[9] (HDM) provides uniform standards and procedures for ODOT and is used for all projects that are located on state highways. The HDM 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 also includes standards for bike and ped facilities as well as street trees based on factors such as posted speed. Design standards for state highways are dependent on the highway's functional classification and the project type. Chapter 6 addresses urban highway design (non-freeway), applicable to the state highways in the City of Gladstone.

---

[9] ODOT Highway Design Manual: http://www.oregon.gov/odot/hwy/engservices/pages/hwy_manuals.aspx

Applicability to Gladstone:

The HDM will be consulted for .all projects on state highways in Gladstone to determine design requirements, including the maximum allowable v/c ratios for use in the design of highway projects. The Gladstone TSP may include design standards that vary from the HDM. A design exception process will be necessary to gain ODOT approval of standards that vary from the HDM.

ACCESS MANAGEMENT RULES (OAR 734-051)

OAR 734-051 governs the permitting, management, and standards of approaches to state highways to ensure safe and efficient operation of the state highways. ODOT has adopted the rules to establish procedures and criteria to govern highway approaches, access control, spacing standards, medians, and restriction of turning movements in compliance with statewide planning goals, in a manner compatible with acknowledged comprehensive plans and consistent with state law and the OTP. Any new street or driveway connections, as well as any changes to existing street or driveway connections, to state roads within the TSP study boundary must be in compliance with these rules by ODOT.

Applicability to Gladstone:

State highways in Gladstone are subject to the rules in OAR 734-051; those facilities are I-205 and OR 99E. Access management spacing standards for state highways vary depending on the classification of the highway, posted speed, average annual daily traffic (AADT) volumes, and a number of other variables. Appendix C of the OHP contains access management standards; Tables 12-20 in Appendix C establish the applicable access spacing standards for the various categories of highway facilities. Gladstone's updated TSP will articulate policy support for requiring future development to adhere to access management spacing standards for private and public approaches on statewide highways, as required by the Oregon Highway Plan and OAR 734-051.

TRANSPORTATION PLANNING RULE

Transportation System Planning in Oregon is required by state law as one of the 19 statewide planning goals (Goal 12 - Transportation). The Transportation Planning Rule (TPR), OAR Division 12, defines how to implement Goal 12. The TPR applies at the state, regional, and local level. The TPR requires:

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

The overall purpose of the TPR is to provide and encourage a safe, convenient, and economical transportation system. The rule also implements provisions of other statewide planning goals related to transportation planning in order to plan and develop transportation facilities and services in close coordination with urban and rural development.[10] The TPR directs TSPs to integrate comprehensive land use planning with transportation needs and to promote multi-modal systems that make it more convenient for people to walk, bicycle, use transit and drive less.

The TPR also requires local governments to adopt land use regulations consistent with state and federal requirements "to protect transportation facilities, corridors and sites for their identified functions (OAR 660-012-0045(2))." This policy is achieved through a variety of measures, including:

- Standards to protect future operations of roads;
- A process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites;
- A process to apply conditions to development proposals to minimize impacts and protect transportation facilities, corridors or sites;
- Regulations to provide notice to ODOT of land use applications that require public hearings, involve land divisions, or affect private access to roads; and,
- Regulations assuring that amendments to land use designations, densities and design standards are consistent with the functions, capacities and performance standards of facilities identified in the TSP. (See OAR 660-012-0060.)

Applicability to Gladstone:

Gladstone's TSP and land use regulations must be consistent with the current TPR, which was amended most recently in January 2012. Table 6**Error! Reference source not found.** includes summary comments from a detailed assessment of Gladstone's Municipal Code Title 17, Zoning and Development, for compliance with the TPR. These recommendations will help to ensure that the updated Gladstone TSP and Zoning and Development Code are consistent with applicable requirements established by the TPR. The updated TSP will be adopted as part of the Gladstone Comprehensive Plan.

2015-2018 STATE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)

The Statewide Transportation Improvement Program (STIP) is Oregon's four-year transportation capital improvement program that identifies funding for, and scheduling of, transportation projects and programs. It includes projects on the federal, state, city, and county transportation systems; multimodal projects (highway, passenger rail, freight, public transit, bicycle, and pedestrian); and, projects in the National Parks, National Forests and Native American tribal lands. Oregon's STIP covers a four-year

---

[10] Transportation Planning Rule, Section 660-012-0000

construction period, but is updated every two years in accordance with federal requirements. The program currently approved is the 2015-2018 STIP.[11]

Applicability to Gladstone:

Within the City of Gladstone, the following projects are listed in the 2015-2018 STIP:

- Trolley Trail Bridge: Gladstone to Oregon City: Feasibility study of rehabilitating the Portland Avenue Historic Trolley Bridge as an extension of the Trolley Trail a shared-use path for bicyclists and pedestrians, Key 19278, $224,999

REGIONAL PLANNING DOCUMENTS

METRO REGIONAL FRAMEWORK PLAN

The Regional Framework Plan unites all of Metro's adopted land use planning policies and requirements. The plan addresses the following subjects:

- Management and amendment of the Urban Growth Boundary (UGB)
- Protection of lands outside the UGB for natural resource use and conservation, future urban expansion or other uses
- Urban design and settlement patterns
- Housing densities
- Transportation and mass transit systems
- Parks, open spaces and recreational facilities
- Water sources and storage
- Jurisdictional coordination
- Planning responsibilities mandated by state law
- Other issues of metropolitan concern

This document brings together these elements with previous regional policies, including the Regional Urban Growth Goals and Objectives, 2040 Growth Concept, Metropolitan Greenspaces Master Plan and Regional Transportation Plan to create a coordinated, integrated Regional Framework Plan.

---

[11] ftp://ftp.odot.state.or.us/outgoing/STIP/OnlineSTIP_Public.pdf

Applicability to Gladstone:

The Regional Framework Plan applies to areas within the Metro regional boundary and is implemented locally through the other Metro documents discussed below, which have more specific applicability to Gladstone.

2040 GROWTH CONCEPT

In 1995, the Portland region adopted the 2040 Growth Concept, a long-range plan for managing growth. It is the unifying concept around which the Metro Regional Framework Plan is based. The 2040 Growth Concept contains a series of land-use building blocks for the region, called 2040 Design Types, arranged in a hierarchy that serves as a framework for prioritizing Regional Transportation Plan (RTP) investments and supports the UGB assumptions. From a transportation perspective, the 2040 Growth Concept aims to provide the best overall performance at the lowest cost of all alternative concepts evaluated. Metro's RTP incorporates the goals of the 2040 Growth Concept.

Applicability to Gladstone:

Specific Design Type designations from the 2040 Growth Concept that apply in Gladstone include: Town Centers, Main Streets, Corridors, Employment Lands, Neighborhoods, and Parks and Natural Areas. Figure 1 shows the location of these Design Types. The specific actions required by cities to implement these design types are established in Title 6 of the Urban Growth Management Functional Plan, which is described below.

Figure 1 Gladstone 2040 Growth Concept Design Types

URBAN GROWTH MANAGEMENT FUNCTIONAL PLAN (UGMFP)

Metro's Urban Growth Management Functional Plan (UGMFP) contains the regional policies recommended and/or required for city and county comprehensive plans and implementing ordinances. The purpose of the functional plan is to implement regional goals and objectives adopted by the Metro Council as the Regional Urban Growth Goals and Objectives (RUGGO), including the Metro 2040 Growth Concept and the Regional Framework Plan.

Applicability to Gladstone:

The UGMFP includes a wide variety of requirements that are being addressed in the City's Comprehensive Plan update. The TSP must be coordinated with all elements of the UGMFP, which are too numerous to be listed here. Key provisions include:

Title 1	Requirements for Housing and Employment Accommodation – coordination of the population and employment assumption used for the TSP.
Title 4	Industrial and Other Employment Areas – Protects the capacity and efficiency of the transportation system for movement of goods and services.
Title 6	Centers, Corridors, Station Communities and Main Streets – Relevant to the Gladstone TSP, Title 6 requires: adoption of a boundary for the Town Centers; analysis of regulatory barriers to mixed use, transit-supportive and pedestrian-friendly development; examination of incentives for mixed use, transit-supportive and pedestrian-friendly development; a plan to achieve the non-Single Occupancy Vehicle mode share targets; and a parking management program for Town Centers and Main Streets. Note: several of the above-listed Title 6 requirements are factors for making the City “eligible for the automatic 30 percent trip reduction credit” during the TSP’s transportation analysis in the Town Centers. The details of this provision should be explored more fully as the TSP progresses.[12]

2014 REGIONAL TRANSPORTATION PLAN AND REGIONAL TRANSPORTATION FUNCTIONAL PLAN

The Regional Transportation Plan (RTP) provides the long-range blueprint for transportation in the Portland metro region and presents the overarching policies and goals, system concepts for all modes of travel, and strategies for funding and local implementation. The RTP has been shaped by the following desired outcomes for the region:

- Promote jobs and create wealth in the economy
- Reduce greenhouse gas emissions
- Improve safety throughout the transportation system
- Promote healthy, active living by making walking and bicycling safe and convenient
- Move freight reliably and make transportation accessible, affordable, and reliable for commuting and everyday life
- Promote vibrant communities while preserving farm and forest land

The RTP was updated in 2014; this was a limited update[13] and included the following:

---

[12] Transportation and Land Use Implementation Guidance for the Portland Metropolitan Region, A handbook for local implementation of the Regional Transportation Plan and the Urban Growth Management Functional Plan, Metro, October 2011, see pages 14-18 for full description of Title 6 requirements.

[13] A major focus of the 2014 update was on meeting Federal Clean Air requirements and incorporating select regional initiatives, including the Regional Active Transportation Plan and Regional Safety Plan. The next RTP update, which is

- Updated Arterial and Throughway policies and design concepts, primarily intended to incorporate more active transportation (walking and biking) elements
- Added an integrated active transportation concept with ten guiding principles
- Updated Pedestrian and Bicycle policies and concepts
- Updated and added Regional Bicycle and Pedestrian Functional Classifications
- Added new design guidelines for pedestrian and bicycle facilities
- Updated project list

The RTP establishes performance targets for safety, congestion, freight reliability, climate change, active transportation, sidewalk/trail/transit infrastructure, clean air, travel, affordability, and access to daily needs (see Table 3). RTP performance targets will be used to inform project goals and objectives as well as project evaluation criteria as part of this TSP update process (see Tech Memo 2).

Table 3: Regional Transportation Performance Targets

Objective	Target by 2040
Safety	Reduce the number of fatal and severe injury crashes for pedestrians, bicyclists, and motor vehicle occupants each by 50% compared to 2007 - 2011 average.
Congestion	Reduce vehicle hours of delay (VHD) per person by 10 percent compared to 2010.
Freight reliability	Reduce vehicle hours of delay per truck trip by 10 percent compared to 2010.
Climate change	Reduce transportation-related greenhouse gas emissions per capita below 2010 levels.
Active transportation	Triple walking, biking and transit mode shares compared to 2010 modeled mode shares.
Basic infrastructure	Increase by 50% the miles of sidewalk, bikeways, and trails compared to the regional networks in 2010.
Clean air	Ensure zero percent population exposure to at-risk levels of air pollution.
Travel	Reduce vehicle miles traveled per person by 10 percent compared to 2010.
Affordability	Reduce the average household combined cost of housing and transportation by 25 percent compared to 2010.
Access to daily needs	Increase by 50 percent the number of essential destinations accessible within 30 minutes by bicycling and public transit for low-income, minority, senior and disabled populations compared to 2005.

The Regional Transportation Functional Plan (RTFP) directs how jurisdictions should implement the RTP through their TSP and other land use regulations. The RTFP establishes requirements for local plans in

---

required to be adopted by 2018, is expected to be a more expansive effort that involves broader public discussion of plan policies and projects.

order to be consistent with the RTP.[14] The RTFP provides guidance on several areas including transportation design for various modal facilities, contents of 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 RTP along with local needs.
- Ensure local needs are consistent with the RTP in terms of land use, system maps, and non-SOV modal targets.
- When developing solutions, consider a variety of strategies in the following order:
    - TSMO (Transportation System Management Operations)
    - Transit, bicycle, and pedestrian projects
    - Traffic calming
    - Land use strategies in OAR 660-012-0035(2)[15]
    - Connectivity, including pedestrian and bicycle facilities
    - Motor vehicle capacity projects
- Ensure parking regulations are consistent with the RTFP.

In addition, the RTFP clarifies that local jurisdictions can propose alternate performance and mobility standards if these changes are consistent with regional and statewide planning goals and can propose regional projects as part of the RTP update process.

The requirements of the RTFP have not been updated to reflect the 2014 RTP. However, Metro is expecting local TSPs that will be updated and adopted prior to 2018 (and the completion of the next RTP update) to reflect the 2014 RTP.

Applicability to Gladstone:

The updated Gladstone TSP's outcomes and recommendations will need to be consistent with goals, policies, and performance targets in the RTP. The plan update will be guided by the more specific implementation measures outlined in the RTFP. In addition, because the 2014 RTP updates are not reflected in the current RTFP, the planning process will need to consider the updated RTP elements and ensure they are reflected by the TSP. Metro has provided guidance on how TSPs can ensure consistency with the 2014 RTP, generally through new and revised local policy language and code amendments. Table

---

[14] The RTFP was not updated to reflect recent changes in the 2014 RTP. This does not impact local requirements specified in the RTFP, but has resulted in some discrepancies between the RTFP checklist – included as Table 5 in this memo and which references the previous 2035 RTP - and the 2014 RTP.

[15] 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.

5 includes a detailed assessment of Gladstone's consistency with the RTFP. This assessment will include specific recommendations regarding plan and code amendments needed to align the Gladstone TSP and code with the RTFP.

METRO CLIMATE SMART STRATEGY

The Metro Council adopted the Climate Smart Strategy in December 2014 to respond to a state mandate[16] to reduce per capita greenhouse gas emissions from cars and small trucks by 2035. The strategy affirms and reflects the region's shared commitment to provide more transportation choices, keep air clean, build healthy and equitable communities and grow the economy, while at the same time reducing greenhouse gas emissions. The Climate Smart Strategy is built around ten policy areas. Policy area focus includes making transit convenient, frequent, accessible and affordable; making biking and walking safe and convenient; and, making streets and highways safe, reliable and connected. The strategy also includes a "toolbox" that lists supporting actions that can be taken by the state, Metro, cities, counties, and public agencies in the next five years to begin implementation and performance targets for progress monitoring.[17]

Applicability to Gladstone:

The TSP process provides the City an opportunity to review the strategy's Toolbox of Possible Actions, to confirm actions that continue to be supported by the City's TSP and consider potential new actions that can be adopted locally to support regional goals.

REGIONAL HIGH CAPACITY TRANSIT SYSTEM PLAN, 2035 SUMMARY REPORT

The Regional High Capacity Transit (HCT) System Plan is a component of the Regional Transportation Plan. The Regional HCT System Plan is designed to focus on the frequent, fast, and high capacity element of the public transit system (other transit system functions, including local bus, paratransit, streetcar, and frequent bus are included in the RTP). High capacity transit is characterized by exclusive right of way and routes with fewer stops.

---

[16] House Bill 2001, adopted by the 2009 Legislature, directed the Land Conservation and Development Commission (LCDC) to adopt administrative rules to guide Metro and local governments in the Portland metropolitan area in the selection and implementation of a land use and transportation scenario that meets the greenhouse gas (GHG) reduction target adopted by LCDC in May 2011. Metro and Central Lane MPO are the only two Oregon MPOs required by the State to undertake scenario planning work; other MPOs in the State may voluntarily undertake a "Strategic Assessment" to evaluate what the metropolitan area may look like in the future given the area's adopted plans. See http://www.oregon.gov/ODOT/TD/OSTI/Pages/scenario_planning.aspx.

[17] http://www.oregonmetro.gov/sites/default/files/CSC_toolbox-actions2014_12_09.pdf Note that these are short-term actions; medium and longer-term actions will be identified during the next update to the Regional Transportation Plan, scheduled for 2016-18.

The Regional HCT System Plan is not intended as a review of the regional transit structure or its management, or a complete service analysis of the existing HCT system. Rather, the plan aligns HCT project advancement in a way that supports and enhances the goals of the RTP and regional 2040 Growth Concept.

Applicability to Gladstone:

The following high capacity transit corridors that go through Gladstone are identified in the HCT System Plan: [18]

- Corridor 8: Clackamas Town Center to Oregon City Transit Center in the vicinity of the I-205 corridor.
- Corridor 9: Milwaukie to Oregon City Transit Center in the vicinity of McLoughlin corridor (extension)
- Corridor 28: Washington Square Transit Center to Clackamas Town Center in the vicinity of the railroad right-of-way.

The corridors are identified as a “Next phase” regional priority corridor, defined as “corridors where future HCT investment may be viable if recommended planning and policy actions are implemented.” [19] The corridors are mapped and described at a generalized level. The location of the alignment is to be decided through a corridor refinement plan and/or alternatives analysis, and through a series of local and regional actions.[20] Potential local actions described in the plan include: developing a corridor problem statement; defining the corridor extent; assessing the corridor against system expansion targets; and creating land use/TOD plans for centers and stations.

METRO NON-SINGLE OCCUPANCY VEHICLE (SOV) TARGET ACTIONS STUDY

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 Gladstone:[21]

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

---

[18] Figure 2.12, 2014 Regional Transportation Plan

[19] Regional High Capacity Transit System Plan, 2035, Summary Report, Metro, June 2010, page 23.

[20] Regional HCT Plan, see 22-30.

[21] Also RTFP Table 3.08-1 Regional Non-SOV Modal Targets.

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 following summarizes the non-SOV strategy requirements for local jurisdictions to implement:[22]

- 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.

Applicability to Gladstone:

In addition to the requirements listed above, the Gladstone TSP must also consider the following regional strategies:[23]

- 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 Framework Plan[24] 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

---

[22] From Metro's 2005 non-SOV Target Actions Study, Evaluation of Potential Measures for Achieving Modal Targets.

[23] From Metro's 2005 non-SOV Target Actions Study, Evaluation of Potential Measures for Achieving Modal Targets.

[24] See summary of the Urban Growth Management Functional Plan (UGMFP) in this memorandum.

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.

METRO 2014 REGIONAL TRAILS AND GREENWAYS

The Regional Trails and Greenways plan is Metro's long range vision for a system of interconnected trails and greenways spanning the 25-city, three-county region and beyond. The plan is updated regularly and describes trails/greenways that are existing, planned or proposed. Planned trails are those that have already gone through significant planning processes; they have exact alignments and are ready to be designed, permitted and built. Proposed trails are more conceptual and still need a master planning process in order to determine alignments and design. Overall, the plan calls for a 1,000-mile network of regional trails. As of 2014, about 35% percent of those trails are complete.

Metro's Regional Trails and Greenways Plan is contained in two documents: the Regional Trails and Greenways publication (2014)[25] and the Regional Trails and Greenways Map (2014)[26]

The Regional Trail System map is shown in Figure 2.

---

[25] www.oregonmetro.gov/sites/default/files/2014%20Regional%20Trails%20and%20Greenways%20publication.pdf

[26] http://www.oregonmetro.gov/sites/default/files/2014_regional_trails_and_greenways_map.pdf

Figure 2 Metro Regional Trails and Greenways

Applicability to Gladstone:

The following proposed trails in the Metro Regional Trails and Greenways plan are relevant to the Gladstone TSP update and will be reflected in the updated plan document:

- Trail 10, Clackamas River Greenway: Accessed via a number of parks including Barton Park and Milo McIver State Park, the greenway also features a paved trail along the banks of the lower Clackamas River, with a bridge connecting Gladstone to Oregon City (15 miles)
- Trail 27, I-205 Trail (NEAR COMPLETION): Runs parallel to the I-205 freeway, connecting the Columbia River at Vancouver to the Clackamas River at Gladstone. Owned and maintained by ODOT, the trail is proposed to continue south to West Linn and Tualatin (26 miles).
- Trail 58, Trolley Trail: Connects Milwaukie to Gladstone along a former streetcar line (7 miles).

TRIMET SOUTHEAST SERVICE ENHANCEMENT PLAN: REFINED DRAFT VISION FOR FUTURE SERVICE (2015)

The Draft Southeast Service Enhancement Plan outlines a future vision for improving bus service, bus stops, and street crossings in the communities of Southeast Portland (generally south of Division Street), Estacada, Gladstone, Happy Valley, Milwaukie, Oregon City, and unincorporated urban Clackamas County. The plan proposes future changes to bus service that would improve access to jobs, education, healthcare, affordable housing, and essential services, help fill gaps in transit coverage, and help serve future population growth.

The Refined Draft Vision reflects the feedback received from riders and community members, including a desire for more hours of service on existing lines and opportunities for partnering with local cities, counties, and ODOT to identify and implement investments to improve service and reduce delay.

Applicability to Gladstone:

The draft vision identifies several opportunities for enhancement that are relevant to Gladstone:

- Increased coverage of Line 99 between Milwaukie and Downtown Portland
- New east-west service on SE Jennings Avenue between Oregon City and Happy Valley
- New service on Webster Road, Oatfield Road, E Dartmouth Street, E Arlington Street, and McLoughlin Boulevard between the Clackamas Transit Center and Oregon City
- Increased weekday frequency and hours of operation for Line 32 between Clackamas Community College and Milwaukie
- Increased frequency and route changes for Line 79 to serve SE 82nd Drive and SE Washington Street between the Clackamas Transit Center and Oregon City Transit Center

The proposed enhancement opportunities listed above will be considered in updating the Gladstone TSP's Public Transportation Plan Element.[27] The TSP update process will also evaluate projects that support transit service enhancements, including identifying connections and projects that improve pedestrian access to transit.

---

[27] Note that these projects are not part of a plan that has been adopted, nor are they programmed into the current Transit Investment Priorities (TIP) document for fiscal year 2017 (July 2016 - June 2017). The TIP lays out TriMet's strategies and programs to meet regional transportation and livability goals through focused investments in service, capital projects, and customer information. The TIP is a rolling five-year plan that is updated annually.

TRIMET COORDINATED TRANSPORTATION PLAN FOR ELDERLY AND PEOPLE WITH DISABILITIES (UPDATED 2012)

This plan, first drafted by TriMet in 2006, describes TriMet's vision for a transit system that will "provide a full range of options for elders and people with disabilities, foster independent and productive lives, strengthen community connections, and strive for continual improvement of services through coordination, innovation, and community involvement."[28] The plan describes existing services, establishes guidelines for service, identifies gaps in service, and outlines strategies that will be used to fill those gaps and increase service where it is needed. Those strategies include:

- Maintain existing services and programs
- Expand or establish new services and programs
- Encourage use of fixed route transit service
- Enhance pedestrian access and implement land use improvements
- Promote coordination among service providers
- Improved information and outreach

Applicability to Gladstone:

The plan identifies Gladstone as a high-frequency and local TriMet service area and notes that there are gaps where service in Gladstone does not meet the guidelines (plan Figure 3-2). Specifically, weekday and weekend services for two categories of users fall short of meeting the guidelines: users who are not ADA (Americans with Disabilities Act) eligible but have some difficulty accessing transit and users who need significant assistance to use transit. The strategies identified in this plan will be considered in identifying transit-related projects and policies for the updated TSP.

LOCAL PLANNING DOCUMENTS

There are a number of local planning documents that contain policies and regulations that are relevant to the Gladstone TSP update. Generally, the TSP update will need to ensure that the policies, projects and design elements contained within these local documents are considered in the development of the new TSP and, where appropriate, reflected or included in the TSP so that there are not any inconsistencies between adopted plans. This is particularly true for local documents that were adopted subsequent to the last TSP update.

Table 4 below provides a list of local planning documents that were reviewed and indicates how each is relevant to the TSP update, using five general categories with the following column headings:

---

[28] https://trimet.org/pdfs/publications/elderly-and-disabled-plan.pdf

- Policies: Indicates that the document contains policies that will need to be reflected in the TSP update.
- Design standards: Indicates that the document includes design standards for transportation facilities (street cross sections, for example).
- Active transportation & connectivity: Indicates that the document contains policies and/or standards relating to active transportation and connectivity (biking, walking and transit policies primarily).
- Project list: Indicates that the document includes a list of specific planned projects that will need to be incorporated into the updated TSP project list.
- Zoning and Development: Indicates that amendments/updates to the Title 17, Zoning and Development, of the Gladstone Municipal Code may be necessary as part of the TSP update to ensure consistency with the document.

Note that all documents included in the table have some relevancy to the TSP update and should be considered in this process, but not all documents listed have been legislatively adopted. The “Comments” column provides a brief explanation of relevancy to the TSP planning process.

Table 4: Local Planning Documents

Local Plans and Regulations	Policy	Design Standards	Active Transp./ Connectivity	Project List	Land Use Requirements	Comments
Public Works Design & Construction Standards (available 2017)		x				The TSP update planning process will ensure that the transportation-related design standards will be consistent between the policy document (TSP) and the public works construction standards document.
Clackamas County TSP	x	x	x	x	x	Review all policy, standards, and projects.
Clackamas County Active Transportation Plan (2015)	x		x	x		Gladstone is part of the Milwaukie to Oregon City north-south active transportation corridor, the 6-mile Trolley Trail connecting Milwaukie to Gladstone is an identified Active Transportation Plan (ATP) Route (Route C-23), and the plan identifies improvements to the Clackamas Town Center to Gladstone (I-205) Multi-use Path (Table 7).
Clackamas County Capital Improvement Plan (CIP)				x		Check latest list for projects and costs.
Oregon City Transportation System Plan (2013)	x		x	x		Ensure consistency with this neighboring jurisdiction's plan, including descriptions, policies and projects pertaining to the I-205 Multi-use Path and the two bridges highway bridges (Clackamas River Bridge and the John McLoughlin/OR 99 Bridge).
Gladstone Comprehensive Plan (1979), including Goal 5 amendments (2011)	x	x	x	x		Consider adopted Goals and Policies, specifically those under the Transportation element. The identified Goal 5 resources will be considered in the evaluation of alternatives phase of the TSP update.
Gladstone TSP 1995	x	x	x	x	x	Review and revise as necessary.

Local Plans and Regulations	Policy	Design Standards	Active Transp./ Connectivity	Project List	Land Use Requirements	Comments
Gladstone Municipal Code Title 17 (Zoning and Development Code)		x	x		x	To be revised for consistency with the recommendations in the updated TSP, the Transportation Planning Rule, and the Regional Transportation Plan/Transportation Functional Plan.
Traffic Control Devices Review (2016)				x		
Gladstone Downtown Revitalization Plan (ongoing)	x	x	x	x	x	The recommendations of the Downtown Revitalization Plan, scheduled to be completed in Spring 2016, will be incorporated into the draft TSP. This planning project is informed by the Portland Avenue Streetscape Design (2008), the Gladstone Downtown Retail Market Analysis (2007) and the Gladstone Downtown Parking Plan (2006).

TPR AND RTFP COMPLIANCE

The evaluation of Gladstone's land use regulations will help guide the Gladstone TSP process by highlighting potential gaps in adopted local transportation policy, standards, and development requirements that may need to be addressed to ensure compliance with state and regional requirements.

OVERVIEW

Transportation system planning in Oregon is required by state law as one of the statewide planning goals (Goal 12 – Transportation). As mentioned above, the TPR, OAR 660 Division 12, defines how to implement Goal 12 as it applies to planning at the state, regional, and local level. The TPR requires counties and cities to prepare local TSPs that are consistent with the Oregon Transportation Plan and Regional Transportation Plan (RTP).

Summary of Recommendations:

The outcome of this planning project will be a full update and replacement of the existing Gladstone TSP. While being undertaken to meet local goals and objectives, the resulting TSP document will also need to be consistent with the RTP and meet the requirements of, or suggest modification to, the RTFP. To provide assistance to local governments, Metro has provided an RTFP checklist; Table 5 includes the checklist items and indicates the location of required RTFP elements within the current Gladstone Municipal Code (GMC) Title 17 Zoning and Development. In limited instances checklist items are identified in other policy document, such as access management in the Comprehensive Plan and RTP. Table 6 identifies a few recommendations that are related to TPR compliance; TPR compliance recommendations are limited to addressing state requirements that are not explicitly captured in the RTFP.

The evaluation shows the Title 17 does not fully reflect the requirements of the TPR and RTFP. This is expected since TPR and RTFP requirements have been updated more recently than Gladstone's last TSP update. Similarly, and discussed elsewhere, recommendations from recent planning efforts such as the Portland Avenue Streetscape Design or the Downtown Parking Plan have not been incorporated into the GMC. Recommendations identified in Table 5 and Table 6 would bring the GMC in compliance with the RTFP and incorporate some of the recommendations from recent planning efforts.

Table 5: Compliance of the Gladstone Municipal Code (Title 17 Zoning and Development) with the RTFP

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
Allow complete street designs consistent with regional street design policies **(Title 1, Street System Design Sec 3.08.110A(1))**	In Metro's Creating Livable Streets: Street Design Guidelines for 2040, regional streets are defined as major and minor arterial streets and some collectors of regional significance. Regional street design concepts are intended to serve all modes of travel in a manner that supports the needs of the 2040 design types. Chapter 17.50 Vehicular and Pedestrian Circulation, Section 17.50.040 Street and road standards. Subsection (1) provides a table with ROW and Roadway width standards according to street classification. Sidewalks are required on all public streets per subsection (15), however sidewalk design standards are not currently provided. **Recommendation:** Existing street design standards do not provide specific standards for sidewalk or bicycle facilities (i.e. cross-sections). Consider modifying 17.50.040 to include or refer to street design standards in the updated TSP. *Note that the City expects updated street standards to include both "default" standards for new development as well as constrained street sections associated with redevelopment and existing street improvements.*
Allow green street designs consistent with federal regulations for stream protection **(Title 1, Street System Design Sec 3.08.110A(2))**	A key component of green street design is the integration of storm water management and treatment within the right of way. Characteristics of green street system design include maximizing tree canopy coverage and bio filtration (swales). With regards to stream crossings or other sensitive area, "green" streets are located and designed to ensure the least impact on its surroundings. Chapter 17.46 Landscaping, Section 17.46.020 Standards includes street tree and landscaping standards for parking and loading areas. Chapter 17.50 Vehicular and Pedestrian Circulation, Section 17.50.020 Vehicular and pedestrian circulation generally. Pedestrian circulation standards in subsection (6) require a form of separation between a path and auto travel lane. Landscaping features is one of the features mentioned that meets the requirement, but is not

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
	required. Section 17.50.040 Street and road standards. Subsection (1) provides a table with ROW and Roadway width standards according to street classification. "Green street" features are not addressed. Section 17.56 Drainage. This chapter includes development standards applicable to new development or redevelopment that meet specific impervious surface criteria. Standards ensure the proper drainage of surface water on-site. The chapter does not currently include provisions or standards allowing for storm water management within the right-of-way. **Recommendation:** Existing standards do not address green street designs such as in-street storm water facilities. Consider modifying 17.50.40 or 17.56 to include or refer to street design standards that include green street design standards. *Note that the City is currently working on modifying the City's Design and Construction Standards. Green streets are expected to be included in the street or storm water portion of those standards.*
Allow transit-supportive street designs that facilitate existing and planned transit service pursuant 3.08.120B **(Title 1, Street System Design Sec 3.08.110A(3))**	Transit-supportive street design attributes include streets and buildings that encourage pedestrian movement, streets that can accommodate 40-foot buses, and safe, direct and convenient pedestrian and bicycle access within communities and to transit stops (see 2014 RTP p. 2-44). The TSP update will be revising the City's transit system map to ensure consistency with the transit functional classifications in the Regional Transit Network (shown in RTP Figure 2.10). I-205 and OR 99E are part of the regional bus system (RTP Figure 2.10). I-205 is a Future High Capacity Transit Corridor and OR 99E is a regional bus line that has several major bus stops. "Regional bus" is described in the RTP as bus service that operates on arterial streets with typical frequencies of 15 minutes during most of the day, with stops generally spaced every 750 to 1000 feet. Chapter 17.50 Vehicular and Pedestrian Circulation, Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6) includes general standards to accommodate pedestrians (i.e. traffic separation, curbs and sidewalks, on-site circulation), however there are no specific requirements for connections to existing

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
	transit stops. Subsection (7) requires new industrial, institutional, retail, and office developments subject to design review and that generate more than 1,000 average daily traffic trips to provide a transit stop on-site or a connection to a transit stop when required by the transit operator. Section 17.50.040 Street and road standards. Bicycle/pedestrian routes are required in subsection (16) when necessary to provide access to a transit stop for specific uses such as schools, parks, churches, commercial centers, or similar facilities. Chapter 17.64 Design Standards for Land Divisions and Property Line Adjustments, Section 17.64.020 Blocks. Easements with associated standards for pedestrian and bicycle paths are required under specific circumstances for land divisions and property line adjustments. However, there are no specific standards for connections to existing transit stops. **Recommendation:** The TSP update will revisit City street design standards to ensure that they continue to facilitate existing and planned transit service. Existing development requirement related to connecting to transit-supportive streets are limited. Consider creating additional requirements for connectivity to transit, particularly around major bus stops. Recommendations for block lengths are found later in this table and address **Title 1, Street System Design Sec 3.08.110F.**
Allow implementation of: • narrow streets (<28 ft curb to curb); • wide sidewalks (at least five feet of through zone); • landscaped pedestrian buffer strips or paved furnishing zones of at least five feet, that include street trees; • traffic calming to discourage traffic infiltration and excessive speeds; • short and direct right-of-way routes and shared-use paths to connect residences with commercial services, parks, schools, hospitals, institutions, transit corridors, regional trails and other neighborhood activity centers; and,	Narrow Streets Chapter 17.50 Vehicular and Pedestrian Circulation, Section 17.50.040 Street and road standards. Subsection (1) provides a table with ROW and Roadway width standards according to street classification. Minimum roadway width for Local streets is 32’ with 5’ utility easement on each side. Subsection (6) requires existing streets with inadequate widths to provide additional ROW at time of development. Chapter 17.50 does not have a local street standard that allows pavement width to be narrower than 28 feet under typical circumstances (e.g., no topographical site challenges), which is inconsistent with the RTFP as well as the “safe harbor” State recommendations for compliance with the Transportation Planning Rule (see Recommendations

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
- opportunities to extend streets in an incremental fashion, including posted notification on streets to be extended. **(Title 1, Street System Design Sec 3.08.110B)**	section and the Transportation and Growth Management program's Neighborhood Street Design Guideline https://www.oregon.gov/LCD/docs/publications/neighstreet.pdf). Chapter 73 Adjustments, Section 17.73.020 Circumstances for granting (Adjustments). Allows for up to a 20% modification of a quantifiable provisions (i.e. street standards) when specific criteria are met. Sidewalks Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (3) requires curbs and sidewalks within ROW or easements, but does not specify minimum width. Section 17.50.040 Street and road standards. Subsection (15) requires sidewalks to be installed on public streets with specific exceptions allowed with Planning Commission approval. It does not specify minimum sidewalk width standards. Landscape Treatments/Buffer Strips Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6)(e) requires a raised curb, bollards, landscaping, or other physical barrier when the pedestrian network is adjacent to an auto travel lane. It does not require more than one feature. Section 17.50.040 Street and road standards. Subsection (1) provides a table with ROW and Roadway width standards according to street classification. It does not include standards for buffer strips. Traffic Calming No provisions found in the Code that allow traffic calming (e.g. medians, speed humps). Street/Route Connections Section 17.50.040 Street and road standards. Subsection (7) limits cul-de-sacs. Subsection (16) requires bicycle and pedestrian routes when consistent the Comprehensive Plan or when necessary to provide connections to transit stops for specific uses.

<table>
<tr><th>Regional Transportation Functional Plan Requirement</th><th>Gladstone Municipal Code
Title 17 Zoning and Development Reference</th></tr>
<tr><td></td><td>
<p><u>Street Extensions</u></p>
<p>Section 17.50.040 Street and road standards. Subsection (3) allows for dead-end streets to be approved with temporary turn-arounds to allow for future street extensions. Subsection (4) allows for reserve strips (street plugs) when necessary to preserve street extensions. No posting informing of street extension is required.</p>
<p>Recommendations: Update Section 17.50.040 to include or reference the updated TSP and provisions/standards for narrow streets, wide sidewalks, and landscape treatments/buffer strips.</p>
<p><i>Note that the City would like to have a standard for constrained right-of-ways and would like to explore the potential for requiring sidewalks on one side of local streets in new subdivisions.</i></p>
<p>Consider adopting more rigorous requirements for pedestrian connectivity for all developments (with the exception of single family residential) that address; pathway systems (pedestrian and/or multi-use) within the site; connections to future phases of development, adjacent trails, public parks and open space areas, and other developed areas; and safe, reasonably direct and convenient connections between primary building entrances and all adjacent streets.</p>
<p>To provide for a narrow street option, revisit adopted local street standards, considering the State-recommended “safe harbor” dimensions:</p>
<table>
<tr><th></th><th>Pavement</th><th>Right of-Way</th></tr>
<tr><td>No On-Street Parking</td><td>20’</td><td>42-48’</td></tr>
<tr><td>Parking on One Side</td><td>24’</td><td>47-52’</td></tr>
<tr><td>Parking on Two Sides</td><td>28’</td><td>52-56’</td></tr>
</table>
<p>Specifically, explore allowing a narrower pavement width where parking is restricted on one or both sides of the street.</p>
<p>Amend Section 17.50.040 to specify that posted notification regarding street extensions is required.</p>
</td></tr>
</table>

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
Require new residential or mixed-use development (of five or more acres) that proposes or is required to construct or extend street(s) to provide a site plan (consistent with the conceptual new streets map required by Title 1, Sec 3.08.110D) that: • provides full street connections with spacing of no more than 530 feet between connections except where prevented by barriers; • Provides a crossing every 800 to 1,200 feet if streets must cross water features protected pursuant to Title 3 UGMFP (unless habitat quality or the length of the crossing prevents a full street connection) • provides bike and pedestrian access ways in lieu of streets with spacing of no more than 330 feet except where prevented by barriers • limits use of cul-de-sacs and other closed-end street systems to situations where barriers prevent full street connections • includes no closed-end street longer than 220 feet or having no more than 25 dwelling units **(Title 1, Street System Design Sec 3.08.110E)**	Section 17.80.061 Submittal Requirements (Design Review). Subsection (1)(b) lists information required to be included in a site plan when submitting an application subject to design review. Required information includes the location and dimensions of existing and proposed ROWs curbs, sidewalks, parking, and pedestrian/bicycle circulation. Section 17.50.030 Streets and roads generally. Subsection (2) requires new residential and mixed-use development on vacant land of five or more acres in specific districts to provide full street connections and access ways in lieu of streets. Section 17.50.040 Street and road standards. Subsection (7) limits the use of cul-de-sacs and hammerhead street design unless barriers are present which prevent connections. When used, cul-de-sacs are limited to 200' in length and serve no more than 25 single-family dwellings. **Recommendation:** No change recommended. This standard is met.
Establish city/county standards for local street connectivity, consistent with Title 1, Sec 3.08.110E, that applies to new residential or mixed-use development (of less than five acres) that proposes or is required to construct or extend street(s). **(Title 1, Street System Design Sec 3.08.110F)**	This RTFP subsection applies to redevelopment of contiguous lots and parcels less than five acres in size that require construction of new streets. The City's development standards (Division IV), including street and road standards, apply to all new development and require street connectivity. The City's block length requirements dictates local street spacing (Section 16.64.020, Chapter 17.64 Design Standards for Land Divisions and Property Line Adjustments). The code states that blocks shall not exceed one thousand feet (1,000') in length between street lines, except for blocks adjacent to arterial streets. **Recommendation:** Amend Section 16.64.020 to be consistent with updated TSP spacing standards and the requirements of the RTFP, which requires that full street connections be provided no more than 530 feet between connections.
Applicable to both Development Code and TSP To the extent feasible, restrict driveway and street access in the vicinity of interchange ramp terminals, consistent with Oregon	This section of Title 1 addresses how local jurisdictions can help protect the capacity, function and safe operation of existing and planned state highway interchanges or planned improvements to interchanges.

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
Highway Plan Access Management Standards, and accommodate local circulation on the local system. Public street connections, consistent with regional street design and spacing standards, shall be encouraged and shall supersede this access restriction. Multimodal street design features including pedestrian crossings and on-street parking shall be allowed where appropriate. **(Title 1,Street System Design Sec 3.08.110G)**	The Street Plan Element of the adopted TSP (1995) provides an inventory and description of access management within the City. The TSP describes access management being reviewed by Planning Commission for specific developments or by the Traffic Safety Commission when requested as part of the design review process (Chapter 17.80). Ordinance No. 1245 (1997) in the Comprehensive Plan amended the TSP to include direction on access management affecting state highways. The Ordinance recognizes ODOT's authority to manage state highways, and defers to the state adopted access management guidelines for state highways as detailed in the Oregon Highway Plan. **Recommendation:** The updated TSP will address access management requirements for state highways and in the vicinity of interchanges.
Include Site design standards for new retail, office, multi-family and institutional buildings located near or at major transit stops shown in Figure 2.15 in the RTP: • Provide reasonably direct pedestrian connections between transit stops and building entrances and between building entrances and streets adjoining transit stops; • Provide safe, direct and logical pedestrian crossings at all transit stops where practicable At major transit stops, require the following: • Locate buildings within 20 feet of the transit stop, a transit street or an intersection street, or a pedestrian plaza at the stop or a street intersections; • Transit passenger landing pads accessible to disabled persons to transit agency standards; • An easement or dedication for a passenger shelter and an underground utility connection to a major transit stop if requested by the public transit provider; • Lighting to transit agency standards at the major transit stop; • Intersection and mid-block traffic management improvements as	Figure 2.10 – Regional Transit Network in the 2014 RTP shows Gladstone's major bus stops. TriMet's current service map shows one frequent bus line (Line 33) travels through the City along OR 99E (Mcloughlin Boulevard). Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6) includes general standards to accommodate pedestrians (i.e. traffic separation, curbs and sidewalks, on-site circulation), however there are no specific standards for connections to existing transit stops. Subsection (7) requires new industrial, institutional, retail, and office developments subject to design review and that generate more than 1,000 average daily traffic trips are required to provide a transit stop on-site or a connection to a transit stop when required by the transit operator. Section 17.50.040 Street and road standards. Bicycle/pedestrian routes are required in subsection (16) when necessary to provide access to a transit stop for specific uses such as schools, parks, churches, commercial centers, or similar facilities.

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
needed and practicable to enable marked crossings at major transit stops. **(Title 1, Transit System Design Sec 3.08.120B(2))**	Section 17.64.020 Blocks. Easements with associated standards for pedestrian and bicycle paths are required under specific circumstances for land divisions and property line adjustments. However, there are no specific standards for connections to existing transit stops. Section 17.80.061 Submittal Requirements (Design Review). Subsection (1)(b) lists information required to be included in a site plan when submitting an application subject to design review. Required information includes the relation of the subject property to nearby transit stops. It does not include language or refer to language elsewhere in the Code to provide connections. **Recommendation:** Existing standards for transit-supportive street improvements are limited. Consider creating additional standards, particularly around major bus stops, that will facilitate transit service.
(Could be in Comprehensive plan or TSP as well) As an alternative to implementing site design standards at major transit stops (section 3.08.120B(2), a city or county may establish pedestrian districts with the following elements: • A connected street and pedestrian network for the district; • An inventory of existing facilities, gaps and deficiencies in the network of pedestrian routes; • Interconnection of pedestrian, transit and bicycle systems; • Parking management strategies; • Access management strategies; • Sidewalk and access way location and width; • Landscaped or paved pedestrian buffer strip location and width; • Street tree location and spacing; • Pedestrian street crossing and intersection design; • Street lighting and furniture for pedestrians; • A mix of types and densities of land uses that will support a high level of pedestrian activity. **(Title 1, Pedestrian System Design Sec 3.08.130B)**	The Portland Avenue Streetscape Design (2008) illustrates a vision for a more pedestrian-oriented Portland Avenue in the downtown area. Several features of the design apply to the entire corridor and include pedestrian-scale lighting, bike lanes, improved intersection crossings, and formalized bus stops along Portland Avenue. The recommendation of this earlier planning process will be revisited as part of the Downtown Revitalization Plan, scheduled to be complete Spring 2017. **Recommendation:** Incorporate features of the Portland Avenue Streetscape Design document into the code as they apply to Portland Avenue.
Require new development to provide on-site streets and access ways that offer reasonably direct routes for pedestrian travel.	Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6) includes standards for providing on-site pedestrian circulation for new non-residential and multi-family developments and for new

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
(Title 1, Pedestrian System Design Sec 3.08.130C)	buildings added to existing non-residential and multi-family developments. Standards specify specific connections between features and design elements. **Recommendation:** No change recommended. This standard is met.
Establish parking ratios, consistent with the following: • No minimum ratios higher than those shown on Table 3.08-3. • No maximum ratios higher than those shown on Table 3.08-3 and illustrated in the Parking Maximum Map. If 20-minute peak hour transit service has become available to an area within a one-quarter mile walking distance from bus transit one-half mile walking distance from a high capacity transit station, that area shall be removed from Zone A. Cities and counties should designate Zone A parking ratios in areas with good pedestrian access to commercial or employment areas (within one-third mile walk) from adjacent residential areas. Establish a process for variances from minimum and maximum parking ratios that include criteria for a variance. Require that free surface parking be consistent with the regional parking maximums for Zones A and B in Table 3.08-3. Following an adopted exemption process and criteria, cities and counties may exempt parking structures; fleet parking; vehicle parking for sale, lease, or rent; employee car pool parking; dedicated valet parking; user-paid parking; market rate parking; and other high-efficiency parking management alternatives from maximum parking standards. Reductions associated with redevelopment may be done in phases. Where mixed-use development is proposed, cities and counties shall provide for blended parking rates. Cities and counties may count adjacent on-street parking spaces, nearby public parking and shared	Parking Ratios Chapter 17.48 Off-street parking and loading, Section 17.48.030 Standards for developments subject to design review. Minimum and maximum parking requirements for Gladstone are found in Table 17.48.030 Table 1. All uses except for multi-family do not exceed the minimum parking requirement. The RTFP defines three variations of multi-family uses dependent on the number of bedrooms present (1-, 2-, 3-bedroom). Gladstone's Code categorizes the use as "Two-family or multi-family" and is consistent with the RTFP requirement for 2-bedroom multi-family uses. Maximum parking ratios for all uses are categorized according to Zone A or Zone B, which are defined according to proximity to frequent transit service. All uses for each zone in the Code do not exceed those shown in Table 3.08-3 of the RTFP. Section 17.48.060 Car pool and van pool parking. New industrial, institutional, and office developments subject to design review and with more than 50 parking spaces are required to designate at least 10% to car pool or van pool parking. Variances and Exemptions Section 17.48.030 Standards for developments subject to design review. Subsection (2)(c) exempts specific types of parking spaces such as parking structures, fleet parking, or carpool parking, from the maximum parking requirement. Provisions for blended parking or shared parking standards are not currently found in the Code. Section 17.80.090 Minor Exceptions (Design Review). Exceptions up to 25% of minimum and maximum parking ratios can be granted by the Planning Commission pursuant to specific factors listed in paragraph (2)(c).

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
parking toward required parking minimum standards. Use categories or standards other than those in Table 3.08-3 upon demonstration that the effect will be substantially the same as the application of the ratios in the table. Provide for the designation of residential parking districts in local comprehensive plans or implementing ordinances. Require that parking lots more than three acres in size provide street-like features along major driveways, including curbs, sidewalks and street trees or planting strips. Major driveways in new residential and mixed-use areas shall meet the connectivity standards for full street connections in section 3.08.110, and should line up with surrounding streets except where prevented by topography, rail lines, freeways, pre-existing development or leases, easements or covenants that existed prior to May 1, 1995, or the requirements of Titles 3 and 13 of the UGMFP. Require on-street freight loading and unloading areas at appropriate locations in centers. Establish short-term and long-term bicycle parking minimums for: • New multi-family residential developments of four units or more; • New retail, office and institutional developments; • Transit centers, high capacity transit stations, inter-city bus and rail passenger terminals; and • Bicycle facilities at transit stops and park-and-ride lots. **(Title 4, Parking Management Sec 3.08.410)**	Exceptions greater than 25% are subject to variance procedures. Chapter 17.72 Variances. The variance procedure, referred to in 17.80.090 for exceptions greater than 25%, allows variances in situations of undue or unnecessary hardship. Variances are subject to administrative procedures in the Code. Chapter 17.73 Adjustments. Although not referred to in 17.80.090, the adjustments procedure allows adjustments of up to 20% of a quantifiable provision when specific criteria are demonstrated. Parking Lots Chapter 17.46 Landscaping, Section 17.46.020 Standards includes street tree and landscaping standards for parking and loading areas, specifically for those with ten (10) or more parking spaces. Loading Section 10.04.250 Use of loading zone. This section restricts the use of loading zones to hours applicable to the respective zone, however it does not specify areas for which the standard applies. Section 17.48.040 Design requirements for permanent off-street parking and loading. All structures and developments subject to design review are subject to this section. This section provides standards for off-street loading areas such as screening/buffering, compatibility with off-street parking, and location of loading areas. No provisions for on-street loading were found in the Code. Bicycle Parking Section 17.48.050 Bicycle parking standards. Bicycle parking standards apply to new multi-family dwellings of four units or more and new commercial/industrial developments. Bicycle parking standards applicable to transit centers, transit stops, or park-and-ride lots are not currently in the Code. The minimum bicycle parking required for all development subject to the section is two (2) spaces or 5% of the minimum required automobile parking spaces. Bicycle parking spaces are not distinguished as short-term or

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
	long-term in the code, however standards require bicycle parking be sheltered when more than 7 spaces are provided or in all multi-family developments. **Recommendation:** Review Chapter 17.46 Landscaping, Section 17.46.020 Standards, to assess the need for improved standards related to large parking lots (3 acres) and pedestrian circulation and safety. Revise off-street parking and loading requirements to allow shared parking and to allow for exemptions from off-street loading requirements within the Town Center. Criteria for the exemption(s) and whether these will be site specific within the Town Center will need to determined. Revise Section 17.48.050 to require bike parking at transit stops. Consider adding a description of "long-term" bicycle parking and refining the requirements for its design and placement.
When proposing an amendment to the comprehensive plan or to a zoning designation, consider the strategies in subsection 3.08.220A as part of the analysis required by OAR 660-012-0060. If a city or county adopts the actions set forth in 3.08.230E (parking ratios, designs for street, transit, bicycle, pedestrian, freight systems, TSMO projects and strategies, and land use actions) and section 3.07.630.B of Title 6 of the UGMFP, it shall be eligible for an automatic reduction of 30 percent below the vehicular trip generation rates recommended by the Institute of Transportation Engineers when analyzing the traffic impacts, pursuant to OAR 660-012-0060, of a plan amendment in a Center, Main Street, Corridor or Station Community. (Title 5, Amendments of City and County Comprehensive and Transportation System Plans Sec 3.08.510A,B)	Amendments Chapter 17.68 Amendments and zone changes. This chapter includes provisions and procedures allowing for amendments to the Comprehensive Plan, Zoning Map, Comprehensive Plan Map, or Title 17 of the Code. Amendments are reviewed through administrative procedures (Section 16.68.020). Conditions may be applied by the City Council (Section 17.68.040) when they can further the objectives of the comprehensive plan or zoning ordinance. Section 17.68.050 Evidence supplied by applicant. Applicants for amendments must provide evidence meeting five criteria. Criteria include consistency with the Comprehensive Plan and Metro's UGMFP as well as adequate public facilities such as transportation systems are present or concurrent with development. Policy 5 under "Plan Evaluation and Update" of the Comprehensive Plan provides procedures for making amendments to the Comprehensive Plan. UGMFP Title 6 The City currently has a designated Town Center boundary as shown in the Urban Growth Management Functional Plan (UGMFP). Progress towards implementing Town Center design is supported by the Portland

Regional Transportation Functional Plan Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
	Avenue Streetscape Design (2008) and is a focus of the Downtown Revitalization Plan project. **Recommendation:** Consider modifying Section 17.68.050 to include compliance with the Transportation Planning Rule, reviewed consistent with OAR 660-012-0060, when a comprehensive plan amendment or land use district change is proposed.
(Could be located in TSP or other adopted policy document) Adopt parking policies, management plans and regulations for Centers and Station Communities. Plans may be adopted in TSPs or other adopted policy documents and may focus on sub-areas of Centers. Plans shall include an inventory of parking supply and usage, an evaluation of bicycle parking needs with consideration of TriMet Bicycle Parking Guidelines. Policies shall be adopted in the TSP. Policies, plans and regulations must consider and may include the following range of strategies: • By-right exemptions from minimum parking requirements; • Parking districts; • Shared parking; • Structured parking; • Bicycle parking; • Timed parking; • Differentiation between employee parking and parking for customers, visitors and patients; • Real-time parking information; • Priced parking; • Parking enforcement. (Title 4, Parking Management Sec 3.08.410I)	As documented earlier, the City's parking regulations are mostly consistent with the RTFP. The City does not currently have an adopted parking management plan. However, progress towards regulating parking demand is supported by the Downtown Parking Plan (2006), which provides future implementation recommendations. Policy 4 of the Comprehensive Plan Transportation Element states "Address the parking needs of commercial district". The implementation of which includes a parking district feasibility study and establishing parking limits within the downtown business district. **Recommendations:** • Incorporate the implementation recommendations, to the extent available, in Chapter 17.48 or 17.50. • Update Policy 4 of the Comprehensive Plan Transportation Element to reflect the implementation recommendations of the Downtown Parking Plan.

Table 6: Compliance of the Gladstone Municipal Code (Title 17 Zoning and Development) with the TPR

Transportation Planning Rule Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
Each local government shall amend its land use regulations to implement the TSP. The following transportation facilities, services and improvements need not be subject to land use regulations except as necessary to implement the TSP and, under ordinary circumstances do not have a significant impact on land use: • Operation, maintenance, and repair of existing transportation facilities identified in the TSP, such as road, bicycle, pedestrian, port, airport and rail facilities, and major regional pipelines and terminals; • Dedication of right-of-way, authorization of construction and the construction of facilities and improvements, where the improvements are consistent with clear and objective dimensional standards; • Changes in the frequency of transit, rail and airport services. To the extent, if any, that a transportation facility, service, or improvement concerns the application of a comprehensive plan provision or land use regulation, it may be allowed without further land use review if it is permitted outright or if it is subject to standards that do not require interpretation or the exercise of factual, policy or legal judgment. (TPR Subsection -0045(1)(a)-(b))	Transportation facilities described in OAR - 0045(1) are not included in Title 17, and therefore the capacity to permit them outright is unclear. **Recommendation:** Revise Title 17 to allow outright specific transportation facilities, services, and improvements in individual zones, or for specific transportation improvements, where consistent with the adopted TSP, to be exempt from land use permitting approval processes.
Where a transportation facility, service or improvement is determined to have a significant impact on land use or requires interpretation or the exercise of factual, policy or legal judgment regarding the application of a comprehensive plan or land use regulation, the local government shall provide a review and approval process that is consistent with 660-012-0050 (Transportation Project Development). Local governments shall amend regulations to provide for consolidated review of land use decisions required to permit a transportation project.	Section 17.94.020 Notice. Written notice of quasi-judicial hearings and hearings for legislative zone changes are required to be sent to affected agencies a minimum of 20 days in advance of the scheduled hearing. Affected agencies are not defined, but can be interpreted to include state and regional transportation agencies. In addition, all legislative actions, according to subsection (4), are required to provide notice to by publication in a newspaper. Consolidated applications are not specifically allowed or prohibited in the code, except

Transportation Planning Rule Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
(TPR Subsection -0045(1)(c))	consolidated permits are allowed within the Habitat Conservation Area District (Section 17.25). **Recommendation:** Consider creating adding “consolidated procedure” language to Chapter 17.66 General Provisions (Use Permits and Amendments).
Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities for their identified functions. Standards to protect the future operations of roadways and transit corridors (TPR Subsection -0045(2)(b))	Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (4), Traffic Volume Expansion, requires provisions to be made to accommodate any increased volume of traffic resulting from development. Provisions include street widening, dedication of property for future widening, or other street improvements. Thresholds, impact studies, and street capacity standards are not included in the Code. **Recommendation:** Consider adding provisions requiring transportation impact analysis or studies when development is expected to increase traffic volume over a specified threshold in Division IV. Development Standards.
Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: land use applications that require public hearings, subdivision and partition applications, applications which affect private access to roads, applications within airport noise corridor and imaginary surfaces which affect airport operations. (TPR Subsection -0045(2)(f))	See response to -0045(1)(c)
Regulations assuring amendments to land use designations, densities, design standards are consistent with the function, capacities, and levels of service of facilities designated in the TSP.	Amendments Chapter 17.68 Amendments and zone changes. This chapter includes provisions and procedures allowing for amendments to the Comprehensive Plan, Zoning Map, Comprehensive Plan Map, or Title 17 of the Code. Amendments are reviewed through

Transportation Planning Rule Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
(TPR Subsection -0045(2)(g))	administrative procedures (Section 16.68.020). Conditions may be applied by the City Council (17.68.040) when they can further the objectives of the comprehensive plan or zoning ordinance. Section 17.68.050 Evidence supplied by applicant. Applicants for amendments must provide evidence meeting five criteria. Criteria include consistency with the Comprehensive Plan and Metro's UGMFP as well as adequate public facilities such as transportation systems are present or concurrent with development. Policy 5 under "Plan Evaluation and Update" of the Comprehensive Plan provides procedures for making amendments to the Comprehensive Plan. **Recommendation:** Consider modifying 17.68.050 to include compliance with the Transportation Planning Rule, reviewed consistent with OAR 660-012-0060, when a comprehensive plan amendment or land use district change is proposed.
Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth in 660-012-0040(3)(a-d): Provide "safe and convenient" (per subsection 660-012-0045.3(d)) pedestrian and bicycle connections from new subdivisions/multifamily development to neighborhood activity centers; bikeways are required along arterials and major collectors; sidewalks are required along arterials, collectors, and most local streets in urban areas except controlled access roadways (TPR Subsection -0045(3)(b))	Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6) includes standards for providing on-site pedestrian circulation for new non-residential and multi-family developments and for new buildings added to existing non-residential and multi-family developments. Standards specify specific connections between features and design elements. Section 17.50.040 Street and road standards. Subsection (15) requires sidewalks on both sides of a public street, unless modified by the Planning Commission under specific conditions. Bicycle/pedestrian routes are required in subsection (16) when consistent with Map 5 of the Comprehensive Plan or when necessary to provide access to a transit stop for specific uses such as schools, parks, churches, commercial centers, or similar facilities. The requirements for sidewalks or bicycle/pedestrian routes are not correlated

Transportation Planning Rule Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
	with street classification standards. **Recommendation:** No change. This criterion is met.
Where off-site road improvements are required as a condition of development approval, they must accommodate bicycle and pedestrian travel, including facilities on arterials and major collectors (TPR Subsection -0045(3)(c))	Section 17.68.040 Conditions. This section allows the City Council to apply types of conditions designed to limit access, provide additional right-of-way, limit the use or density, among other listed types. It does not specifically include off-street improvements beyond just the dedication of right-of-way. Section 17.70.010 Authorization to grant or deny. Conditions of approval for conditional uses include requiring additional right-of-way to be dedicated for street improvements. It does not specifically include off-street approval conditions, however the conditions of approval is not limited to the listed conditions. Section 17.94.040 Hearing procedure and Section 17.94.080 Action of applications. These sections authorize the Planning Commission or City Council approve an application/recommendation with conditions as part of a hearing procedure. It does not specify types of conditions, similar to what's listed in Section 17.70.010. **Recommendation:** Consider adding types of conditions that specifically or generally include off-street improvements such as bicycle or pedestrian facilities to Section 17.68.040 and 17.70.010, or to 17.94.040. *Note that there may be limited opportunities for offsite bicycle and pedestrian facilities in Gladstone due to limited right-of-way available for such improvements.*
To support transit in urban areas containing a population greater than 25,000, where the area is already served by a public transit system or where a determination has been made that a public transit system is feasible, local governments shall adopt land use and	While Gladstone's population does not meet the threshold in the following TPR requirements, it is currently served by transit and should have adopted land use and subdivision requirements that are transit-supportive. Section 17.48.060 Car pool and van

Transportation Planning Rule Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
subdivision regulations as provided in the subsections below: Designated employee parking areas in new developments shall provide preferential parking for carpools and vanpools. (TPR Subsection -0045(4)(d))	pool parking. New industrial, institutional, and office developments with more than 50 employee parking spaces are required to designate spaces for car pool and van pool parking. **Recommendation:** No change. This criterion is met.
Existing development shall be allowed to redevelop a portion of existing parking areas for transit-oriented uses, including bus stops and pullouts, bus shelters, park and ride stations, transit-oriented developments, and similar facilities, where appropriate. (TPR Subsection -0045(4)(e))	No provisions were found that meet this criteria. **Recommendation:** Add provisions that allow existing or new developments to offset the use parking requirements in Section 17.48.030.
Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility. (TPR Section -0060)	Amendments Chapter 17.68 Amendments and zone changes. This chapter includes provisions and procedures allowing for amendments to the Comprehensive Plan, Zoning Map, Comprehensive Plan Map, or Title 17 of the Code. Amendments are reviewed through administrative procedures (Section 16.68.020). Conditions may be applied by the City Council (17.68.040) when they can further the objectives of the comprehensive plan or zoning ordinance. Section 17.68.050 Evidence supplied by applicant. Applicants for amendments must provide evidence meeting five criteria. Criteria include consistency with the Comprehensive Plan and Metro's UGMFP as well as adequate public facilities such as transportation systems are present or concurrent with development. Policy 5 under "Plan Evaluation and Update" of the Comprehensive Plan provides procedures for making amendments to the Comprehensive Plan. **Recommendation:** Consider modifying Section 17.68.050 to include compliance with the

Transportation Planning Rule Requirement	Gladstone Municipal Code Title 17 Zoning and Development Reference
	Transportation Planning Rule, reviewed consistent with OAR 660-012-0060, when a comprehensive plan amendment or land use district change is proposed.

APPENDIX B TECH MEMO #2: PROJECT GOALS, OBJECTIVES, AND EVALUATION CRITERIA

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

Date: November 4, 2016 Project #: 19890.2

To: Jim Whynot and Jacque Betz, City of Gladstone
Gail Curtis, Oregon Department of Transportation, Region 1

From: Matt Bell and Molly McCormick, Kittelson and Associates, Inc.

Project: Gladstone Transportation System Plan (TSP) Update

Subject: Final Tech Memo 2: Project Goals and Objectives and Evaluation Criteria (Subtask 2.4)

This memorandum presents the goals and objectives that will be used to guide development of the Gladstone Transportation System Plan (TSP) update. The goals and objectives presented herein reflect the City's existing goals and policies as articulated in the current Gladstone TSP and Comprehensive Plan with updates that reflect changes in state, regional, and local planning requirements as well as local desire for active transportation options. The goals and objectives will be used to guide the review and documentation of existing and future transportation system needs, the development and evaluation of potential solutions to address the needs, and the selection and prioritization of preferred alternatives for inclusion in the final plan. The goals and objectives will also inform recommendations for policy language that will serve as guidance for future land use decision making, such as approval criteria related zone change and comprehensive plan amendments.[1]

EXISTING GOALS AND POLICIES

Several existing goals and policies currently guide the management and development of the Gladstone transportation system. These goals and policies are included in the current Gladstone TSP and Comprehensive Plan as described below.

Gladstone Transportation System Plan (TSP)

The current Gladstone TSP was adopted in 1995. The policies included in Chapter 2 of the current Gladstone TSP reflect the policies of the state from 1995, which include:

---

[1] Additions and amendments to adopted Comprehensive Plan transportation policy language will be proposed as part of Draft Tech Memo #7, Regulatory Solutions.

- Reduce reliance on the single-occupant vehicle;
- Encourage alternatives to the auto, including bicycling, walking and, where feasible, public transit;
- Manage existing transportation facilities and service efficiently;
- Coordinate local transit services with interurban services;
- Coordinate land uses with the transportation facilities and services; and
- Make the transportation system accessible to all potential users, including the transportation disadvantaged.

These policies emphasize the need to reduce reliance on single-occupancy vehicles, encourage alternative travel modes, coordinate facilities and services, and improve accessibility. Per the TSP, the goals and policies included in the Gladstone Comprehensive Plan closely reflect the policies of the state and are included in the TSP by reference.

Gladstone Comprehensive Plan

The current Gladstone Comprehensive Plan was adopted in 1979. Since then, several of the goals and policies included in the Comprehensive plan have been updated several times, including most recently in 2006. However, the goals and policies related to transportation are the same as they were in 1979. Chapter 10 of the current Gladstone Comprehensive Plan includes the following transportation-related goal and several policies.

- Goal 1: Promote a safe, efficient, and convenient multi-modal transportation system that emphasizes mass transit and a street circulation pattern designed to serve people first.
- Policy 1: Promote decreased reliance on the private automobile.
- Policy 2: Provide pedestrian/bicycle ways linking public and semi-public facilities, commercial areas and regional bikeways to encourage and facilitate the use of human-powered modes of travel.
- Policy 3: Encourage and facilitate high-density residential development within walking distance (1/4 mile to 1/2 mile radius) from commercial districts in order to support future plans for rapid bus and/or light rail transit.
- Policy 4: Promote the elimination of architectural barriers on public and semi-public lands and transportation facilities.
- Policy 5: Design and develop safe pedestrian/bicycle crossings at potentially hazardous locations.
- Policy 6: Monitor and map traffic accidents on a quarterly basis to alert city officials and public to problems and the need for corrective measures
- Policy 7: Designate…streets…and physically define their function.

- Policy 8: Encourage TriMet to provide service that emphasizes east-west as well as north-south movement
- Policy 9: Adopt…street design guidelines
- Policy 10: Develop street improvement schedules.
- Policy 11: Solicit and utilize input in planning traffic safety improvements so they better serve residents and to minimize social costs.

Each of the policies identified above include implementation measures designed to facilitate the policies. A few of the policies are more related to housing and a few are action items that have been completed since the adoption of the Comprehensive Plan in 1979. These goals and policies emphasize the need for safety, efficiency, mobility, and connectivity.

PROPOSED GOALS AND OBJECTIVES

The proposed goals and objectives for the Gladstone TSP update are based on an evaluation of the existing goals and policies in the current Gladstone TSP and Comprehensive Plan. The goals provide direction for where the City would like to go while the objectives provide a more detailed breakdown of the goals with specific outcomes the City desires to achieve. In order to ensure compliance with the Transportation Planning Rule (TPR), Regional Transportation Plan (RTP), and Regional Transportation Functional Plan (RTFP) and other state, regional, and local planning requirements, the proposed goals and objectives presented below tend to favor improvements in active transportation facilities and services over capacity improvements.

Goal I: Safety – Provide a safe and efficient multimodal transportation system for all members of the community.

- Objective A. Address safety issues at locations with a history of fatal, serious injury, or frequent bicycle/pedestrian-related crashes
- Objective B. Implement strategies that reduce the potential for future conflicts between travel modes

Goal II: Mobility – Provide a multimodal transportation system that is a good state of repair and meets applicable State, regional, and local operational performance measures.

- Objective A. Maintain the existing transportation system in a state of good repair
- Objective B. Meet applicable state, regional, and local operational performance measures

Goal III: Accessibility – Provide a multimodal transportation system that is accessible to all members of the community and minimizes out of direction travel.

- Objective A. Ensure adequate access for children, disabled, low-income, or elderly people

- Objective B. Ensure adequate access for all members of the community to schools, parks, churches, and other essential destinations

Goal IV: Connectivity – Provide a multimodal transportation system that increases connections to all areas of the City and works to overcome existing barriers to regional connectivity.

- Objective A. Improve existing connections between residential areas and local schools, parks, churches, and other essential destinations
- Objective B. Create new connections between residential areas and local schools, parks, churches, and other essential destinations

Goal V: Health – Develop a transportation system that encourages active transportation and supports healthy and active choices for the community.

- Objective A. Increase the number of active transportation options available to all members of the community
- Objective B. integrate active transportation options with other modes of travel within the community

Goal VI: Coordination – Develop a transportation system that is consistent with other state, regional, and local plans.

- Objective A. Ensure consistency with State, regional, and local planning rules and regulations.
- Objective B. Coordinate land use, financial, and environmental planning to prioritize strategic transportation investments

Goal VII: Financial Responsibility – Invest in financially feasible infrastructure projects that will serve the city for years to come.

- Objective A. Ensure adequate funding is available to fund further study or implementation of the planned transportation system.
- Objective B. Ensure there are no significant barriers to implementation of the planned transportation system.

PROPOSED EVALUATION CRITERIA

The proposed evaluation criteria are based on the proposed goals and objectives. A qualitative process using the evaluation criteria will be used to evaluate alternatives and prioritize projects developed through the TSP update. The rating method used to evaluate the alternatives is described below.

- Most Desirable: The concept addresses the criterion and/or makes substantial improvements in the criteria category. (+1)

- No Effect: The criterion does not apply to the concept or the concept has no influence on the criteria. (0)
- Least Desirable: The concept does not support the intent of and/or negatively impacts the criteria category. (-1)

At this level of screening, the criteria will not be weighted; the ratings will be used to inform discussions about the benefits and tradeoffs of each alternative. Table 1 presents the evaluation criteria that will be used to qualitatively evaluate the alternatives developed through the TSP update.

Table 1: Evaluation Criteria

Objective	Evaluation Criteria	Evaluation Score
Goal I: Safety – Provide a safe and efficient multimodal transportation system for all members of the community.		
Objective A. Address safety issues at locations with a history of fatal, serious injury, or frequent bicycle/pedestrian-related crashes	Project could reduce the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	+1
	Project would have no impact on the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	0
	Project could increase the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	-1
Objective B. Implement strategies that reduce the potential for future conflicts between travel modes	Project could reduce potential for future conflicts between travel modes	+1
	Project would have no impact on the potential for future conflicts between travel modes	0
	Project could increase the potential for future conflicts between travel modes	-1
Goal II: Mobility – Provide a multimodal transportation system that is in a good state of repair and meets applicable State, regional, and local operational performance measures.		
Objective A. Maintain the transportation system in a good state of repair	Project could improve the state of the transportation system	+1
	Project would have no impact on the state of the transportation system	0
	Project could diminish the state of the transportation system	-1
Objective B. Meet applicable State, regional, and local operational performance measures	Project will meet applicable State, regional, and local operational performance measures	+1
	Project will not impact State, regional, and local operational performance measures	0
	Project will not meet State, regional, and local operational performance measures	-1
Goal III: Accessibility – Provide a multimodal transportation system that is accessible to all members of the community and minimizes out of direction travel.		
Objective A. Ensure adequate access for children, disabled, low-income, or elderly people	Project improves access in an area with a high concentration of children, disabled, low-income, or elderly people	+1
	Project does not improve access in an area with a high concentration of children, disabled, low-income, or elderly people	0
	Project impedes access in an area with a high concentration of children, disabled, low-income, or elderly people	-1
Objective B. Ensure adequate access for all members of the community to schools, parks, churches, and other essential destinations	Project improves access to schools, parks, churches, and other essential destinations	+1
	Project does not improve access to schools, parks, churches and other essential destinations	0
	Project impedes access schools, parks, churches, and other essential destinations	-1
Goal IV: Connectivity – Provide a multimodal transportation system that increases connections to all areas of the City and works to overcome existing barriers to regional connectivity		

Objective A. Improve existing connections between residential areas and local school, parks, churches and other essential destinations	Project will improve an existing connection	+1
	Project will not improve an existing connection	0
	Project will impede an existing connection	-1
Objective B. Create new connections between residential areas and local school, parks, churches, and other essential destinations	Project will create a new connection	+1
	Project will not create a new connection	0
	Project will impede the creation of a new connection	-1
Goal V: Health – Develop a transportation system that encourages active transportation and supports healthy and active choices for the community.		
Objective A. Increase the number of active transportation options available to all members of the community	Project could increase the number of active transportation options	+1
	Project would not increase the number of active transportation options	0
	Project could reduce the number of active transportation options	-1
Objective B. Integrate active transportation options with other modes of travel within the community	Project could integrate active transportation options with other modes of travel	+1
	Project would not integrate active transportation options with other modes of travel	0
	Project could impede integration of active transportation options with other modes of travel	-1
Goal VI: Coordination – Develop a transportation system that is consistent with other state, regional, and local plans.		
Objective A. Ensure consistency with State, regional, and local planning rules and regulations	Project will ensure consistency with State, regional, and local planning rules and regulations	+1
	Project will not ensure consistency with State, regional, and local planning rules and regulations	0
	Project will defy State, regional, and local planning rules and regulations	-1
Objective B. Coordinate land use, financial, and environmental planning to prioritize strategic transportation investments	Project will coordinate land use, financial, and environmental planning	+1
	Project will does require coordination between land use, financial, and environmental planning	0
	Project will disrupt coordination between land use, financial, and environmental planning	-1
Goal VII: Financial Responsibility – Invest in financially feasible infrastructure projects that will serve the city for years to come		
Objective A. Ensure adequate funding is available to fund further study or implementation of the planned transportation system	Adequate funding is currently available	+1
	Adequate funding is available through an existing grant program or other funding source	0
	Adequate funding is not available	-1
Objective B. Ensure there are no significant barriers to implementation of the planned transportation system	There are no significant barriers	+1
	There are barriers, but they can be overcome	0
	There are significant barriers	-1

APPENDIX C TECH MEMO #3: TSP FINANCIAL FORECAST

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

Date: November 4, 2016 Project #: 19890.2

To: Jim Whynot and Jacque Betz, City of Gladstone
Gail Curtis, Oregon Department of Transportation, Region 1

From: Matt Bell and Molly McCormick, Kittelson and Associates, Inc.

Project: Gladstone Transportation System Plan (TSP) Update

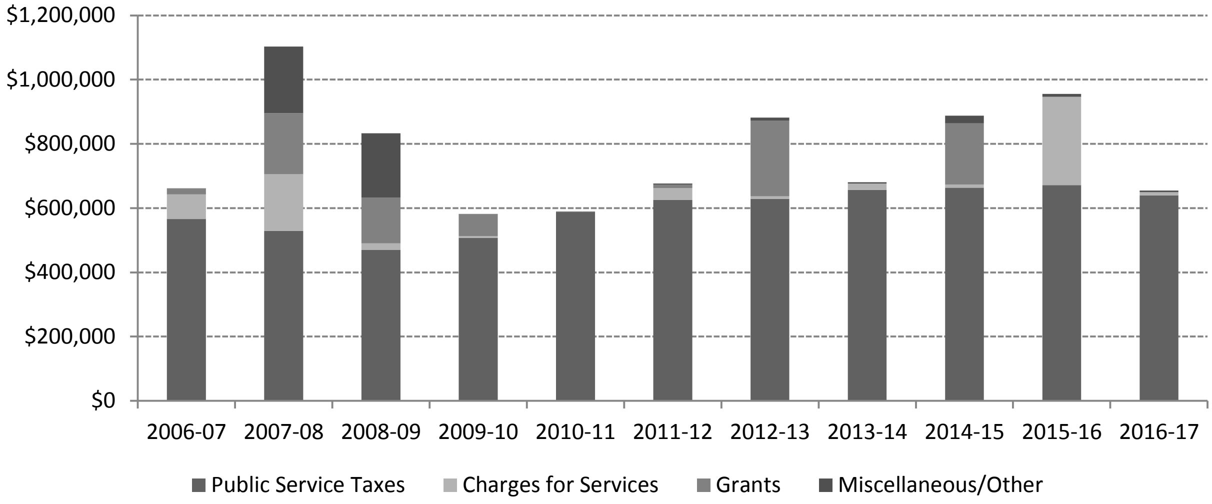
Subject: Final Tech Memo 3: TSP Financial Forecast (Subtask 2.5)

This memorandum documents historical and potential future sources of transportation funding for implementation of the Gladstone Transportation System Plan (TSP) update. Funding information from the City's Street and Road Fund provides context for evaluating projects and defining project priorities that will allow Gladstone to use all available funding opportunities and maximize current resources to preserve and improve the transportation system.

HISTORICAL REVENUE SOURCES

Historical revenue sources that have contributed to transportation funding for Gladstone over the last several years include public service taxes, charges for services, grants, and miscellaneous/other. Chart 1 illustrates the historical revenue sources for Fiscal Year (FY) 2006-07 through FY 2015-16 and includes projections for FY 2016-17.

Chart 1: City of Gladstone Historical Revenue Sources



As shown in Chart 1, transportation funding has remained relatively flat over the last 10 years with the exceptions of FY 2007-08 and FY 2015-16, which experienced higher levels of funding from Charges for Services than in other years. The following summarizes additional information related to historical revenue sources. A detailed summary of historical revenue sources can be found in **Attachment A**.

Public Service Taxes

Public Service Taxes are comprised of proceeds from the Oregon Highway Revenues Apportionment and the Bikeway Resource. The average yearly revenue generated from Public Service taxes is approximately $591,000. Over the last 10 years the funds have increased from approximately $566,000 in FY 2006-007 to $672,000 in FY 2015-16, or approximately 2.1 percent per year.

Oregon Highway Revenues Apportionment

The State of Oregon generates revenue for transportation funding through the collection of Motor Vehicle Registration and Title Fees, Driver License Fees, Motor Vehicle Fuel Taxes, and Weight-Mile Taxes. The proceeds from the taxes and fees are distributed to Oregon counties and cities in accordance with Oregon Revised Statute (ORS) 366.764, by county-registered vehicle number, and ORS 366.805, by city population. The Oregon Constitution states that revenue from the state is to be used for the construction, reconstruction, improvement, maintenance, operation and use of public highways, roads, streets, and roadside rest areas.

Bikeway Resource

The Bikeway Resource is a percentage of the Oregon Highway Revenue Apportionment that Gladstone reserves for bikeway projects and improvements. It is approximately one percent of the apportionment.

Charges for Services

Charges for Services are comprised of proceeds from assessing System Development Charges (SDCs) on developers. The average yearly revenue generated from Charges for Services is approximately $63,000; however, over the last 10 years the funds have varied from approximately $1,000 in FY 2010-11 to $275,000 in FY 2015-16.

System Development Charges (SDC)

System Development Charges (SDCs) are fees assessed on developments for impacts to public infrastructure. All revenue is dedicated to transportation capital improvement projects designed to accommodate growth. The City can offer SDC credits to developers that provide public improvements beyond the required street frontage, including those that can be constructed by the private sector at a lower cost. For example, SDC credits might be given for providing off-site improvements, such as sidewalks and bike lanes that connect the site to nearby transit stops. Gladstone uses the revenue from SDCs on eligible projects that cannot be funded by other means, such as urban renewal. Projects that may be funded by urban renewal funds are any work completed under ORS 457.170 in an urban renewal area and may include the construction or improvement of streets, utilities, and/or site improvements in accordance with the urban renewal plan.

Grants

The City has received several grants over the last ten years, including several Community Development Block Grants (CDBG) from Metro. Metro provides CDBG to help cities and counties throughout the region improve existing centers and corridors, and prepare for new housing and jobs in urban expansion areas. The City has used CDBG funds to improve public facilities and infrastructure throughout the City. The City also received an American Reinvestment and Recovery Act (ARRA) grant from the federal government. Signed into law in February 2009 as a response to the recession, the ARRA's main purpose was to create immediate jobs and secondly to invest in public needs such as infrastructure, education, health, and energy. The ARRA grant awarded to Gladstone was comprised of funds that were distributed by the federal government to all government agencies based on population and other criteria. TIGER grants are another example of the type of federal funding made available by the ARRA. The average yearly revenue generated from grants in Gladstone is approximately $86,000.

Miscellaneous/Other

Miscellaneous/other includes all historical revenue sources that do not directly fall under Public Service Taxes, Charges for Services, or Grants. Miscellaneous/other funds come from sources such as donations and invoices for inspections, and permits. The average yearly revenue generated from miscellaneous/other revenue sources is approximately $46,000.

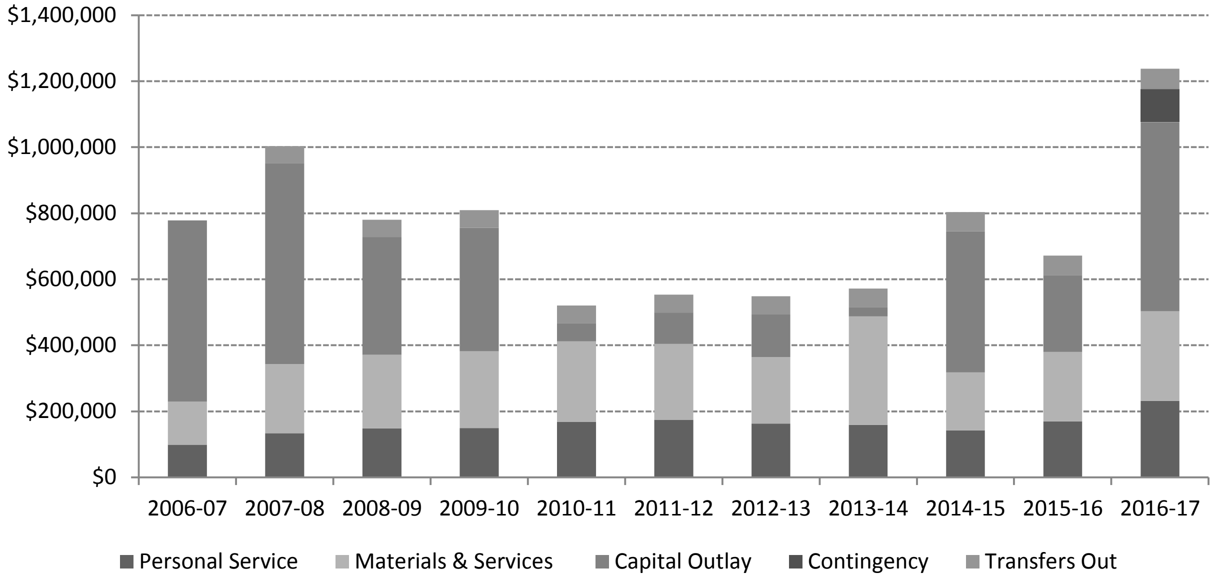
Summary of Historical Revenues

Overall transportation funding has remained relatively flat over the last ten years in Gladstone with an average of $708,000 per year from FY 2006-07 to FY 2015-2016. While revenue from public service taxes has experienced an increase over the last 10-year period, other revenue sources have varied considerably from year to year. Revenue forecasts and potential further funding sources are discussed in subsequent sections of this memo.

HISTORICAL EXPENDITURES

The City organizes historical expenditures into five categories, including: personal service, materials and services, capital outlay, contingency, and transfers out. Chart 2 illustrates the City's historical expenditures for FY 2006-07 through FY 2015-16 and includes projections for FY 2016-17.

Chart 2: Historical Expenditures, FY 2006-07 to FY 2016-17



As shown in Chart 2, total expenditures over the last ten year period have ranged from a low of approximately $520,000 during FY 2010-11 to a high of approximately 1,000,000 for FY 2007-08. It should be noted that the projected total expenditures of approximately $1,238,000 in FY 2016-17 will represent the highest total expenditures over the last ten years. The following summarizes additional information related to historical expenditures. A detailed summary of transportation related expenditures is provided in **Attachment A**.

Personal Services

Personal services expenditures consist of personnel salaries and associated payroll costs. The average yearly cost of personal services is approximately $151,000. Over the last ten years, the cost of personal service has ranged from 13 to 32 percent of yearly expenditures.

Materials and Services

Materials and services expenditures consist of equipment rentals, street maintenance supplies, shop supplies, and utilities. The average yearly cost of materials and services is approximately $219,000. Over the last ten years, the cost of materials and services has ranged from 17 to 57 percent of yearly expenditures and is the second largest average expense next to capital outlay.

Capital Outlay

Capital outlay expenditures consist of street sign maintenance, engineering services, and street maintenance. In this portion of the budget, Gladstone has also established a reserve account for equipment replacement. This reserve account is meant to ensure that Gladstone has the necessary funds to purchase newer equipment as the City’s current equipment begins to age out of its useful life.

The reserve account is proposed to increase by approximately $25,000 per fiscal year. The average yearly cost of capital outlay is approximately $285,000. Over the last ten years, capital outlay has been the largest average expense in Gladstone, ranging from 5 to 71 percent of yearly expenditures.

Contingency

The contingency is a sum of money set aside by Gladstone for the purpose of having available cash in case of an emergency. The City has not expended any funds from the contingency over the last ten years; however, the amount set aside for FY 2016-17 is $100,000, or approximately 8 percent of projected expenditures.

Transfers Out

Transfers out refers to the indirect rate the General Fund (GF) charges the Road and Street fund for use of the finance department in handling the fund. It is the portion of the GF maintenance cost that each City fund needs to pay for expenses associated with the staff that support and maintain the integrity of the GF. The average yearly cost of transfers out is approximately 50,000. Over the last ten years, transfers out have ranged from 0 to 10 percent of yearly expenditures.

Summary of Historical Expenditures

Overall transportation expenditures have varied considerably over the last ten years. The majority of the yearly expenditures have consisted of capital outlay, materials and services, and personal service expenses, while contingency and transfers out costs have remained relatively low by comparison.

PROJECTED TRANSPORTATION FUNDING AND FUNDING OUTLOOK

The average annual revenue from each of the historical revenue sources were combined and projected out over the next 5, 10 and 25 year period to determine the total revenue that is estimated through 2040. The projections assume a simple linear growth pattern over the 25-year period. Table 1 provides a summary of the potential future project funding (in year 2016 dollars) through 2040.

Table 1: Future Transportation Funding Projections

Revenue Source	Average Annual	5-Year Forecast	10-Year Forecast	Estimated Through 2040
Public Services Taxes	$591,000	$2,955,000	$5,910,000	$14,775,000
Charges for Services	$63,000	$315,000	$630,000	$1,575,000
Grants	$86,000	$40,000	$860,000	$2,150,000
Miscellaneous/Other	$46,000	$230,000	$460,000	$1,150,000
Total	**$786,000**	**$3,930,000**	**$7,860,000**	**$19,650,000**

The average annual expenditures were also combined and projected out over the next 5, 10 and 25 year period. Table 2 provides a summary of the potential future expenses (in year 2016 dollars) through 2040.

Table 2: Future Transportation Expenditures Projections

Expenditures	Average Annual	5-Year Forecast	10-Year Forecast	Estimated Through 2040
Personal Service	$151,000	$755,000	$1,510,000	$3,775,000
Materials & Services	$219,000	$1,095,000	$2,190,000	$5,475,000
Capital Outlay	$285,000	$1,425,000	$2,850,000	$7,125,000
Contingency	$0	$0	$0	$0
Transfers Out	$50,000	$250,000	$500,000	$1,250,000
Total	**$705,000**	**$3,525,000**	**$7,050,000**	**$17,625,000**

As shown in Tables 1 and 2, the projected funding from now through FY 2040-41 is approximately $19,650,000, and the projected expenditures are approximately $17,625,000. Based on the information provided in Tables 1 and 2, the City is expected to have approximately $2,025,000 over the next 25 years to implement the TSP. This suggests the City will need to identify other potential revenue sources to fund implementation of the TSP projects. The following section identifies potential funding sources for the City to consider. Two potential funding sources discussed below, right-of-way fees and gas tax, are currently being reviewed by the City and County, respectively. Combined, these potential funding sources could provide the City with an additional $11,400,000 over the 25 year period. The funding forecast will be revisited throughout the TSP update process to add any updated funding sources that are approved by the City.

POTENTIAL ADDITIONAL FUNDING SOURCES

The projected transportation funding analysis shows that Gladstone will likely have very little funds that can be dedicated to transportation-related capital improvement projects over the next twenty years. As such, the City will likely rely upon transportation improvement grants, partnerships with regional and state agencies, and other funding sources to help implement future transportation-related improvements. A list of potential grant sources and partnering opportunities for the City are identified below.

Federal Sources

Congestion Mitigation and Air Quality (CMAQ)

The Congestion Mitigation and Air Quality (CMAQ) program provides funding for projects that help reduce emissions and meet national air quality standards, such as transportation demand management programs, bicycle and pedestrian improvements, transit projects, diesel retrofits, and vehicle emissions reductions programs.

More information is available at: http://www.fhwa.dot.gov/environment/air_quality/cmaq/

Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) provides funding for infrastructure and non-infrastructure projects that improve safety on all public roads, including non-State-owned public roads and roads on tribal lands. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. ODOT administers HSIP funding through the All Roads Transportation Safety (ARTS) program described below.

More information is available at: http://safety.fhwa.dot.gov/hsip/

Transportation Alternatives Program (TAP)

The Transportation Alternatives Program (TAP) provides funding for programs and projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities, and environmental mitigation; recreational trail program projects; safe routes to school projects; and projects for planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways.

More information is available at: http://www.fhwa.dot.gov/map21/guidance/guidetap.cfm

State Sources

All Roads Transportation Safety (ARTS)

The All Roads Transportation Safety (ARTS) program (formerly known as Jurisdictionally Blind Safety Program) is intended to address safety needs on all public roads in Oregon. By working collaboratively with local road jurisdictions (cities, counties, MPO's and tribes) ODOT expects to increase awareness of safety on all roads, promote best practices for infrastructure safety, compliment behavioral safety efforts and focus limited resources to reduce fatal and serious injury crashes in the state of Oregon. The program is *data driven* to achieve the greatest benefits in crash reduction and should be blind to jurisdiction. The ARTS program primarily uses federal funds from the HSIP.

More information is available at:http://www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/Pages/ARTS.aspx

ConnectOregon

*Connect*Oregon is a lottery bond based initiative to invest in air, rail, marine, transit, and bicycle/pedestrian infrastructure to ensure Oregon's transportation system is strong, diverse, and efficient. *Connect*Oregon projects are eligible for up to 80% of project costs for grants and 100% for loans. A minimum 20% cash match is required from the recipient for all grant funded projects. Projects eligible for funding from state fuel tax revenues (section 3a, Article IX of the Oregon Constitution, the Highway Trust Fund), are not eligible for *Connect*Oregon funding. If a highway or public road element is essential to the complete functioning of the proposed project, applicants are encouraged to work with their ODOT region, city, or county to identify the necessary funding sources.

More information is available at: http://www.oregon.gov/ODOT/TD/TP/pages/connector.aspx

Statewide Transportation Improvement Program (STIP)

The Statewide Transportation Improvement Program (STIP) is ODOT's four-year transportation capital improvement program. It is the document that identifies the funding for, and scheduling of, transportation projects and programs. It includes projects on the federal, state, city, and county transportation systems, multimodal projects (highway, passenger rail, freight, public transit, bicycle and pedestrian), and projects in the National Parks, National Forests, and Indian tribal lands. STIP project lists are developed through the coordinated efforts of ODOT, federal and local governments, Area Commissions on Transportation, tribal governments, and the public.

The STIP is divided into two broad categories: Fix-It and Enhance. The Enhance category funds activities that enhance, expand, or improve the transportation system. The project selection process for the Enhance category has undergone significant changes in the last few years and reflects ODOT's goal to become a more multimodal agency and make investment decisions based on the system as a whole, not for each mode or project type separately. The agency has requested assistance from its local partners in developing Enhance projects that assist in moving people and goods through the transportation system. The projects are selected through a competitive application process. The Fix-it category funds activities that fix or preserve the transportation system. These projects are developed mainly from ODOT management systems that help identify needs based on technical information for things like pavement and bridges.

More information is available at: http://www.oregon.gov/ODOT/TD/STIP/Pages/default.aspx

Local Sources

Economic Improvement Districts (EIDs)

Transportation improvements can often be included as part of larger efforts aimed at business improvement and retail district beautification. Economic Improvement Districts collect assessments or fees on businesses in order to fund improvements that benefit businesses and improve customer access within the district. Adoption of a mutually agreed upon ordinance establishing guidelines and setting necessary assessments or fees to be collected from property owners is essential to ensuring a successful EID.

Local Improvement Districts

Local Improvement Districts (LIDs) are most often used by to construct projects such as streets, sidewalks, or bikeways. Through the LID process, the costs of local improvements are generally spread out among a group of property owners within a specified area. The cost can be allocated based on property frontage or other methods such as trip generation. Though the costs of an LID project are borne primarily by the property owners, moderate administrative costs must be factored in, and the public involvement process must still be followed. As shown previously, Gladstone is forecast to have only $60,000 over the next 20 years to implement further transportation improvements that will be identified through the TSP update process. The above potential funding sources can provide further revenue to allow the City to invest more money on their transportation system in the coming years.

Urban Renewal District

An Urban Renewal District (URD) is a tax-funded district within the City. An URD is normally funded property taxes that are increased incrementally, which is a type of funding that has been used in Oregon since 1960. The taxes are increased as a result of construction of applicable improvements. The incremental taxes are used, rather than fees, to fund different types of improvements. Transportation projects are one type of potential funding use.

Local Bond Measures

Local bond measures, or levies, are usually initiated by voter-approved general obligation bonds for specific projects. Bond measures are typically limited by time, based on the debt load of the local government or the project under focus. Funding from bond measures can be used for right-of-way acquisition, engineering, design, and construction of transportation facilities. Transportation-specific bond measures have passed in other communities throughout Oregon. Though this funding source is one that can be used to finance a multitude of project types, it must be noted that the accompanying administrative costs are high and voter approval must be gained.

Optional Tax

Optional taxes are taxes that a taxpayer elects to pay to fund projects and improvements. Usually not a legislative requirement to pay the tax and paid at the time other taxes are collected, optional taxes are usually less controversial and easily collected since they require the taxpayer to decide whether or not to pay the additional tax. The voluntary nature of the tax limits the reliability and stableness of the funding source.

Local Fuel Tax

A local tax assessed on fuel purchased within the jurisdiction that has assessed the tax. The taxes are paid to the city monthly by distributors of fuel. Voters would need to pass the tax, and the process for presenting such a tax to voters will need to be consistent with Oregon State law as well as the laws of the City. Nearby locations with a gas tax includes Milwaukie (two cents per gallon), Canby (three cents per gallon), Tigard (three cents per gallon), Multnomah County (three cents per gallon) and Washington County (one cent per gallon).

Residents of Clackamas County are currently voting on 6 to 8 cent gas tax that, if passed, could provide Gladstone with an additional $200,000 in revenue per year for seven years.

User Fees

Fees tacked onto a monthly utility bill or tied to the annual registration of a vehicle to pay for improvements, expansion, and maintenance to the street system. This may be a more equitable assessment given the varying fuel efficiency of vehicles. Regardless of fuel efficiency, passenger vehicles do equal damage to the street system. The cost of implementing such a system could be prohibitive given the need to track the number of vehicle miles traveled in every vehicle. Additionally, a user fee specific to a single jurisdiction does not account for the street use from vehicles registered in other jurisdictions.

Street Utility Fees/Road Maintenance Fee

The fee is based on the number of trips a particular land use generates and is usually collected through a regular utility bill. For the communities in Oregon that have adopted this approach, it provides a stable source of revenue to pay for street maintenance allowing for safe and efficient movement of people, goods, and services.

Gladstone is in the process of starting to charge right-of-way (ROW) fees to users of City-owned ROW to fund improvements and ROW management and maintenance. It is projected that the ROW fees could correspond to an extra $300,000 to $400,000 per year to Gladstone’s General Fund, which will then be included as part of the street improvement funding.

General Fund (GF) Revenues

Revenue from the City’s GF can be allocated to transportation funding at the discretion of the City Council during the annual budget process. GF revenues primarily include property taxes, use taxes, and any other miscellaneous taxes and fees imposed by the City. GF resources have the potential to fund any type of transportation expenditures but would only be available if it had increased revenues or if the City Council directs funding that is traditionally allotted to other City expenditures and programs.

Attachment A Historical Revenue and Expenditures

Street & Road Fund 005

Revenue	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17
Beginning Fund Balance	782,097	646,441	556,168	466,775	239,041	308,281	431,374	529,660	637,724	531,152	709,515
Public Service Taxes	566,383	529,584	469,987	507,073	587,777	626,123	628,655	656,823	663,873	671,672	640,000
Charges for Services	76,747	175,957	20,147	5,780	1,162	36,154	8,123	19,863	9,778	275,176	10,000
Miscellaneous	27	207,684	11,400	327	458	2,668	9,860	3,620	23,661	8,225	5,000
Other	0	0	188,925	0	0	0	0	0	0	0	0
Grants	0	0	0	68,339	0	11,325	0	0	0	0	0

Expenditures	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17
Personal Service	98,787	133,766	148,560	149,718	168,207	174,616	163,116	159,344	142,499	169,286	231,285
Materials & Services	130,876	208,948	222,329	231,958	243,924	229,835	201,730	328,703	175,836	210,901	272,000
Capital Outlay	549,150	609,361	356,836	374,042	54,411	95,030	128,146	27,174	426,818	231,289	572,496
Contingency	0	0	0	0	0	0	0	0	0	0	100,000
Transfers Out	0	51,423	52,127	53,535	53,615	53,696	55,360	57,021	58,731	60,493	62,308

Ending Fund Balance	646,441	556,168	466,775	239,041	308,281	431,374	529,660	637,724	531,152	814,256	126,426

APPENDIX D TECH MEMO #4: TSP METHODOLOGY AND ASSUMPTIONS

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

Date: November 4, 2016 Project #: 19890.2

To: Jim Whynot and Jacque Betz, City of Gladstone
Gail Curtis, Oregon Department of Transportation, Region 1

From: Matthew Bell and Molly McCormick, Kittelson & Associates, Inc.
Project: Gladstone Transportation System Plan (TSP) Update
Subject: Final Tech Memo 4: TSP Methodology and Assumptions (Subtask 2.7)

This memorandum documents the methodology and assumptions associated with the existing and future transportation system operations analyses for the Gladstone Transportation System Plan (TSP) Update. The methodology and assumptions included in this memorandum are based on guidance provided in the Oregon Department of Transportation (ODOT) Transportation System Plan Guidelines (Reference 1), the ODOT Analysis Procedures Manual (APM – Reference 2), and direction provided by City and ODOT staff. The analyses described in this memorandum will help identify potential deficiencies in the transportation system, including:

- Traffic operations at the study intersection under existing and future traffic conditions,
- Traffic safety at the study intersections and along study area roadways,
- Gaps and deficiencies in the bicycle and pedestrian network,
- Gaps and deficiencies in the transit service (service frequency, hours, coverage, etc.), and
- Gaps and deficiencies in other travel modes.

This information will serve as a baseline for identifying a comprehensive list needs and deficiencies to be addressed as part of the TSP update. It will also serve as a baseline for identifying and evaluating potential solutions and developing a prioritized list of improvements for the TSP update.

STUDY INTERSECTIONS

The study intersections for the Gladstone TSP Update were determined by the City and ODOT prior to the development of the scope of the work. There are a total of eight study intersections located along City and ODOT facilities, including six signalized and two unsignalized intersections. Figure 1 illustrates the location of the study intersections. The following provides information related to the traffic counts conducted at the study intersections and how they will be used to develop existing and future traffic volumes. The eight study intersections include:

- OR 99E/S Arlington Street
- OR 99E/W Gloucester Street
- OR 99E/Glen Echo Avenue
- Oatfield Road/SE 82nd Drive
- Oatfield Road/Ridgegate Drive-Collins Crest Street
- Oatfield Road/Glen Echo Avenue
- I-205 Southbound Ramp Terminal/ SE 82nd Drive
- I-205 Northbound Ramp Terminal/SE 82nd Drive

Additional consideration will be given to traffic operations and safety at the Oatfield Road/Webster Road and Oatfield Road/Gloucester Street intersections. Per discussion with the project team and advisory committees, several of the study intersections have operational and/or safety issues today.

Traffic Counts

Manual turning movement counts were conducted at the study intersections in June 2016. The counts were conducted on a typical mid-week day during the evening (4:00 to 6:00 p.m.) peak period. The counts include the total number of pedestrians, bicyclists, and motor vehicles that entered the study intersections in 5-minute intervals. *The traffic count worksheets are provided in Attachment A.*

Peak Hour Development

The traffic counts were reviewed to determine individual and system-wide peak hours for the operational analyses. The system-wide peak hour for the study intersections was identified as 4:30 to 5:30 p.m. Although a system-wide peak hour was identified, individual intersection peak hours will be used to complete the operational analyses because the system-wide peak hour is not consistent with the individual peak hours. Table 1 summarizes the study intersections, the individual intersection peak hours, and the percent difference in peak hour total entering volume (TEV) between the individual intersection and system-wide peak hours.

Table 1: Study Intersection Peak Hours

Map ID	Intersection	Intersection Peak Hour	Total Entering Volume (TEV)	% Difference from System Peak Hour
1	OR 99E/S Arlington Street	4:35 to 5:35 p.m.	3,764	-0.6
2	OR 99E/W Gloucester Street	4:55 to 5:55 p.m.	3,256	-2.2
3	OR 99E/Glen Echo Avenue	4:55 to 5:55 p.m.	3,301	-0.3
4	Oatfield Road/SE 82nd Drive	4:10 to 5:10 p.m.	2,238	-0.2
5	Oatfield Road/Ridgegate Drive-Collins Crest Street	4:05 to 5:05 p.m.	990	-3.0
6	Oatfield Road/Glen Echo Avenue	4:00 to 5:00 p.m.	984	-0.6
7	I-205 Southbound Ramp Terminal/SE 82nd Drive	4:00 to 5:00 p.m.	2,546	-2.7
8	I-205 Northbound Ramp Terminal/SE 82nd Drive	4:30 to 5:30 p.m.	2,308	0.0

Study Intersections
Gladstone, Oregon

Figure
1

H:\projfile\19890 - Gladstone TSP Update\gis\TM11_Study Intersections.mxd - mbell - 3:11 PM 9/23/2016

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

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

Seasonal Factors

30th Hour Volumes (30 HV) for the Gladstone TSP Update will be developed based on the traffic counts collected at the study intersections and the application of seasonal adjustment factors consistent with the methodology identified in the APM. The APM identifies three methods for identifying seasonal adjustment factors for highway traffic volumes. All three methods utilize information provided by Automatic Traffic Recorders (ATRs) located in select locations throughout the State Highway System that collect traffic data 24-hours a day, 365 days a year. Each method was evaluated to determine the most appropriate method for the study intersections. Based on the evaluations, the Seasonal Trend Table method will be used to develop 30 HV volumes at the ODOT study intersections. The results of the evaluation are summarized below.

Seasonal Trend Table Method

The Seasonal Trend Table Method uses average values from the ATR Characteristic Table for each seasonal traffic trend. Based on a review of the regional and local traffic trends, a combination of the Interstate Urbanized and Commuter seasonal traffic trend values were used to determine the seasonal adjustment factors for the study intersections. Table 2 summarizes the average values for the seasonal traffic trends during the count month of June and the peak period as provided in the ODOT Seasonal Trend Table.

Table 2: Seasonal Trend Table

Trend	1-June	15-June	Peak Period Seasonal Factor	Seasonal Adjustment Factor
Interstate Urbanized	0.9381	0.9195	0.9164	1.0129
Commuter	0.9495	0.9586	0.9149	1.0432

The seasonal adjustment factor shown in Table 2 for Interstate Urbanized facilities (1.0129) will be used to derive 30 HV volumes at the Interstate 205 (I-205) Ramp Terminals, while the seasonal adjustment factor for Commuter facilities will be used to derive 30 HV at all other ODOT study intersections.

Historical Factors

All of the traffic counts were conducted in 2016; therefore, no historical factors are needed to adjust traffic volumes.

Forecast Traffic Volumes

Forecast traffic volumes for the Gladstone TSP Update will be developed for the study intersections based on the methodology identified in the National Cooperative Highway Research Program (NCHRP) Report 255 *Highway Traffic Data for Urbanized Area Project Planning and Design*. The methodology combines the year 2016 30 HV traffic volumes developed at the study intersections with base year 2010 and future year 2040 traffic volume forecasts from the current Metro travel demand model developed for the adopted 2014 Regional Transportation Plan (RTP).

Intersection Operational Standards

City Facilities

The City of Gladstone uses Level of Service (LOS) to assess intersection operations. The City's current TSP sets a maximum LOS standard of E for all signalized and unsignalized intersections. Table 3 summarizes the LOS standards that will be used to identify existing and potential future operational issues at the City study intersections.

Table 3: City Mobility Standards

Map ID	Intersection	Traffic Control	Mobility Standard
5	Oatfield Road/Ridgegate Drive-Collins Crest Street	TWSC	LOS E
6	Oatfield Road/Glen Echo Avenue	TWSC	LOS E

TWSC: Two-way Stop Control

ODOT Facilities

ODOT uses volume-to-capacity (V/C) ratio to assess intersections operations. Table 7 of the *Oregon Highway Plan* (OHP - Reference 3) and Table 10-2 of the *Oregon Highway Design Manual* (HDM – Reference 4) provide maximum volume-to-capacity ratios for all signalized and unsignalized intersections within the Portland metropolitan area Urban Growth Boundary (UGB). The OHP ratios are used to evaluate existing and future no-build conditions, while the HDM ratios are used in the creation of future TSP alternatives which involve projects along state highways. The ODOT controlled intersections within the study area are located along OR 99E, at the I-205 ramp terminals, and along SE 82nd Drive. Table 4 summarizes the v/c ratios that will be used to identify existing and potential future operational issues at the ODOT study intersections.

Table 4: ODOT Mobility Standards

Map ID	Intersection	Traffic Control	OHP Mobility Targets		HDM Standard
			1st Hour	2nd Hour	
1	OR 99E/S Arlington Street	Signal	1.1	0.99	0.85
2	OR 99E/W Gloucester Street	Signal	1.1	0.99	0.85
3	OR 99E/Glen Echo Avenue	Signal	1.1	0.99	0.85
4	Oatfield Road/SE 82nd Drive	Signal	0.99	0.99	0.85
7	I-205 Southbound Ramp Terminal /SE 82nd Drive	Signal	0.85*		0.75
8	I-205 Northbound Ramp Terminal /SE 82nd Drive	Signal	0.85*		0.75

* This v/c ratio may be increased to 0.90 if it can be determined that vehicles queues will not extend onto the mainline or into the portion of the ramp needed to safely accommodate deceleration; and if an adopted Interchange Area Management Plan (IAMP) is present or can be developed.

Traffic operations at the study intersection will be evaluated based the mobility standards shown in Tables 3 and 4. Potential solutions will be identified and evaluated for the study intersections that are found to exceed the mobility standards under existing and/or future traffic conditions.

ANALYSIS MODEL PARAMETERS

The bullets below identify the specific sources of data and methodologies proposed to conduct the operational analyses. Analyses of all state facilities will be conducted according to the APM, unless otherwise agreed upon by the City and ODOT.

1. *Intersection/Roadway Geometry* (lane numbers and arrangements, cross-section elements, signal phasing, etc.) will be collected through aerial photography and confirmed through a site visit. Available as-built data may also be used to verify existing roadway geometry. The analysis models will be built on scaled roadway line work from GIS or aerial photography.
2. *Operational Data* (such as posted speeds, intersection control, parking, transit stops, rail crossings, right-turn on red, etc.) will be collected through a site visit. Data will be reviewed and supplemented by available GIS data, traffic count DVDs, aerials, and photos.
3. *Peak Hour Factors* (PHF) will be calculated for each intersection and applied to the existing conditions analyses. PHFs of 0.95 will be used for the year 2040 analysis for high-order facilities (arterials), with 0.90 applied to medium-order facilities (collectors) and 0.85 applied to local roads. If the existing PHF is greater than these default future values, the existing PHF will be applied.
4. *Traffic Volume* development is described above.
5. *Signal Timing Data* will be requested from ODOT for use in the existing conditions analysis. Signal parameters such as Flash Don't Walk, Walk, and Minimum Times will be retained in the forecast analysis with the signal splits optimized to better serve the future traffic volume patterns. Optimized signal cycle lengths may range between 60 and 120 seconds.
6. Traffic Operations
    a. The 2000 Highway Capacity Manual (HCM 2000) methodology will be used to analyze traffic operations at the signalized intersections while the HCM 2010 methodology will be used to analyze traffic operations at the unsignalized intersections.
    b. The existing and future no-build traffic operations analyses will use Synchro 9 software using HCM 2000 reports for signalized intersections and HCM 2010 reports for unsignalized intersections.
    c. Queuing analysis methodology will be based on Synchro 95th percentile queue lengths. Microsimulation is not proposed as part of this long-range planning effort.

TRAFFIC ANALYSIS SOFTWARE AND INPUT ASSUMPTIONS

Synchro 9 software will be used for the intersection analysis. The reported results will be the level of service, intersection delay, and v/c ratios generated by the HCM report. Analysis assumptions are listed in Table 5.

Table 5: Synchro Operations Parameters/Assumptions

Arterial Intersection Parameters	Existing Conditions
Peak Hour Factor	From traffic counts
Conflicting Bikes and Pedestrian per Hour	From traffic counts, as available
Area Type	Other
Ideal Saturation Flow Rate (for all movements)	1,750 passenger cars per hour green per lane
Lane Width	12 feet unless field observations suggest otherwise
Percent Heavy Vehicles	From traffic counts by movement, as available
Percent Grade	Estimated based on field observations
Parking Maneuvers per Hour	Estimated based on field observations
Bus Blockages	Estimated based on frequency of service
Intersection signal phasing and coordination	From ODOT/County/City
Intersection signal timing optimization limits	Maximum cycle length = 120 seconds
Minimum Green time	From timing plans
Yellow and all-red time	From timing plans
95th percentile vehicle queues	Synchro HCM summary output

MULTI-MODAL ANALYSIS

The multimodal analysis will be performed in accordance with the methodologies identified in Chapter 14 of the APM and identify the needs associated with public transportation, pedestrian, and bicycle facilities and services. The pedestrian and bicycle analyses will be supplemented by a Pedestrian Level of Traffic Stress (PLTS) analysis and a Bicycle Level of Traffic Street (BLTS) analysis, consistent with the APM. All analysis results will be presented both in a tabular format and as part of a GIS map. Both PLTS and BLTS methods group facilities into four different stress levels for segments, intersection approaches and intersection crossings. Facilities with an LTS 1 rating have little to no traffic stress, require less attention, and are suitable for all users. Facilities with an LTS 2 rating have little traffic stress, but require more attention and therefore, may or may not be suitable for small children. Facilities with an LTS 3 rating have moderate traffic stress and are suitable for adults. Facilities with an LTS 4 rating have high traffic stress and are only suitable for able-bodied adults with limited options.

CRASH ANALYSIS

The five most recent years of crash data will be reviewed at the study intersections and along the City's roadway segments consistent with the methodologies outlined in the APM. The data will be analyzed for number, type, severity, and location to identify potential crash patterns and million entering vehicle (MEV) crash rates. Intersection crash rates will be compared to the published 90th percentile crash rates in Exhibit 4.1 of the APM and segment crash rates will be compared to Table II in the current ODOT Crash Rate Tables. In addition, ODOT's top 10% ODOT Safety Priority System sites will be reviewed, as appropriate. Any identified potential countermeasures (and any resulting crash percentage reduction) will be taken from the All Roads Transportation Safety (ARTS) Crash Reduction Factors (CRF) listing or the CRF Appendix.

2014 REGIONAL TRANSPORTATION PLAN PERFORMANCE MEASURES

Metro's Regional Transportation Plan (RTP) establishes performance targets for safety, congestion, freight reliability, climate change, active transportation, sidewalk/trail/transit infrastructure, clean air, travel, affordability, and access to daily needs. These performance targets were used to inform the project goals and objectives as well as project evaluation criteria identified in Tech Memo 2. The TSP update will address each of these performance targets and identify how the City will help the region move closer to meeting the targets on a local and regional level.

REFERENCES

1. Oregon Department of Transportation. *Transportation System Plan Guidelines*, 2008.
2. Oregon Department of Transportation. *Analysis Procedures Manual*, 2012.
3. Oregon Department of Transportation. *Oregon Highway Plan*, 2012.
4. Oregon Department of Transportation. *Highway Design Manual*, 2012.
5. Transportation Research Board, Nation Research Council. *TCRP Report 100: Transit Capacity and Quality of Service Manual*, 2003.

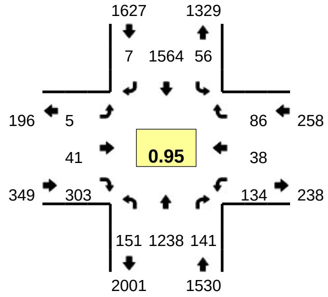
ATTACHMENTS

A. Traffic Counts

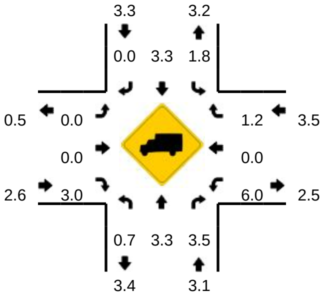
Attachment A Traffic Counts

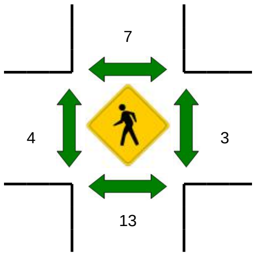
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

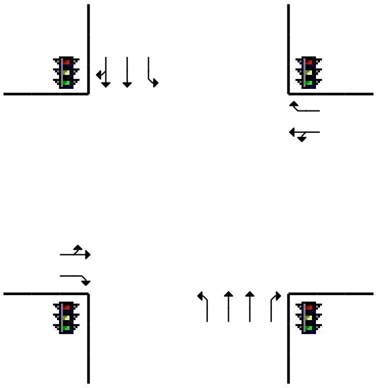
LOCATION: OR-99E -- W Arlington St | **QC JOB #:** 13837102
CITY/STATE: Gladstone, OR | **DATE:** Wed, Jun 08 2016

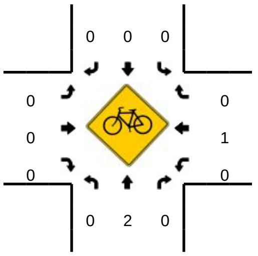


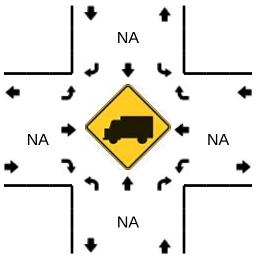
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

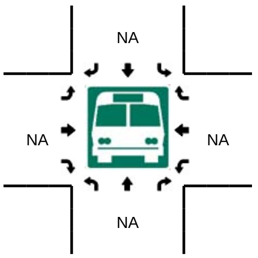












5-Min Count Period Beginning At	OR-99E (Northbound)				OR-99E (Southbound)				W Arlington St (Eastbound)				W Arlington St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	8	95	13	0	5	129	0	0	0	1	22	0	13	2	4	0	292	
4:05 PM	6	104	6	0	3	134	2	0	0	0	22	0	13	4	6	0	300	
4:10 PM	13	67	12	0	4	127	1	0	0	3	16	0	13	7	4	0	267	
4:15 PM	9	89	10	0	8	131	1	0	0	4	27	0	13	4	11	0	307	
4:20 PM	17	107	9	0	2	101	0	0	2	3	17	0	9	2	4	0	273	
4:25 PM	15	95	8	0	3	117	0	0	2	4	23	0	16	3	8	0	294	
4:30 PM	13	94	8	0	4	101	0	0	0	4	27	0	12	4	14	0	281	
4:35 PM	11	104	18	0	4	140	1	0	0	3	30	0	8	2	3	0	324	
4:40 PM	16	80	9	0	6	121	0	0	1	1	23	0	14	5	9	0	285	
4:45 PM	14	98	15	0	5	126	0	0	1	0	25	0	13	5	5	0	307	
4:50 PM	15	95	10	0	4	119	0	0	1	5	37	0	12	3	11	0	312	
4:55 PM	12	108	11	0	1	153	1	0	0	2	19	0	8	3	5	0	323	3565
5:00 PM	13	100	12	0	6	110	1	0	0	6	34	0	2	1	10	0	295	3568
5:05 PM	8	119	9	0	6	140	0	0	0	5	23	0	12	1	11	0	334	3602
5:10 PM	17	99	14	0	3	128	1	0	0	4	29	0	17	7	11	0	330	3665
5:15 PM	7	115	12	0	5	155	0	0	0	5	13	0	11	2	3	0	328	3686
5:20 PM	12	98	9	0	7	117	1	0	1	4	30	0	15	0	7	0	301	3714
5:25 PM	10	107	14	0	5	137	2	0	1	4	20	0	14	5	1	0	320	3740
5:30 PM	16	115	8	0	4	118	0	0	0	2	20	0	8	4	10	0	305	3764
5:35 PM	7	95	10	0	3	121	0	0	1	2	23	0	13	6	3	0	284	3724
5:40 PM	17	113	9	0	9	102	1	0	1	3	34	0	10	4	6	0	309	3748
5:45 PM	10	101	13	0	5	127	0	0	0	3	11	0	6	7	4	0	287	3728
5:50 PM	16	117	10	0	4	131	0	0	1	4	27	0	6	1	10	0	327	3743
5:55 PM	10	99	8	0	4	110	1	0	0	3	19	0	15	5	7	0	281	3701

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	128	1332	140	0	56	1692	4	0	0	56	260	0	160	40	100	0	3968
Heavy Trucks	0	32	12		0	44	0		0	0	8		4	0	0		100
Pedestrians		4				0				8				8			20
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

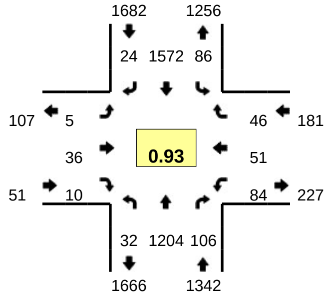
Report generated on 8/15/2016 1:52 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

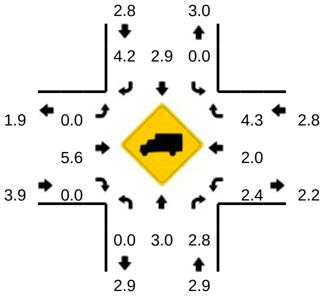
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

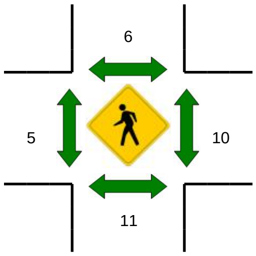
LOCATION: OR-99E -- W Gloucester St — **QC JOB #:** 13837104

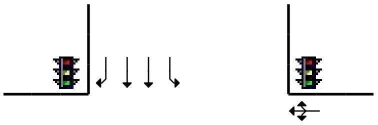
CITY/STATE: Gladstone, OR — **DATE:** Wed, Jun 08 2016

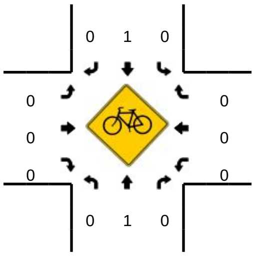


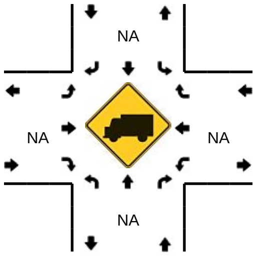
Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

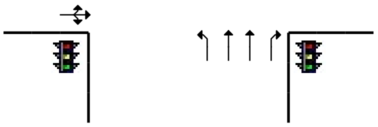


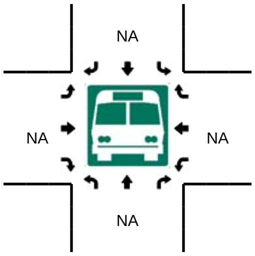












5-Min Count Period Beginning At	OR-99E (Northbound)				OR-99E (Southbound)				W Gloucester St (Eastbound)				W Gloucester St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	110	9	0	9	109	4	0	1	1	0	0	7	4	3	0	258	
4:05 PM	4	85	7	0	4	154	0	0	1	2	2	0	4	2	2	0	267	
4:10 PM	3	75	8	0	7	138	4	0	1	4	3	0	7	8	4	0	262	
4:15 PM	2	78	8	0	10	129	2	0	1	3	3	0	6	4	4	0	250	
4:20 PM	2	95	9	0	2	86	0	0	0	3	3	0	9	10	5	0	224	
4:25 PM	2	88	9	0	4	120	5	0	3	2	1	0	5	3	7	0	249	
4:30 PM	0	108	5	0	2	110	2	0	2	3	0	0	6	2	3	0	243	
4:35 PM	3	77	3	0	7	143	0	0	0	3	4	0	8	1	7	0	256	
4:40 PM	2	99	5	0	6	107	3	0	3	3	1	0	5	5	4	0	243	
4:45 PM	1	94	2	0	5	151	1	0	1	3	2	0	6	2	2	0	270	
4:50 PM	1	98	1	0	7	100	3	0	2	4	1	0	6	4	4	0	231	
4:55 PM	5	87	7	0	6	159	4	0	1	2	0	0	5	2	3	0	281	3034
5:00 PM	2	84	6	0	6	118	3	0	1	1	1	0	10	5	7	0	244	3020
5:05 PM	2	124	7	0	6	149	3	0	0	1	0	0	6	4	6	0	308	3061
5:10 PM	3	116	10	0	9	132	2	0	0	10	3	0	6	1	2	0	294	3093
5:15 PM	1	78	10	0	15	151	2	0	0	1	0	0	6	4	2	0	270	3113
5:20 PM	3	117	10	0	4	132	2	0	1	2	1	0	17	7	2	0	298	3187
5:25 PM	1	88	9	0	9	126	2	1	1	3	1	0	3	1	2	0	247	3185
5:30 PM	6	108	9	0	7	109	1	0	0	4	0	0	4	6	1	0	255	3197
5:35 PM	4	81	12	0	6	133	1	0	0	5	0	0	4	5	7	0	258	3199
5:40 PM	3	116	10	0	6	111	3	0	0	1	0	0	7	7	6	0	270	3226
5:45 PM	2	91	8	0	5	123	1	0	1	4	1	0	6	4	4	0	250	3206
5:50 PM	0	114	8	0	6	129	0	0	0	2	3	0	10	5	4	0	281	3256
5:55 PM	2	91	8	0	7	108	1	0	1	8	0	0	1	5	4	0	236	3211

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	24	1272	108	0	120	1728	28	0	0	48	12	0	72	36	40	0	3488
Heavy Trucks	0	32	8		0	44	4		0	0	0		0	0	0		88
Pedestrians		16				4				8				12			40
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/15/2016 1:52 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

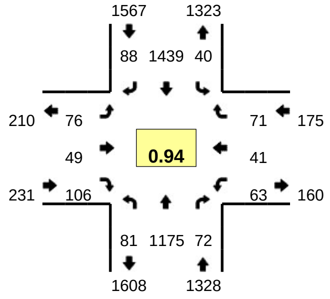
Method for determining peak hour: Total Entering Volume

LOCATION: OR-99E -- Glen Echo Ave

CITY/STATE: Gladstone, OR

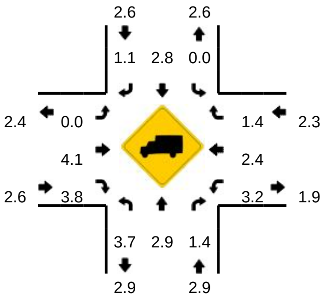
QC JOB #: 13837106

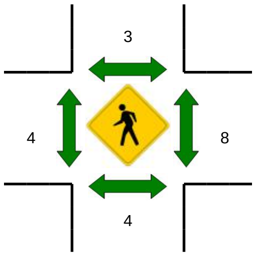
DATE: Wed, Jun 08 2016

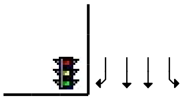


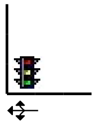
Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

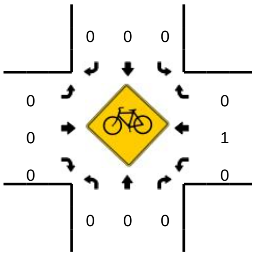
Quality Counts
TRANSPORTATION DATA
COLLECTION SERVICES

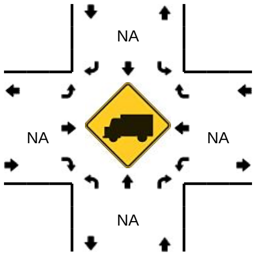


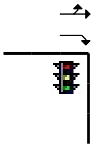


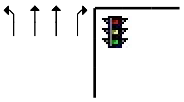


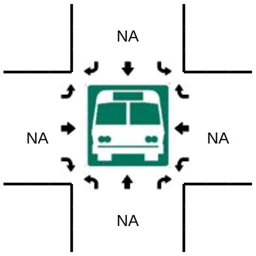












5-Min Count Period Beginning At	OR-99E (Northbound)				OR-99E (Southbound)				Glen Echo Ave (Eastbound)				Glen Echo Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	6	95	5	0	7	125	8	0	7	0	7	0	7	4	4	0	275	
4:05 PM	6	91	4	0	0	119	7	0	6	4	14	0	1	7	7	0	266	
4:10 PM	4	76	2	0	5	138	8	0	1	5	10	0	11	3	4	0	267	
4:15 PM	5	91	6	0	2	106	6	0	7	2	14	0	2	8	2	0	251	
4:20 PM	11	85	1	0	2	98	8	0	4	5	2	0	2	3	3	0	224	
4:25 PM	8	103	5	0	2	96	6	0	3	6	9	0	0	3	10	0	251	
4:30 PM	5	91	5	0	3	124	11	0	8	1	5	0	4	2	8	0	267	
4:35 PM	9	94	4	0	0	108	7	0	2	3	13	0	5	6	4	0	255	
4:40 PM	3	82	5	0	3	132	5	0	7	2	7	0	7	1	9	0	263	
4:45 PM	4	105	10	0	2	117	6	0	5	4	9	0	7	2	7	0	278	
4:50 PM	8	79	3	0	2	131	7	0	7	4	1	0	5	4	10	0	261	
4:55 PM	10	98	4	0	4	128	8	0	4	7	16	0	2	2	10	0	293	3151
5:00 PM	1	95	6	0	5	118	7	0	5	2	13	0	6	10	5	0	273	3149
5:05 PM	8	115	8	0	1	113	6	0	6	3	7	0	5	3	8	0	283	3166
5:10 PM	5	109	5	0	3	140	7	1	5	6	10	0	4	2	5	0	302	3201
5:15 PM	5	82	6	0	0	124	9	0	7	3	5	0	7	4	5	0	257	3207
5:20 PM	5	95	8	0	3	160	10	0	10	7	7	0	3	3	4	0	315	3298
5:25 PM	11	87	5	0	3	94	6	0	7	3	8	0	9	4	6	0	243	3290
5:30 PM	7	100	3	0	3	112	7	0	4	4	4	0	4	0	6	0	254	3277
5:35 PM	7	95	4	0	4	108	8	0	4	1	7	0	4	4	7	0	253	3275
5:40 PM	7	82	10	0	5	124	11	0	6	6	9	0	7	2	3	0	272	3284
5:45 PM	7	121	5	0	2	93	5	0	7	5	8	0	8	5	6	0	272	3278
5:50 PM	8	96	8	0	6	125	4	0	11	2	12	0	4	2	6	0	284	3301
5:55 PM	5	97	8	0	1	89	7	0	9	2	3	0	5	3	11	0	240	3248

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	60	1144	76	0	24	1696	104	4	88	64	88	0	56	36	56	0	3496
Heavy Trucks	0	24	4		0	52	0		0	0	0		0	4	0		84
Pedestrians		4				0				12				8			24
Bicycles	0	0	0		0	0	0		0	0	0		0	1	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/15/2016 1:52 PM

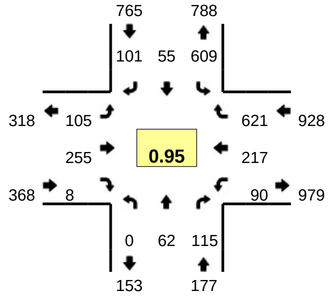
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

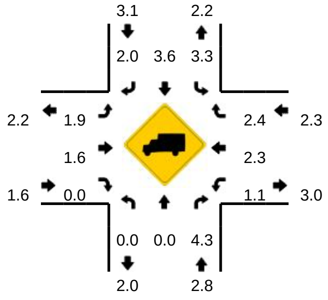
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

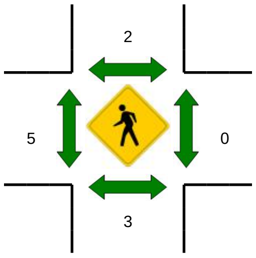
LOCATION: Oatfield Rd -- 82nd Dr
CITY/STATE: Gladstone, OR

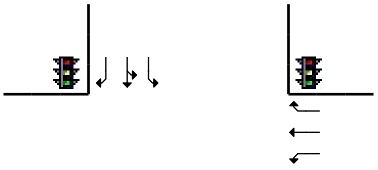
QC JOB #: 13837110
DATE: Wed, Jun 08 2016

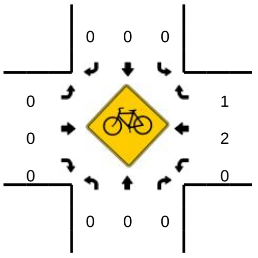
Peak-Hour: 4:10 PM -- 5:10 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

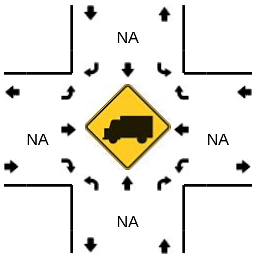


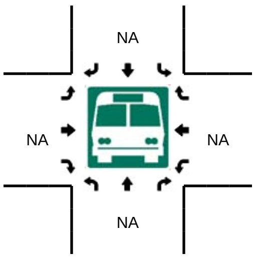












5-Min Count Period Beginning At	Oatfield Rd (Northbound)				Oatfield Rd (Southbound)				82nd Dr (Eastbound)				82nd Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	4	18	0	54	6	7	0	9	14	0	0	9	19	40	0	180	
4:05 PM	1	4	8	0	34	3	6	0	6	21	0	0	10	18	57	0	168	
4:10 PM	0	6	8	0	67	2	7	0	15	17	1	0	4	17	39	0	183	
4:15 PM	0	3	6	0	69	7	9	0	3	23	1	0	8	18	52	0	199	
4:20 PM	0	6	8	0	45	2	6	0	12	19	0	0	5	22	44	0	169	
4:25 PM	0	8	10	0	49	0	11	0	7	11	0	0	9	16	56	0	177	
4:30 PM	0	3	6	0	45	7	6	0	10	30	2	0	8	18	52	0	187	
4:35 PM	0	6	9	0	49	8	8	0	5	19	1	0	8	26	44	0	183	
4:40 PM	0	3	10	0	38	4	8	0	8	23	0	0	10	19	73	0	196	
4:45 PM	0	5	12	0	61	4	7	0	10	19	1	0	9	14	52	0	194	
4:50 PM	0	5	11	0	47	3	15	0	9	16	2	0	13	14	48	0	183	
4:55 PM	0	7	12	0	57	8	4	0	8	21	0	0	6	19	68	0	210	2229
5:00 PM	0	8	12	0	39	5	14	0	11	25	0	0	2	22	39	0	177	2226
5:05 PM	0	2	11	0	43	5	6	0	7	32	0	0	8	12	54	0	180	2238
5:10 PM	1	8	11	0	47	3	5	0	10	24	0	0	11	21	32	0	173	2228
5:15 PM	1	6	13	0	53	4	6	0	8	27	0	0	4	14	48	0	184	2213
5:20 PM	0	3	9	0	43	7	12	0	9	25	0	0	5	13	55	0	181	2225
5:25 PM	0	5	5	0	48	2	10	0	10	14	0	0	5	31	54	1	185	2233
5:30 PM	0	4	8	0	57	5	4	0	8	21	2	0	12	15	43	0	179	2225
5:35 PM	0	8	7	0	56	6	12	0	7	17	0	0	9	17	44	0	183	2225
5:40 PM	0	4	12	0	50	2	8	0	9	11	0	0	4	17	44	0	161	2190
5:45 PM	0	4	8	0	50	3	5	0	12	15	1	0	9	21	38	0	166	2162
5:50 PM	0	5	10	0	45	4	7	0	11	11	0	0	3	18	48	0	162	2141
5:55 PM	1	8	8	0	35	5	4	0	7	12	0	0	12	25	38	0	155	2086

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	68	140	0	660	60	104	0	108	224	12	0	112	188	672	0	2348
Heavy Trucks	0	0	4		16	0	0		4	4	0		0	4	24		56
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

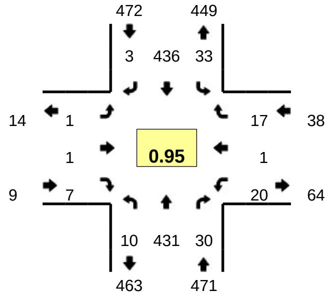
Comments:

Report generated on 8/15/2016 1:52 PM

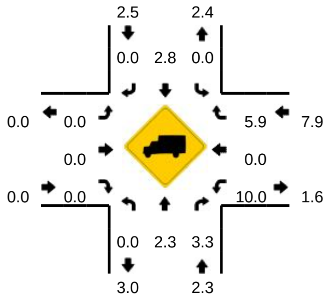
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

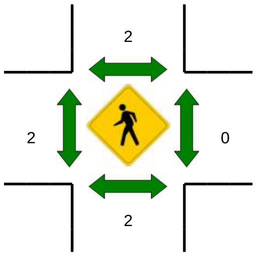
LOCATION: Oatfield Rd -- Collins Crest St/Ridgegate Dr **QC JOB #:** 13837112
CITY/STATE: Gladstone, OR **DATE:** Wed, Jun 08 2016

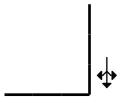


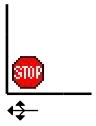
Peak-Hour: 4:05 PM -- 5:05 PM
Peak 15-Min: 4:05 PM -- 4:20 PM

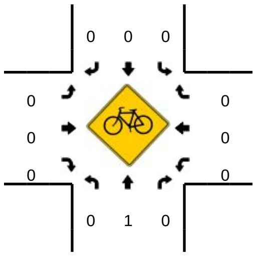


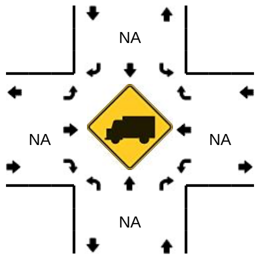
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

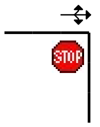


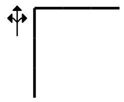


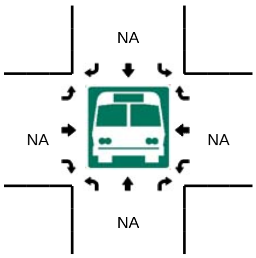












5-Min Count Period Beginning At	Oatfield Rd (Northbound)				Oatfield Rd (Southbound)				Collins Crest St/Ridgegate Dr (Eastbound)				Collins Crest St/Ridgegate Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	34	1	0	1	32	1	0	0	0	0	0	0	0	2	0	71	
4:05 PM	1	42	7	0	4	45	0	0	0	0	1	0	1	0	2	0	103	
4:10 PM	0	28	4	0	1	41	0	0	1	0	0	0	3	0	0	0	78	
4:15 PM	2	34	1	0	2	38	1	0	0	0	0	0	1	0	0	0	79	
4:20 PM	1	39	2	0	1	31	1	0	0	0	0	0	0	0	2	0	77	
4:25 PM	1	39	2	0	4	40	1	0	0	0	1	0	0	0	2	0	90	
4:30 PM	0	39	1	0	5	25	0	0	0	0	0	0	2	0	2	0	74	
4:35 PM	1	28	1	0	5	33	0	0	0	0	1	0	2	1	2	0	74	
4:40 PM	1	43	3	0	4	37	0	0	0	0	1	0	5	0	1	0	95	
4:45 PM	2	35	3	0	4	38	0	0	0	0	1	0	1	0	3	0	87	
4:50 PM	1	27	2	0	0	40	0	0	0	0	0	0	0	0	2	0	72	
4:55 PM	0	39	2	0	0	37	0	0	0	1	1	0	3	0	0	0	83	983
5:00 PM	0	38	2	0	3	31	0	0	0	0	1	0	2	0	1	0	78	990
5:05 PM	2	41	1	0	4	27	0	0	0	0	0	0	1	1	2	0	79	966
5:10 PM	2	26	1	0	1	31	3	0	0	0	1	0	0	0	2	0	67	955
5:15 PM	1	40	3	0	2	40	2	0	1	1	0	0	2	0	2	0	94	970
5:20 PM	2	26	4	0	4	34	2	0	1	0	3	0	0	0	1	0	77	970
5:25 PM	0	28	0	0	4	41	1	0	1	0	1	0	4	0	1	0	81	961
5:30 PM	1	31	1	0	7	40	0	0	0	0	0	0	5	0	1	0	86	973
5:35 PM	2	28	2	0	2	20	0	0	1	0	0	0	0	0	4	0	59	958
5:40 PM	2	35	3	0	4	43	1	0	1	0	2	0	2	0	3	0	96	959
5:45 PM	0	22	2	0	3	24	2	0	0	0	3	0	3	0	1	0	60	932
5:50 PM	0	38	3	0	1	24	0	0	0	0	1	0	1	0	6	0	74	934
5:55 PM	1	33	3	0	1	35	0	0	0	0	2	0	2	0	1	0	78	929

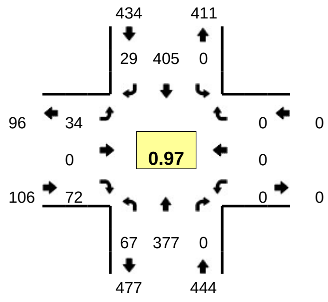
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	416	48	0	28	496	4	0	4	0	4	0	20	0	8	0	1040
Heavy Trucks	0	4	0		0	16	0		0	0	0		0	0	0		20
Pedestrians		4				0				4				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

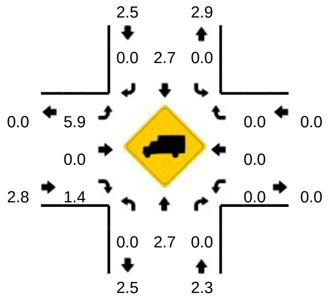
Report generated on 8/15/2016 1:52 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

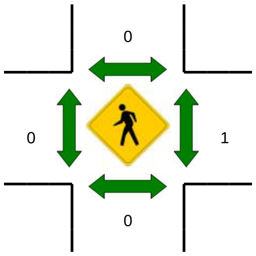
Type of peak hour being reported: Intersection Peak   Method for determining peak hour: Total Entering Volume

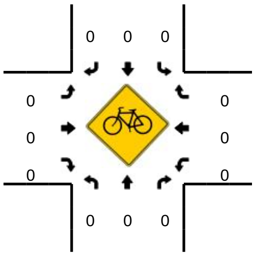
LOCATION: Oatfield Rd -- Glen Echo Ave   **QC JOB #:** 13837114
CITY/STATE: Clackamas, OR   **DATE:** Wed, Jun 08 2016

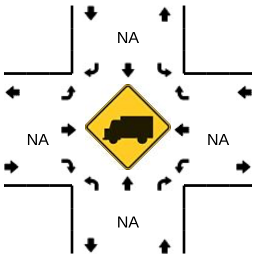


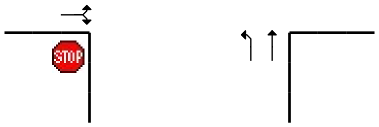
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:40 PM -- 4:55 PM

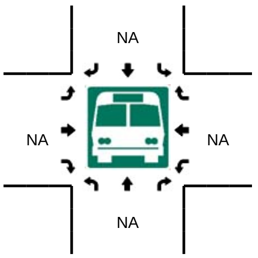












5-Min Count Period Beginning At	Oatfield Rd (Northbound)				Oatfield Rd (Southbound)				Glen Echo Ave (Eastbound)				Glen Echo Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	29	0	0	0	36	3	0	4	0	7	0	0	0	0	0	84	
4:05 PM	8	33	0	0	0	36	5	0	3	0	6	0	0	0	0	0	91	
4:10 PM	1	31	0	0	0	40	1	0	2	0	2	0	0	0	0	0	77	
4:15 PM	3	31	0	0	0	40	1	0	4	0	5	0	0	0	0	0	84	
4:20 PM	4	33	0	0	0	29	4	0	4	0	7	0	0	0	0	0	81	
4:25 PM	5	39	0	0	0	32	0	0	2	0	8	0	0	0	0	0	86	
4:30 PM	10	31	0	0	0	22	4	0	3	0	9	0	0	0	0	0	79	
4:35 PM	7	24	0	0	0	33	0	0	2	0	4	0	0	0	0	0	70	
4:40 PM	7	35	0	0	0	36	1	0	3	0	9	0	0	0	0	0	91	
4:45 PM	5	31	0	0	0	35	6	0	3	0	3	0	0	0	0	0	83	
4:50 PM	7	25	0	0	0	35	3	0	1	0	9	0	0	0	0	0	80	
4:55 PM	5	35	0	0	0	31	1	0	3	0	3	0	0	0	0	0	78	984
5:00 PM	6	31	0	0	0	30	3	0	1	0	3	0	0	0	0	0	74	974
5:05 PM	10	31	0	0	0	24	6	0	4	0	6	0	0	0	0	0	81	964
5:10 PM	10	20	0	0	0	33	2	0	4	0	4	0	0	0	0	0	73	960
5:15 PM	5	33	0	0	0	39	3	0	2	0	5	0	0	0	0	0	87	963
5:20 PM	4	25	0	0	0	36	5	0	1	0	1	0	0	0	0	0	72	954
5:25 PM	9	23	0	0	0	40	7	0	1	0	10	0	0	0	0	0	90	958
5:30 PM	2	29	0	0	0	38	3	0	4	0	8	0	0	0	0	0	84	963
5:35 PM	9	20	0	0	0	22	1	0	3	0	3	0	0	0	0	0	58	951
5:40 PM	9	35	0	0	0	38	2	0	0	0	9	0	0	0	0	0	93	953
5:45 PM	4	19	0	0	0	23	3	0	1	0	5	0	0	0	0	0	55	925
5:50 PM	10	32	0	0	0	25	4	0	0	0	0	0	0	0	0	0	71	916
5:55 PM	4	29	0	0	0	30	2	0	3	0	5	0	0	0	0	0	73	911

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	76	364	0	0	0	424	40	0	28	0	84	0	0	0	0	0	1016
Heavy Trucks	0	16	0		0	12	0		0	0	0		0	0	0		28
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/15/2016 1:52 PM   SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

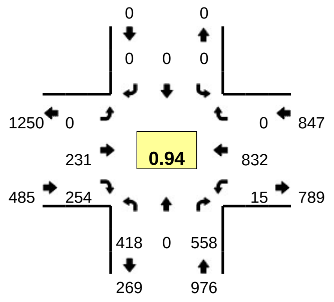
Method for determining peak hour: Total Entering Volume

LOCATION: I-205 NB Ramps -- 82nd Dr

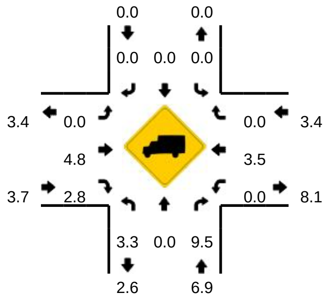
QC JOB #: 13837116

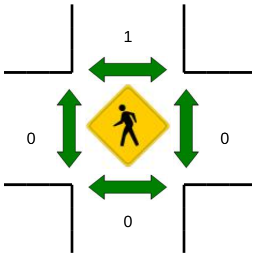
CITY/STATE: Clackamas, OR

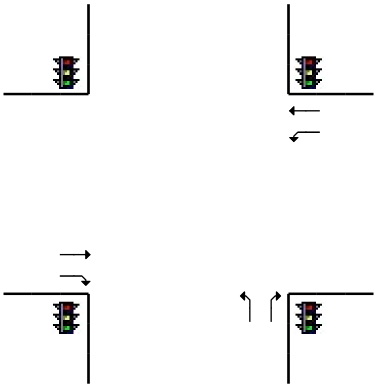
DATE: Wed, Jun 08 2016

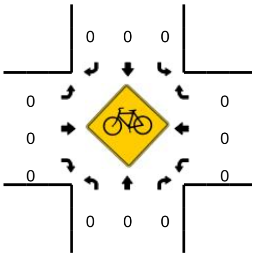


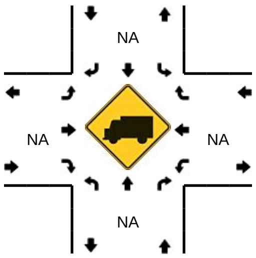
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

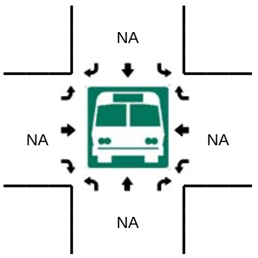












5-Min Count Period Beginning At	I-205 NB Ramps (Northbound)				I-205 NB Ramps (Southbound)				82nd Dr (Eastbound)				82nd Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	35	0	40	0	0	0	0	0	0	21	23	0	1	63	0	0	183	
4:05 PM	47	0	56	0	0	0	0	0	0	17	18	0	3	67	0	0	208	
4:10 PM	30	0	42	0	0	0	0	0	0	10	25	0	3	76	0	0	186	
4:15 PM	31	0	49	0	0	0	0	0	0	16	20	0	3	71	0	0	190	
4:20 PM	30	0	54	0	0	0	0	0	0	22	19	0	4	53	0	0	182	
4:25 PM	45	0	49	0	0	0	0	0	0	14	10	0	3	68	0	0	189	
4:30 PM	35	0	56	0	0	0	0	0	0	25	22	0	1	77	0	0	216	
4:35 PM	31	0	38	0	0	0	0	0	0	18	18	0	0	70	0	0	175	
4:40 PM	46	0	63	0	0	0	0	0	0	19	21	0	1	71	0	0	221	
4:45 PM	35	0	32	0	0	0	0	0	0	21	21	0	0	66	0	0	175	
4:50 PM	38	0	40	0	0	0	0	0	0	22	17	0	2	57	0	0	176	
4:55 PM	39	0	49	0	0	0	0	0	0	14	19	0	2	64	0	0	187	2288
5:00 PM	25	0	40	0	0	0	0	0	0	19	22	0	1	70	0	0	177	2282
5:05 PM	36	0	60	0	0	0	0	0	0	14	21	0	1	66	0	0	198	2272
5:10 PM	29	0	52	0	0	0	0	0	0	23	22	0	0	76	0	0	202	2288
5:15 PM	33	0	43	0	0	0	0	0	0	20	28	0	1	72	0	0	197	2295
5:20 PM	31	0	40	0	0	0	0	0	0	18	24	0	2	72	0	0	187	2300
5:25 PM	40	0	45	0	0	0	0	0	0	18	19	0	4	71	0	0	197	2308
5:30 PM	30	0	40	0	0	0	0	0	0	10	13	0	0	76	0	0	169	2261
5:35 PM	31	0	54	0	0	0	0	0	0	15	21	0	1	60	0	0	182	2268
5:40 PM	25	0	44	0	0	0	0	0	0	19	18	0	1	53	0	0	160	2207
5:45 PM	29	0	50	0	0	0	0	0	0	8	26	0	2	54	0	0	169	2201
5:50 PM	32	0	44	0	0	0	0	0	0	12	19	0	1	57	0	0	165	2190
5:55 PM	34	0	48	0	0	0	0	0	0	14	18	0	2	39	0	0	155	2158

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	448	0	628	0	0	0	0	0	0	248	244	0	8	872	0	0	2448
Heavy Trucks	16	0	84		0	0	0		0	16	20		0	40	0		176
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

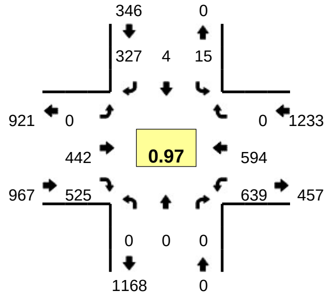
Report generated on 8/15/2016 1:52 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

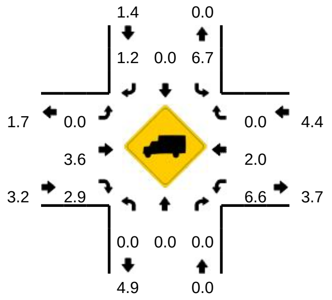
LOCATION: I-205 SB Ramps -- 82nd Dr | **QC JOB #:** 13837118

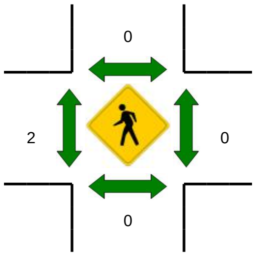
CITY/STATE: Clackamas, OR | **DATE:** Wed, Jun 08 2016

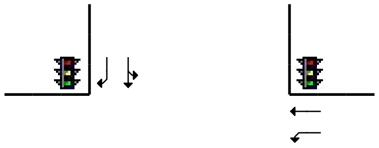


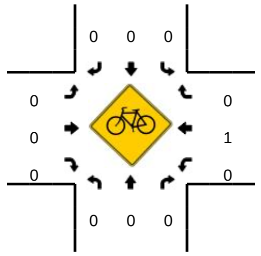
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:40 PM -- 4:55 PM

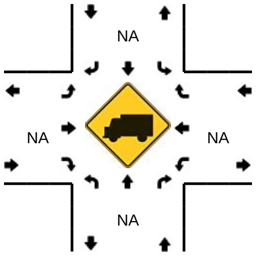
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

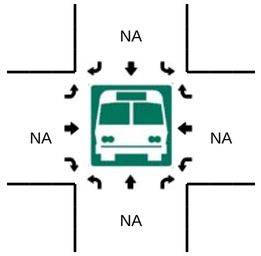












5-Min Count Period Beginning At	I-205 SB Ramps (Northbound)				I-205 SB Ramps (Southbound)				82nd Dr (Eastbound)				82nd Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	3	0	28	0	0	41	47	0	45	45	0	0	209	
4:05 PM	0	0	0	0	0	0	25	0	0	37	43	0	58	59	0	0	222	
4:10 PM	0	0	0	0	4	0	20	0	0	31	56	0	57	46	0	0	214	
4:15 PM	0	0	0	0	0	1	29	0	0	36	52	0	53	49	0	0	220	
4:20 PM	0	0	0	0	1	1	31	0	0	40	44	0	52	37	0	0	206	
4:25 PM	0	0	0	0	0	0	30	0	0	28	42	0	57	50	0	0	207	
4:30 PM	0	0	0	0	3	0	24	0	0	43	27	0	64	53	0	0	214	
4:35 PM	0	0	0	0	1	0	26	0	0	35	44	0	56	36	0	0	198	
4:40 PM	0	0	0	0	0	2	33	0	0	38	42	0	54	64	0	0	233	
4:45 PM	0	0	0	0	1	0	25	0	0	42	49	0	56	51	0	0	224	
4:50 PM	0	0	0	0	1	0	31	0	0	38	40	0	40	52	0	0	202	
4:55 PM	0	0	0	0	1	0	25	0	0	33	39	0	47	52	0	0	197	2546
5:00 PM	0	0	0	0	1	0	20	0	0	40	44	0	45	48	0	0	198	2535
5:05 PM	0	0	0	0	1	0	19	0	0	34	44	0	60	47	0	0	205	2518
5:10 PM	0	0	0	0	2	0	23	0	0	43	47	0	61	42	0	0	218	2522
5:15 PM	0	0	0	0	2	0	18	0	0	46	47	0	51	44	0	0	208	2510
5:20 PM	0	0	0	0	0	0	24	0	0	43	43	0	56	47	0	0	213	2517
5:25 PM	0	0	0	0	3	0	24	0	0	34	42	0	57	60	0	0	220	2530
5:30 PM	0	0	0	0	0	0	24	0	0	22	51	0	61	47	0	0	205	2521
5:35 PM	0	0	0	0	1	0	24	0	0	35	46	0	46	48	0	0	200	2523
5:40 PM	0	0	0	0	1	0	24	0	0	36	42	0	38	45	0	0	186	2476
5:45 PM	0	0	0	0	2	0	20	0	0	32	40	0	39	44	0	0	177	2429
5:50 PM	0	0	0	0	1	0	28	0	0	30	30	0	42	47	0	0	178	2405
5:55 PM	0	0	0	0	2	0	36	0	0	29	36	0	34	38	0	0	175	2383

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	8	8	356	0	0	472	524	0	600	668	0	0	2636
Heavy Trucks	0	0	0		0	0	0		0	32	8		32	12	0		84
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/15/2016 1:52 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

APPENDIX E TECH MEMO #5: EXISTING GAPS AND DEFICIENCIES

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

Date: March 3, 2017 Project #: 19890.3

To: Jim Whynot and Jacque Betz, City of Gladstone
Gail Curtis, Oregon Department of Transportation, Region 1

From: Matt Bell and Molly McCormick, Kittelson and Associates, Inc.

Project: Gladstone Transportation System Plan (TSP) Update

Subject: Final Tech Memo 5: Existing Transportation System Gaps and Deficiencies (Subtask 3.1)

This memorandum documents existing transportation system gaps and deficiencies within the City of Gladstone. Figure 1 illustrates the city boundary. The information presented in this memorandum will serve as a baseline for evaluating transportation system needs and identifying potential solutions for the Transportation System Plan (TSP) update. The information is based on an inventory of existing transportation facilities, discussions with City and Oregon Department of Transportation (ODOT) staff, and input from the project advisory committees and the general public.

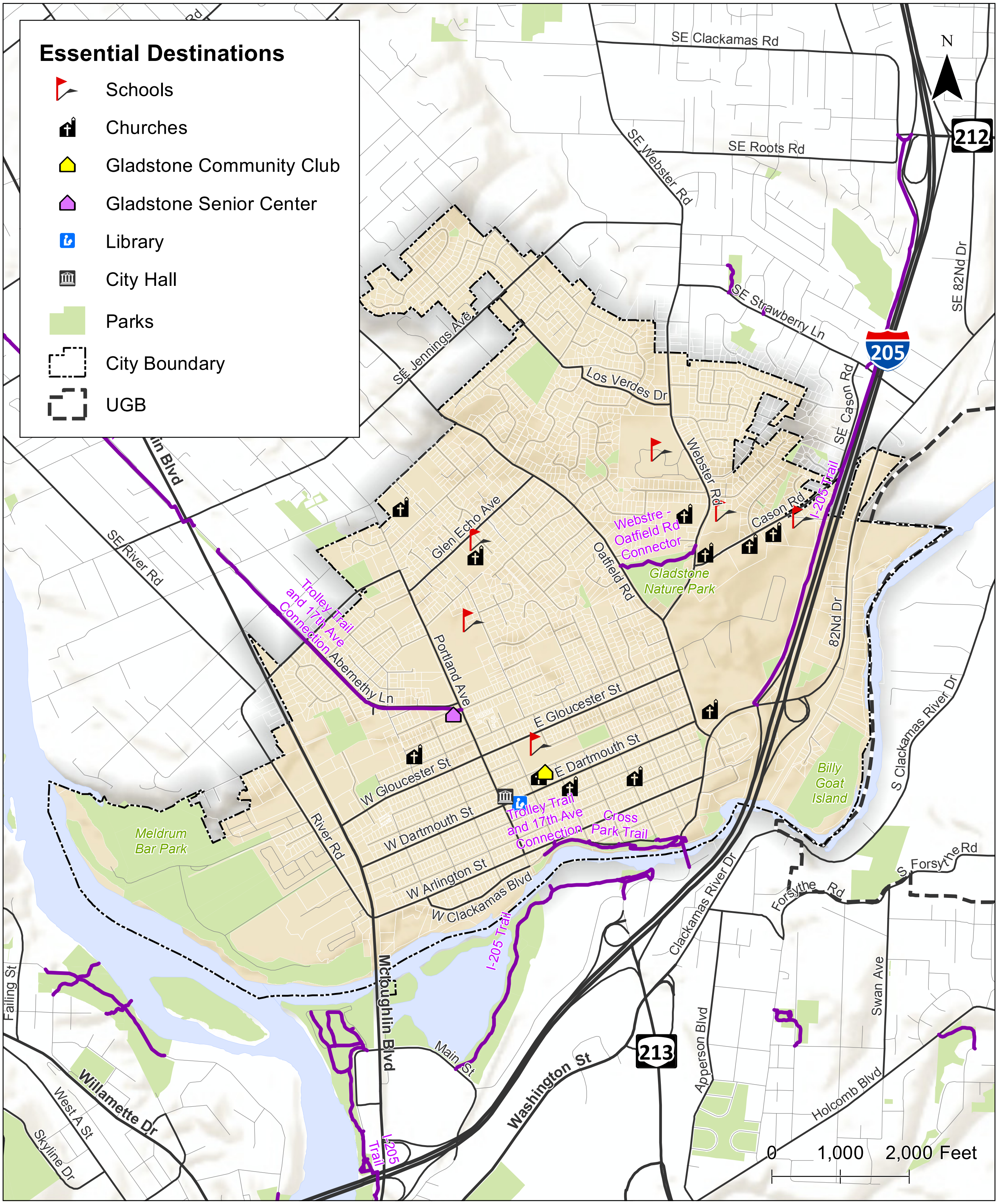
This memorandum includes information on the existing public transit, pedestrian, bicycle, motor vehicle, and other travel modes within the city. This memorandum also includes information on existing Transportation System Management and Operations (TSMO) and Transportation Demand Management (TDM) programs within the city as well and the region. The following sections describe the characteristics, usage, performance, gaps, and deficiencies of the existing transportation system within Gladstone.

PUBLIC TRANSIT SYSTEM

The public transit system within Gladstone consists of fixed-route and paratransit services as well as school and shuttle bus service. Frequent morning and evening peak hour service along OR 99E provides residents with the ability to use public transit for daily commuting, while less frequent mid-day, and weekend service provides residents with the ability to use public transit to access retail and recreational areas located throughout Clackamas County and the region.

Transit Service Providers

Transit service is provided in Gladstone by the Tri County Metropolitan Transportation District of Oregon (TriMet), which provides transit service for the Portland Metro area including the counties of Clackamas, Multnomah and Washington. Other service providers include the Gladstone Senior Center, Somerset Lodge, and Clackamas County Social Services.



Study Area
Gladstone, Oregon

Figure
1

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\01 Study Area.mxd - jsommerville - 10:16 AM 3/14/2017

KITTELSON & ASSOCIATES

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

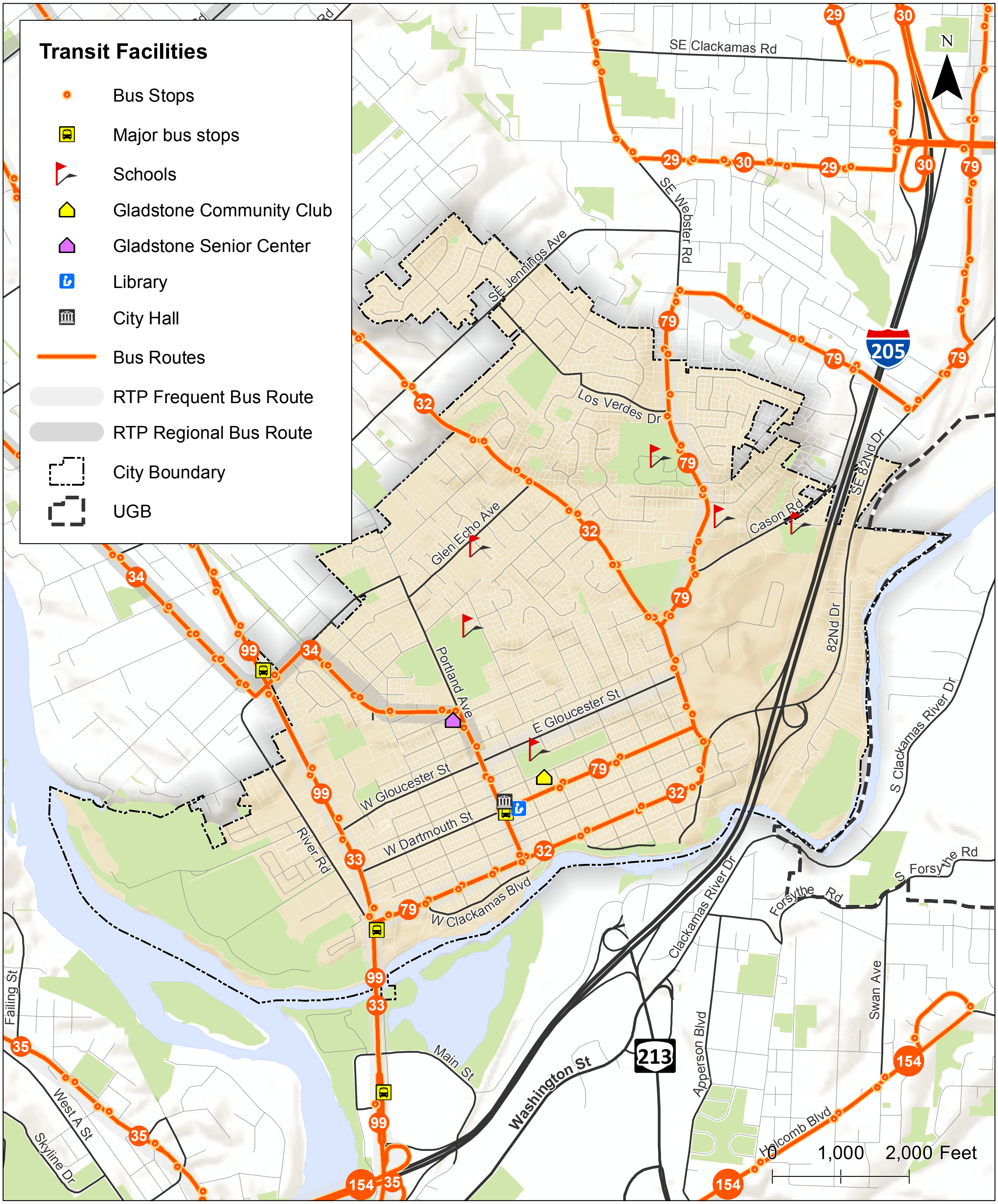
Transit Facilities and Services

Fixed-Route Service

TriMet operates five fixed-route bus lines in Gladstone, including Lines 32, 33, 34, 79, and 99, providing connections to the Milwaukie City Center, Clackamas Community College (CCC), Clackamas Town Center, Oregon City Transit Center, and Portland City Center.

- Line 32 (Oatfield) provides weekday service between Clackamas Community College (CCC) Downtown Milwaukie via OR 99E, Arlington Street, and Oatfield Road from 4:49 a.m. to 9:49 p.m. on approximately 30 minute headways during the morning and evening peak periods and 60 minute headways during non-peak periods. Line 32 also provides Saturday service between CCC and the Oregon City Transit Center from 9:43 a.m. to 5:26 p.m. on approximately 60 minute headways.
- Line 33 (McLoughlin/King Road) provides weekday service between CCC, Downtown Milwaukie, and Clackamas Town Center via OR 99E from 4:15 a.m. to 12:29 a.m. on approximately 15-30 minute headways. Weekend service is provided from 5:33 a.m. to 11:58 p.m. on Saturday and 12:31 a.m. on Sunday on approximately 15-30 minute headways.
- Line 34 (Linwood/River Road) provides weekday service between the Clackamas Town Center and the Oregon City Transit Center via Arlington Street, Portland Avenue, Abernathy Lane, and River Road from 6:04 a.m. to 8:05 p.m. on approximately 40 minute headways.
- Line 79 (Clackamas/Oregon City) provides weekday service between the Clackamas Town Center and the Oregon City Transit Center via Arlington Street, Portland Avenue, Dartmouth Street, Oatfield Road, and Webster Road from 5:19 a.m.to 10:31 p.m. on approximately 30-40 minute headways. Weekend service is provided from 8:15 a.m. to 10:33 p.m. on approximately 40 minute headways.
- Line 99 (Macadam/McLoughlin) provides weekday rush hour service between CCC and the Portland City Center via OR 99E during the morning peak period from 5:16 a.m. to 8:46 a.m. on approximately 15-30 minute headways and during the evening peak period from 3:07 p.m. to 5:57 p.m. on approximately 15-30 minute headways.

Existing transit routes and stops are illustrated on Figure 2. As shown, fixed-route transit service is provided along several major roadways throughout the city with stops at major intersections. Also shown, there are currently two stops with bus shelters within Gladstone: bus stop 10328, north of the OR 99E/E Arlington Avenue intersection, and bus stop 10326, north of the OR 99E/Glen Echo Avenue intersection.



Existing Transit Facilities
Gladstone, Oregon

Figure
2

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\02 Existing Transit Facilities.mxd - jsommerville - 9:14 AM 3/13/2017

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

Ridership

Ridership data was obtained from TriMet for each of the fixed-route services and stops located within Gladstone. The data includes the average number of weekday boardings and alightings (ons and offs) at each stop in Spring 2016. *Tables A-1 through A-5 in Attachment "A" summarize the TriMet ridership data for the stops located within Gladstone*. Per TriMet's Bus Stops Guidelines document, bus stop amenities are provided at each stop based on average daily ridership. A pole and bus stop sign is required at all stops; however, shelters are installed at stops that experience 50 or more boardings and alightings (ons and offs) per day (35 if headways are greater than 17 minutes).

Paratransit Service

TriMet's LIFT Paratransit service is a shared-ride transportation service for residents who are unable to use regular fixed-route services due to disabilities or disabling health conditions. The service is offered within three-fourths of a mile beyond the outermost portions of TriMet's fixed-route bus and light-rail lines. Service is not offered outside of TriMet's service district. LIFT is available from 4:30 a.m. to 2:30 a.m. seven days a week.

School Bus Service

School bus service within the Gladstone area is contracted out to a local service provider. Elementary school students living more than one mile from school are eligible for bus service, as are middle and high school students living more than 1.5 miles from their schools. School buses operate on all arterial and collector streets and many local streets. Safe bus stop approaches and waiting areas are a concern, as are walkways to schools within the radii not served by buses.

Shuttle Service

Shuttle service is provided by the Gladstone Senior Center Tram for senior citizens who reside within city limits. Seniors may call to take part in the Tuesday through Thursday service including trips to the Senior Center for their provided lunches, transportation to specified grocery stores after lunch, and rides to morning medical appointments in Gladstone or Oregon City. In addition, senior citizens can sign up for pre-paid Friday excursions scheduled by the Senior Center.

Somerset Lodge and Somerset Assisted Living Facility provide a shuttle service for Somerset residents. The shuttle service operates Monday through Friday during regular business hours and provides residents with travel options to local retail and commercial activity within Gladstone (i.e. Safeway, Walmart, Rite-Aid). Special trips can also be prearranged with the service provider.

Clackamas County Social Services runs several transportation programs that are meant to provide service to people unable to access other transportation options. One program called "Transportation Reaching People" provides transportation for elderly, disabled, or rural County residents to medical appointments, shopping and errands. Volunteers with personal cars provide the service. A second transportation program called "Ride Together" provides similar service with the exception that volunteer drivers, such as family, friends, or neighbors, are recruited by the riders. The last Clackamas

County Social Services transportation program, “Vets Driving Vets”, provides the type of services for veterans with volunteer veteran drivers. The services are available from 8:00 a.m. to 5:00 p.m. on weekdays, excluding holidays.

Park-and-Rides

There are no park-and-rides located within the city. The closest park-and-ride is located to the north in Milwaukie. The Milwaukie Elks park-and-ride located at 13121 SE McLoughlin Boulevard is a shared facility which provides 90 parking stalls to transit riders. The SE Park Avenue park-and-ride located in Milwaukie at 2750 SE Park Avenue is a TriMet facility that provides 402 parking stalls to transit riders. Both facilities are free for up to 24-hours (unless otherwise posted). Overnight parking is permitted, as long as it does not exceed 24-hours.

Regional Public Transit Facilities

The 2014 Regional Transportation Plan (RTP) identifies several regional public transit facilities within Gladstone, including frequent bus routes, regional bus routes, and major transit stops. Per Figure 2.10 (Regional Transit Network) of the RTP, OR 99E, Arlington Street, Portland Avenue, Gloucester Street, Oatfield Road, and Webster Road are frequent bus routes; OR 99E, Portland Avenue, Abernathy Lane, Glen Echo Avenue, and River Road are regional bus routes, and; bus stop 10326 (McGloughlin & Glen Echo), 10328 (McLoughlin & W Arlington), and 4463 (Portland Ave & E Dartmouth) are identified as major bus stops. Other regional public transit facilities within the area include an inter-city bus passenger terminal and an inter-city rail passenger terminal in Oregon City.

Existing Gaps and Deficiencies

The following provides a summary of the existing gaps and deficiencies in the public transit system along with issues identified by local residents:

- Marketing and awareness of existing public transit facilities and services should be improved to attract higher levels of ridership.
- More frequent transit service should be provided to improve the viability of using public transit for daily commuting.
- More direct service should be provided to regional centers located further west, such as Tigard, Tualatin, Beaverton, and Hillsboro.
- Locations for new park-and-ride facilities should be identified within the city.
- Transit shelters should be installed where warranted by existing ridership.
- Transit service enhancements should be identified along regional public transit facilities.
  - Transit service is not provided along Gloucester Street, which is identified in the RTP as a frequent bus route.

  - A bus shelter is not provided at bus stop 4463 (Portland Avenue & E Dartmouth), which is identified in the RTP as a major transit stop.

- Gaps and deficiencies in the pedestrian and bicycle systems that provide access to public transit facilities as well as other key destinations with Gladstone are identified below.

PEDESTRIAN SYSTEM

The pedestrian system within Gladstone consists of sidewalks, shared-use paths, and trails as well as marked and unmarked, signalized and unsignalized pedestrian crossings. These facilities provide local residents with the ability to access transit as well as local retail, commercial, recreational, and other land uses by foot. Safe and convenient pedestrian facilities are essential to a vibrant community and economy within the city.

Pedestrian Facilities

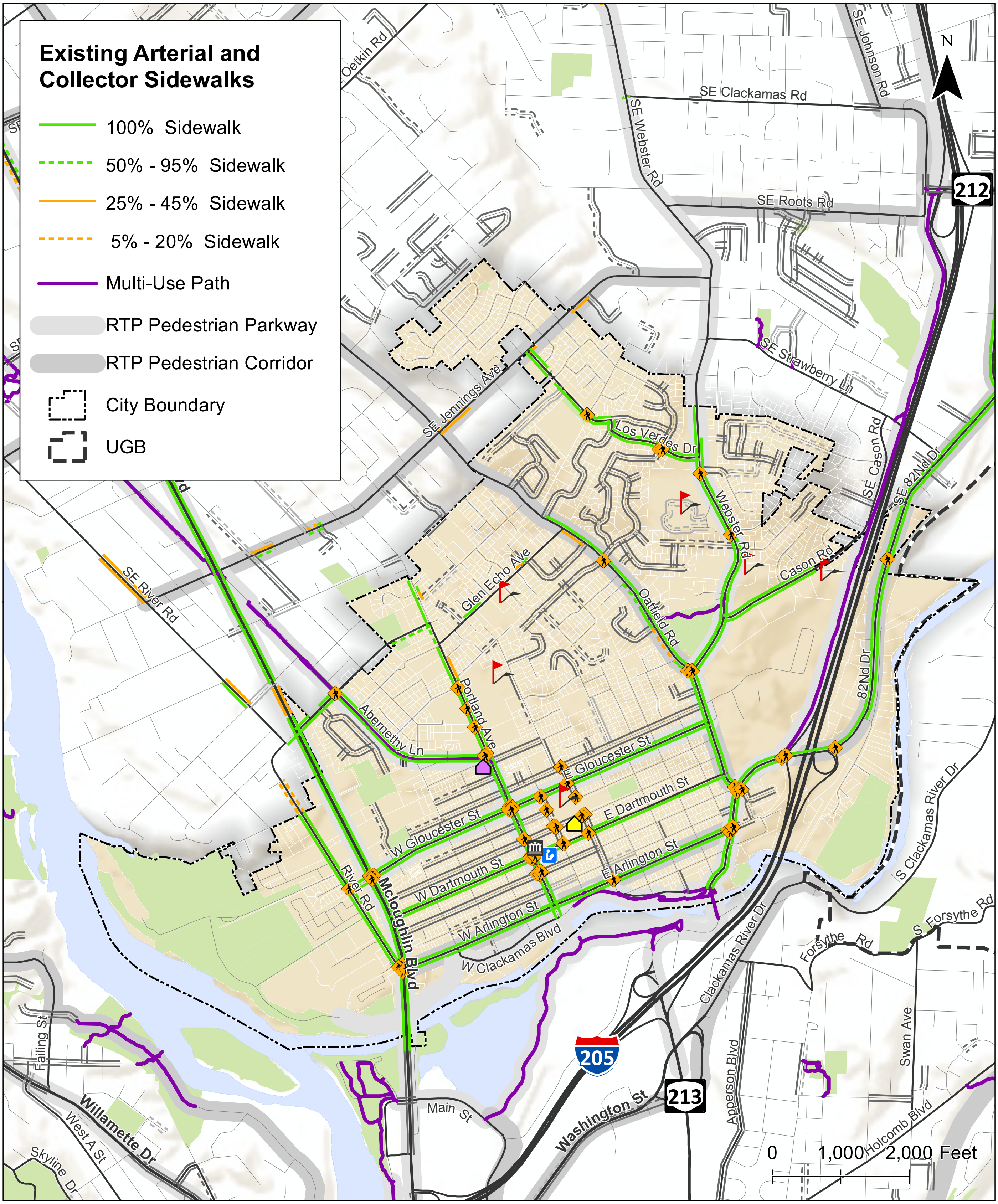
In order to assess the adequacy of pedestrian facilities, Geographic Information System (GIS) data was obtained from Metro's Regional Land Information System (RLIS). The GIS data was updated to reflect recent aerial imagery of sidewalks and other pedestrian facilities along the city's arterial and collector streets. The data includes the location of existing sidewalks and crosswalks along with the location of essential destinations such as schools, parks, and retail/commercial areas as well as the local senior center, community center, library, and City Hall. Local churches are also included as essential destination per direction from the project committees. These essential destinations were identified to determine possible pedestrian trip generators and to help prioritize potential improvements to the pedestrian system. Figure 3 shows the existing pedestrian facilities within Gladstone and the location of essential destinations. The following provides a summary of the facilities, including existing gaps and deficiencies.

Sidewalks

Sidewalks are currently provided along a majority of arterial and collector streets within the city as well as many local streets. However, there are gaps in the northern parts of the city, particularly along Glen Echo Avenue and Oatfield Road. The gaps along Glen Echo Avenue limit pedestrian access to Grace Christian School as well as access to OR 99E and Oatfield Road. The gaps along Oatfield Road limit pedestrian access to transit service. Other notable gaps include those along the norther portion of Portland Avenue, Dartmouth Street, and 82nd Drive.

Crosswalks

Marked crosswalks are also provided at several major intersections (signalized and unsignalized), particularly within the central part of the city and along Portland Avenue; however, there are several locations that currently lack signed or striped crosswalks, particularly near schools, parks, and along street that provide transit service (i.e. Arlington Street, Oatfield Road, Webster Road).



Existing Pedestrian Facilities
Gladstone, Oregon

Figure
3

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\03 Existing Pedestrian Facilities.mxd - jsommerville - 9:14 AM 3/13/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

Shared-use Paths and Trails

There are several shared-use paths and trails located throughout the city. A few of the key paths and trails include the Trolley Trail, the Cross Park Trail, the Charles Ames Park Way, and the I-205 Tail.

- Trolley Trail – the Trolley Trail is a shared use path that follows the historic streetcar right-of-way that ran in the area from 1893 until 1968. The trail extends north from Portland Avenue along the south side of Abernathy Lane and crosses OR 99E at Jennings Avenue.
- Cross Park Trail – the Cross Park Trail is a shared-use path that is located along the southern boundary of the city in Cross Park. The trail extends from 82nd Drive, near the Park Place Bridge, to Chief Charles Ames Memorial Park.
- Charles Ames Park Walk – the Charles Ames Park Walk is a shared-use path that is located along the southern boundary of the city in Chief Charles Ames Memorial Park. The trail extends from Cross Park to Clackamas Boulevard.
- I-205 Trail – the I-205 trail is a shared-use path that follows I-205. The trail extends north from 82nd Drive along the west side of I-205.

Pedestrian Accessways

There are several pedestrian accessways located throughout the city. These accessways provide pedestrian connectivity between cul-de-sacs and other areas where there are no streets. Additional accessways are not always possible due to topography and existing development patterns. However, there are a few locations where accessways could be provided and where existing accessways could be improved.

Safe Routes to School

Gladstone does not have a Safe Routes to School (SRTS) program, which is a program design to encourage students to walk to school by improving infrastructure along streets that provide access to local schools as well as providing education programs, driver enforcement programs, and more. This TSP update will provide a SRTS program, but it will serve as a catalyst to begin discussions and implementation of a SRTS program in the city.

Regional Pedestrian Facilities

The 2014 RTP identifies several regional pedestrian facilities within Gladstone, including on-street and off-street pedestrian parkways and regional pedestrian corridors and a regional pedestrian district. Per Figure 2.20 (Regional Pedestrian Network) of the RTP, OR 99E, Portland Avenue (between Arlington Street and Abernathy Lane), Oatfield Road (between Gloucester Street and Webster Road), Gloucester Street, Webster Road, and the shared-use paths and trails described above are regional parkways; Arlington Street, 82nd Drive, Oatfield Road and Jennings Avenue are pedestrian corridors; and the central city is a regional pedestrian district.

In general, the existing pedestrian facilities are adequate in the retail and commercial areas along OR 99E, Portland Avenue, and 82nd Drive and in the central part of the city; however, they are inadequate in the areas surrounding several schools and parks and along streets that provides transit service. It is desirable to provide at least one continuous sidewalk connection between essential destinations and along arterial and collector roadways to provide safe and convenient non-motorized travel options. Further review of the adequacy of existing pedestrian facilities will be provided in subsequent tech memos.

Pedestrian Activity

Pedestrian counts were conducted at the study intersections in June 2016 while school was in session. All of the counts were conducted on a typical mid-weekday during the evening (4:00 to 6:00 p.m.) peak time period. All of the counts include the total number of pedestrians that entered the intersections in 15-minute intervals. The pedestrian counts show a relatively high level of pedestrian activity at the study intersections along OR 99E and a relatively low level of pedestrian activity at the other study intersections. It should be noted that while the peak hour for vehicular traffic typically occurs between 4:00 to 6:00 p.m., the peak hour for pedestrian activity near schools and other activity centers typically occurs earlier in the day. The pedestrian count data is shown in Table 1.

Table 1: PM Peak Hour Pedestrian Crossing Volumes at Study Intersections

Map ID	Intersection	North/South Pedestrian Volume	East/West Pedestrian Volume	Pedestrian Peak Hour
1	OR 99E/S Arlington Street	24	14	4:05 to 5:05 p.m.
2	OR 99E/W Gloucester Street	22	16	5:00 to 6:00 p.m.
3	OR 99E/Glen Echo Avenue	12	19	4:15 to 5:15 p.m.
4	Oatfield Road/SE 82nd Drive	8	5	4:15 to 5:15 p.m.
5	Oatfield Road/Ridgegate Drive-Collins Crest Street	6	1	4:00 to 5:00 p.m.
6	Oatfield Road/Glen Echo Avenue	0	2	4:05 to 5:05 p.m.
7	I-205 Southbound Ramp Terminal/SE 82nd Drive	1	3	4:15 to 5:15 p.m.
8	I-205 Northbound Ramp Terminal/SE 82nd Drive	2	0	5:00 to 6:00 p.m.

As shown in Table 1, the highest pedestrian crossing volumes were observed at intersections located along OR 99E near retail and commercial land uses and along Oatfield Road. Potential pedestrian crossing improvements should be prioritized at these locations to ensure safe and convenient access for pedestrians.

Existing Gaps and Deficiencies

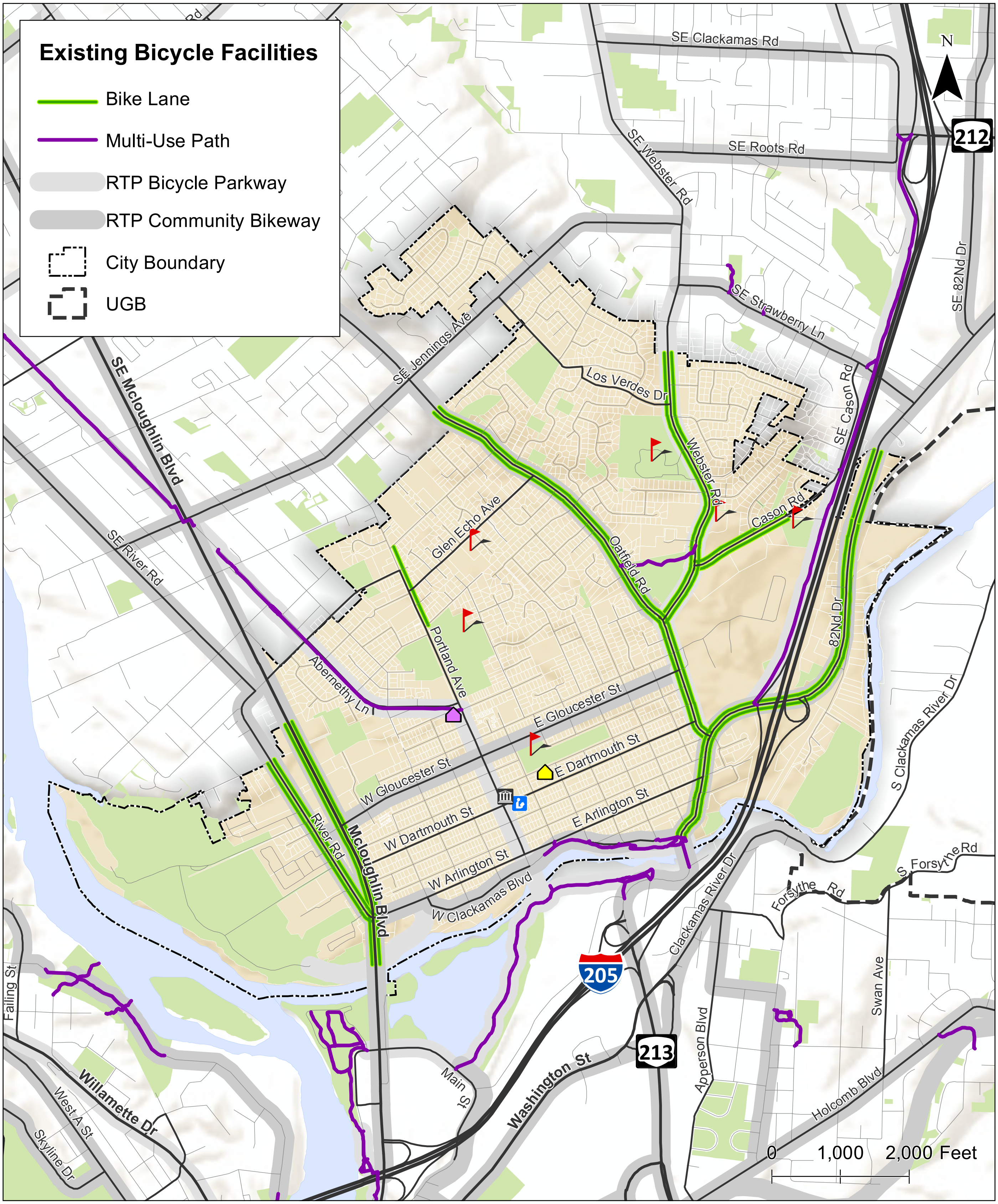
Streets with no sidewalks or intermittent sidewalks force pedestrians to walk along the edge of the travel lane or use the shoulder if available. In many cases, this is not a desirable option for pedestrians due to narrow lane widths or uneven pavement conditions. Similarly, streets with no crosswalks or limited crosswalks force pedestrians to make unsafe or illegal crossings. Adequate pedestrian facilities should be provided to allow for safe travel between neighborhoods and essential destinations. The following provides a summary of the existing gaps deficiencies in the existing pedestrian system along with issues identified by local residents:

- There are several arterial and collector streets that currently do not have sidewalks along one or two sides of the roadway. These streets include:
    - Glen Echo Avenue from River Road to Oatfield Road – gaps on both sides
    - Dartmouth Street from Portland Avenue to Oatfield Road – north side
    - Portland Avenue from Nelson Lane to the north city limits – gaps on both sides
    - Oatfield Road from Webster Road to north city limits – gaps on both sides
    - Los Verdes Drive from Valley View Road to north city limits – gaps on both sides
- There are also several local streets that currently do not have sidewalks along one or two sides of the roadway.
- Several of the gaps and deficiencies limit connectivity between residential areas and essential destinations throughout the city, including schools, parks, and transit stops.
- Many sidewalks throughout the city do not provide sufficient width to accommodate pedestrian activity or are in disrepair.
- Many sidewalks and pedestrian ramps throughout the city are not ADA compliant.
- Several intersections do not provide marked pedestrian crossings.
- There are a few locations where new pedestrian accessways could be provided and others where existing accessways could be improved.

BICYCLE SYSTEM

The bicycle system within Gladstone consists of on-street bike lanes and shared roadways as well as off-street bicycle facilities such as bicycle parking and shared-use paths. These facilities provide local residents with the ability to access transit as well as local retail, commercial, recreational, and other land uses within Gladstone and neighboring cities by bike. Safe and convenient bicycle facilities are essential to a vibrant community and economy within the city.

In order to assess the adequacy of bicycle facilities in Gladstone, GIS data was obtained from Metro’s RLIS. The GIS data was updated to reflect recent aerial imagery of bike lanes and other bicycle facilities along the city’s arterial and collector streets. The data includes the location of existing bike lanes along with the location of essential destinations such as schools, parks, and retail/commercial areas as well as the local senior center, community center, library, and City Hall. Local churches are also included as essential destination per direction from the project committees. These essential destinations were identified to determine possible bicycle trip generators and to help prioritize potential improvements to the bicycle system. Figure 4 shows the existing bicycle facilities within Gladstone as well as the location of essential destinations.



Existing Bicycle Facilities
Gladstone, Oregon

Figure
4

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\04 Existing Bicycle Facilities.mxd - jsommerville - 9:15 AM 3/13/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

Bicycle Facilities

Bike lanes

On-street bike lanes are currently provided along only a few arterial and collector streets within the city including River Road, OR 99E, Oatfield Road, Webster Road, Carson Road, and 82nd Drive. Bike lane striping also appears to be provided along the east side of Portland Avenue north of Nelson Road; however, there are no bicycle symbols and vehicles can be seen parked along the side of the roadway.

Bicycle Crossings

Bicycle crossing treatments are also provided at several major intersections, particularly along OR 99E and 82nd Drive where channelized right-turn lanes would otherwise conflict with through bike movements; however, they are limited to intersections channelized right-turn lanes.

Regional Bicycle Facilities

The 2014 RTP identifies several regional bicycle facilities within Gladstone, including on-street and off-street regional bikeways and bicycle parkways and a regional bicycle district. Per Figure 2.18 (Regional Bicycle Network) of the RTP, River Road, OR 99E, Oatfield Road (north of Webster Road), 82nd Drive, Gloucester Street, and Clackamas Boulevard are regional bikeways; Portland Avenue (between Arlington Street and Abernathy Lane), Oatfield Road (between 82nd Drive and Webster Road), Webster Road, 82nd Drive, and the shared-use paths and trail described above are bicycle parkways; and the central city is a regional bicycle district.

In general, the existing bicycle facilities are limited to a few arterial and collector streets; however, these streets (OR 99E, River Road, 82nd Drive, Oatfield Road, and Webster Road) provide connectivity on a local and regional level. It should also be noted that not all streets need to provide bike facilities, since streets with low vehicle volumes (fewer than 3,000 average daily traffic) and slow speeds (25 miles per hour or less) are considered safe environments for shared vehicle and bicycle use of the travel lanes. Further review of the adequacy of existing bicycle facilities will be provided in subsequent tech memos.

Bicycle Activity

Bicycle counts were conducted at the study intersections in June 2016 while school was in session. All of the counts were conducted on a typical mid-week day during the evening (4:00 to 6:00 p.m.) peak time period. All of the counts include the total number of bicyclists that entered the intersections in 15-minute intervals. The bicycle counts show a relatively low level of bicycle activity at the study intersections in general. It should be noted that while the peak hour for vehicular traffic typically occurs between 4:00 to 6:00 p.m., the peak hour for bicycle activity near schools and other activity centers typically occurs earlier in the day. The bicycle count data is shown in Table 2.

Table 2: Bicycle Crossing Volumes at Study Intersections

Map ID	Intersection	North/South Bicycle Volume	East/West Bicycle Volume	Bicycle Peak Hour
1	OR 99E/S Arlington Street	6	2	5:00 to 6:00 p.m.
2	OR 99E/W Gloucester Street	2	0	4:55 to 5:55 p.m.
3	OR 99E/Glen Echo Avenue	0	1	4:55 to 5:55 p.m.
4	Oatfield Road/SE 82nd Drive	0	4	4:15 to 5:15 p.m.
5	Oatfield Road/Ridgegate Drive-Collins Crest Street	1	1	4:50 to 5:50 p.m.
6	Oatfield Road/Glen Echo Avenue	1	0	4:55 to 5:55 p.m.
7	I-205 Southbound Ramp Terminal/SE 82nd Drive	0	1	4:00 to 5:00 p.m.
8	I-205 Northbound Ramp Terminal/SE 82nd Drive	0	0	4:30 to 5:30 p.m.

As shown in Table 2, the highest bicycle crossing volumes were observed at intersections located along OR 99E near retail and commercial land uses and along Oatfield Road.

Existing Gaps and Deficiencies

Streets with no bike lanes or intermittent bike lanes force bicyclists to share the travel lane with motor vehicles or use the shoulder if available. In many cases, this is not a desirable option for bicyclists due to narrow lane widths or uneven pavement conditions. Adequate bicycle facilities should be provided to allow for safe travel between neighborhoods and essential destinations. The following provides a summary of the existing gaps deficiencies in the existing bicycle system along with issues identified by local residents:

- There are several arterial and collector streets that currently do not provide on-street bike lanes. These streets include:
    - Glen Echo Avenue from River Road to Oatfield Road
    - Abernathy Lane from Glen Echo Avenue to Portland Avenue
        - There is a shared-use path along the south/west side of Abernathy Lane
    - Gloucester Street from River Road to Oatfield Road
    - Dartmouth Street from OR 99E to Oatfield Road
    - Arlington Street from OR 99E to 82nd Drive
    - Portland Avenue from Arlington Street to the north city limits
    - Los Verdes Drive from Webster Road to Valley View Road
    - Valley View Road from Los Verdes Drive to north city limits
- Several of the gaps and deficiencies limit connectivity between residential areas and bicycle destinations throughout the city, including schools, parks, and transit stops.

MOTOR VEHICLE SYSTEM

The motor vehicle system within Gladstone includes private streets, city streets, state highways, and an interstate freeway. These types of facilities provide residents with the ability to access retail, commercial, recreational, and other land uses within Gladstone and neighboring cities by vehicle. This section describes how the system has been developed to date and provides a more detailed review of how it is used and operated.

Jurisdiction

Streets within Gladstone are owned and operated by the City of Gladstone and the Oregon Department of Transportation (ODOT). Each jurisdiction is responsible for determining the functional classification of the streets, defining major design and multimodal features, and approving construction and access permits. Coordination is required among the jurisdictions to ensure that the streets are planned, operated, maintained, and improved to safely meet public needs. Figure 5 illustrates the jurisdiction (ownership and maintenance responsibilities) of streets within Gladstone. As shown, OR 99E and I-205 are under the jurisdiction of ODOT along with the I-205 on- and off-ramps and the segment of 82nd Drive between Berkeley Street and Edgewater Road. All remaining streets within the city limits are under the jurisdiction of the City of Gladstone.

Functional Classification

A street's functional classification defines its role in the transportation system and reflects desired operational and design characteristics such as right-of-way requirements, pavement widths, pedestrian and bicycle features, and driveway (access) spacing standards. Figure 6 illustrates the functional classification of streets within Gladstone, which includes the following designations:

- Freeways are divided highways with two or more travel lanes for exclusive use by traffic in each direction. They have uninterrupted traffic flow and allow full control of access and egress at ramps.
- Major arterials carry a high volume of traffic at relatively high travel speeds. They connect major traffic generators and may only be accessed by major traffic generators. Major arterials should not divide homogenous land uses.
- Minor arterials carry relatively high traffic volumes and high travel speeds. They connect major traffic generators to collector streets; facilitate through traffic, and channel it around homogenous land uses. Private driveways and parking entrances are discouraged along minor arterials while channelization is encouraged at major intersections.
- Collector streets provide access between neighborhoods and arterials and may define neighborhood boundaries. Through traffic is discouraged along collector streets as are private residential driveways.

Roadway Jurisdiction Gladstone, Oregon

Figure
5

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\05 Roadway Jurisdiction.mxd - jsommerville - 9:15 AM 3/13/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl\ Portland Metro Data Resource Center

Gladstone Functional Classifications
Gladstone, Oregon

Figure
6

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\06 Functional Roadway Classifications.mxd - jsommerville - 9:15 AM 3/13/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

- Local Streets provide access to abutting properties and accommodate minor traffic volumes. Local streets should not be a route for through traffic, buses, or trucks. They should also not connect to arterials.

Table 3 summarizes the functional classifications of the arterial and collector streets within Gladstone and identifies the overlapping ownership/maintenance and jurisdictional relationships that exist. Figure 6 illustrates the functional classifications of streets within Gladstone.

Table 3: Functional Classification Comparison of Collector and Higher Streets by Jurisdiction

Roadway	Jurisdiction	Functional Classification			
		Gladstone	Clackamas County	Metro	ODOT
I-205	ODOT	Freeway/Expressway	Principal Interstate	Principal Arterial	Interstate
OR 99E	ODOT	Major Arterial	Principal Arterial	Major Arterial	Principal Arterial
82nd Drive	City	Minor Arterial	Minor Arterial	Minor Arterial	Minor Arterial
Arlington Street	City	Minor Arterial	Minor Arterial	Minor Arterial	Minor Arterial
Oatfield Road	City	Minor Arterial	Minor Arterial	Minor Arterial	Minor Arterial
Portland Avenue (Arlington to Glen Echo)	City	Minor Arterial	Minor Arterial	[1]	Minor Arterial
River Road	City	Minor Arterial	Minor Arterial	[1]	Minor Arterial
Webster Road	City	Minor Arterial	Minor Arterial	Minor Arterial	Major Collector
Jennings Avenue	City	Minor Arterial	Minor Arterial	Minor Arterial	Major Collector
Abernathy Lane	City	Collector	Collector	[1]	Major Collector
Cason Road	City	Collector	Collector	[1]	Major Collector
Dartmouth Street	City	Collector	Collector	[1]	Major Collector
Glen Echo Avenue	City	Collector	Collector	[1]	Major Collector
Gloucester Street (OR 99E to Oatfield)	City	Collector	Collector	[1]	Major Collector
Gloucester Street (River Road to OR 99E)	City	Local	Local	[1]	Local
Los Verdes Drive	City	Collector	Collector	[1]	Major Collector
Valley View Road	City	Collector	Collector	[1]	Major Collector
Portland Avenue (Glen Echo to Caldwell	City	Local	Local	[1]	Major Collector
Portland Avenue (Caldwell to north city limits)	City	Local	Local	[1]	Minor Collector

1. Figure 2.7 of the RTP (Arterial and Throughway Network) identifies Metro's classification of regionally significant arterial streets within the city.

Per the RTP, the functional classifications used in local TSPs should be consistent with other regional planning efforts. As shown in Table 3, the following streets currently have conflicting classifications:

- Webster Road is classified as a minor arterial by the City of Gladstone, Clackamas County, and Metro, but as a major collector by ODOT.
- Jennings Avenue is classified as a minor arterial by the City of Gladstone, Clackamas County, and Metro, but as a major collector by ODOT.
- Portland Avenue (Glen Echo to Caldwell) is classified as a local street by the City of Gladstone and Clackamas County, but as a major collector by ODOT.

- Portland Avenue (Caldwell to north city limits) is classified as a local street by the City of Gladstone and Clackamas County, but as minor collector by ODOT.

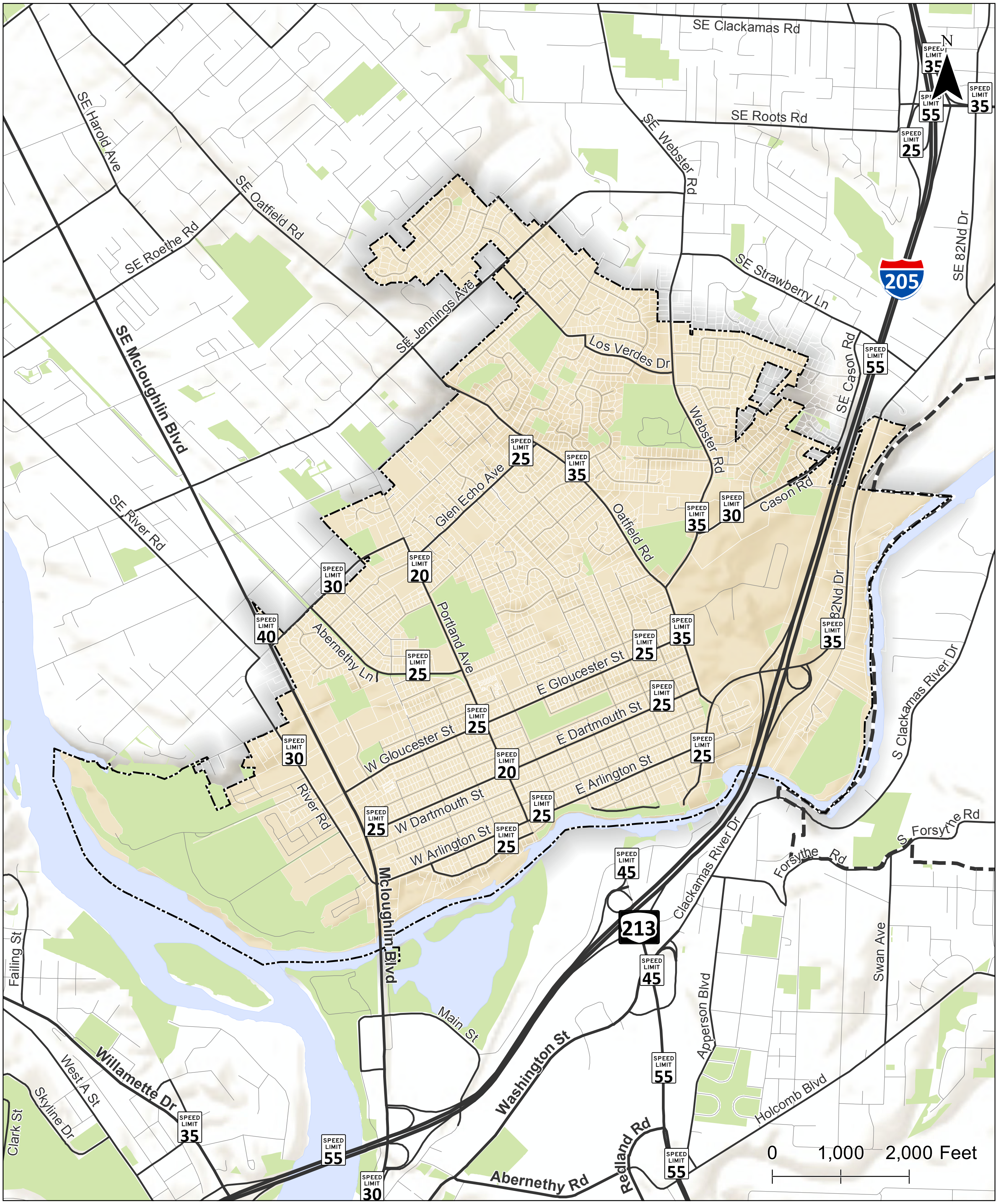
Roadway Characteristics

The characteristics of arterial and collector streets are summarized in Table 4. The data includes posted speed limits, street widths, number of lanes, lane widths, on-street bike lanes, and on-street parking. These characteristics define roadway capacity and operating speeds through the street system, which affects travel path choices for drivers in Gladstone. Figure 7 illustrates posted speed limits throughout the city. Figure 8 illustrates average daily traffic volumes in select locations throughout the city. Subsequent sections provide additional information on traffic volumes at select study intersections.

Table 4: Existing Study Area Roadway Characteristics by Functional Classification

Corridor	Posted Speed [MPH]	Street Width [ft]	Number of Lanes	Lane Width [ft]	On-street Bike Lanes	On-street Parking
Major Arterial						
OR 99E	40	80	5	12-14	Yes	No
Minor Arterial						
82nd Drive (Cross Park to First)	25	42-50	2	11-12	Yes	Yes
82nd Drive (First to city limits)	35	50-59	3-5	11-12	Yes	No
Arlington Street	25	35	2	10-11	No	Yes
Jennings Avenue	30	24	2	10-11	No	No
Oatfield Road (82nd to Webster)	35	48	3	11-12	Yes	No
Oatfield Road (Webster to city limits)	35	42	2	11-12	Yes	Yes
Portland Avenue (Arlington to Nelson)	20	56	3	11-12	No	Yes
Portland Avenue (Nelson to Lynne)	20	41	2	11-12	No	Yes
Portland Avenue Lynne to city limits)	20	41	2	11-12	No	Yes
River Road (OR 99E to 600’ north)	25	46	3	11-12	Yes	No
River Road (600’ North to city limits)	25	42	2	11-12	Yes	Yes
Webster Road	35	42	2	11-12	Yes	No
Collector Street						
Abernethy Lane	25	38	2	11-12	No	Yes
Cason Road	30	36	2	11-12	Yes	No
Dartmouth Street (OR 99E to Portland)	25	36	2	10-11	No	Yes
Dartmouth Street (Portland to Oatfield)	25	56	2	11-12	No	Yes
Glen Echo Avenue	25	30	2	10-11	No	Yes
Gloucester Street	25	35	2	11-12	No	Yes
Los Verdes Drive	25	36	2	11-12	No	Yes
Valley View Road	25	32	2	10-11	No	Yes

Per the current TSP, minor arterials are required to have a minimum pavement width of 42-feet while collector streets are required to have a minimum pavement width of 36 feet. As shown in Table 4, a majority of arterial and collector streets meet the City’s minimum pavement widths, with the following exceptions:



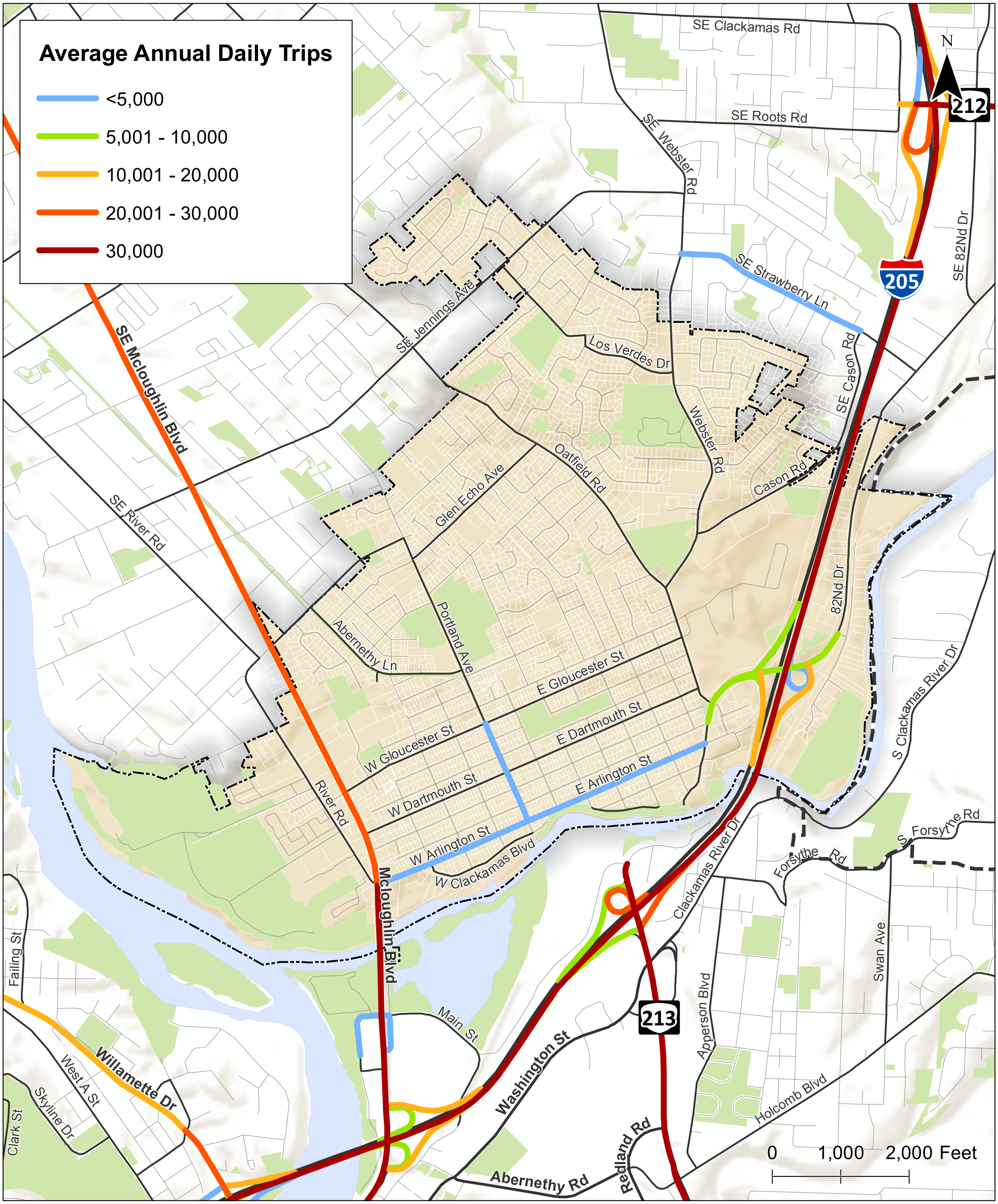
Traffic Speeds
Gladstone, Oregon

Figure
7

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\07 Traffic Speeds.mxd - jsommerville - 9:15 AM 3/13/2017

KITTELSON & ASSOCIATES

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



Traffic Volumes
Gladstone, Oregon

Figure
8

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\08 Traffic Volumes.mxd - jsommerville - 9:15 AM 3/13/2017

KITTELSON & ASSOCIATES

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

- Arlington Street is currently 35-feet wide and also allows on-street parking, which results in relatively narrow travel lanes in some areas.
- Jennings Avenue is currently 24-feet wide; however, it does not allow on-street parking.
- Glen Echo Avenue is currently 30-feet wide and allows on-street parking, which results in relatively narrow travel lanes in some areas.
- Valley View Road is currently 32-feet wide and allows on-street parking, which results in relatively narrow travel lanes in some areas.

Pavement Condition

Capitol Assets & Pavement Services, Inc. was contracted by the City of Gladstone to evaluate the pavement condition of all City maintained streets. A total of 37.41 miles were evaluated by Capitol in October and November 2016 and assigned a Pavement Conditions Index (PCI) value of 0 to 100 based on the pavement condition. A higher PCI value allows for more cost-effective treatments, such as slurry seals and thin overlays while a lower PCI (<50) may require more expensive treatments, such as thick overlays and full reconstruction.

Capitol prepared a draft report that summarizes the current state of the city's street network, the likely state of the street network over the next five years, and what steps can be taken to improve the overall condition of the street network. Based on the draft report, the city's overall street network PCI is currently a 67 and is projected to be 68 in 2021 given current funding levels.

Traffic Operations

Traffic operations were evaluated at eight study intersections in accordance with the assumptions and methodologies identified in Tech Memo 4. Figure 9 illustrates the location of the study intersections.

Traffic Volumes and Peak Hour Operations

Manual turning movement counts were conducted at the study intersections in June 2016. The counts were conducted on a typical mid-week day during the evening (4:00 to 6:00 p.m.) peak time period. The system-wide peak hour for the study intersections was identified as 4:30 to 5:30 p.m.; however, individual intersection peak hours that range from 4:00 to 5:00 p.m. along Oatfield Road and 82nd Drive to 5:00 to 6:00 p.m. along OR 99E were used to complete the operational analyses. Figure 10 provides a summary off the turning movement counts at the study intersections.

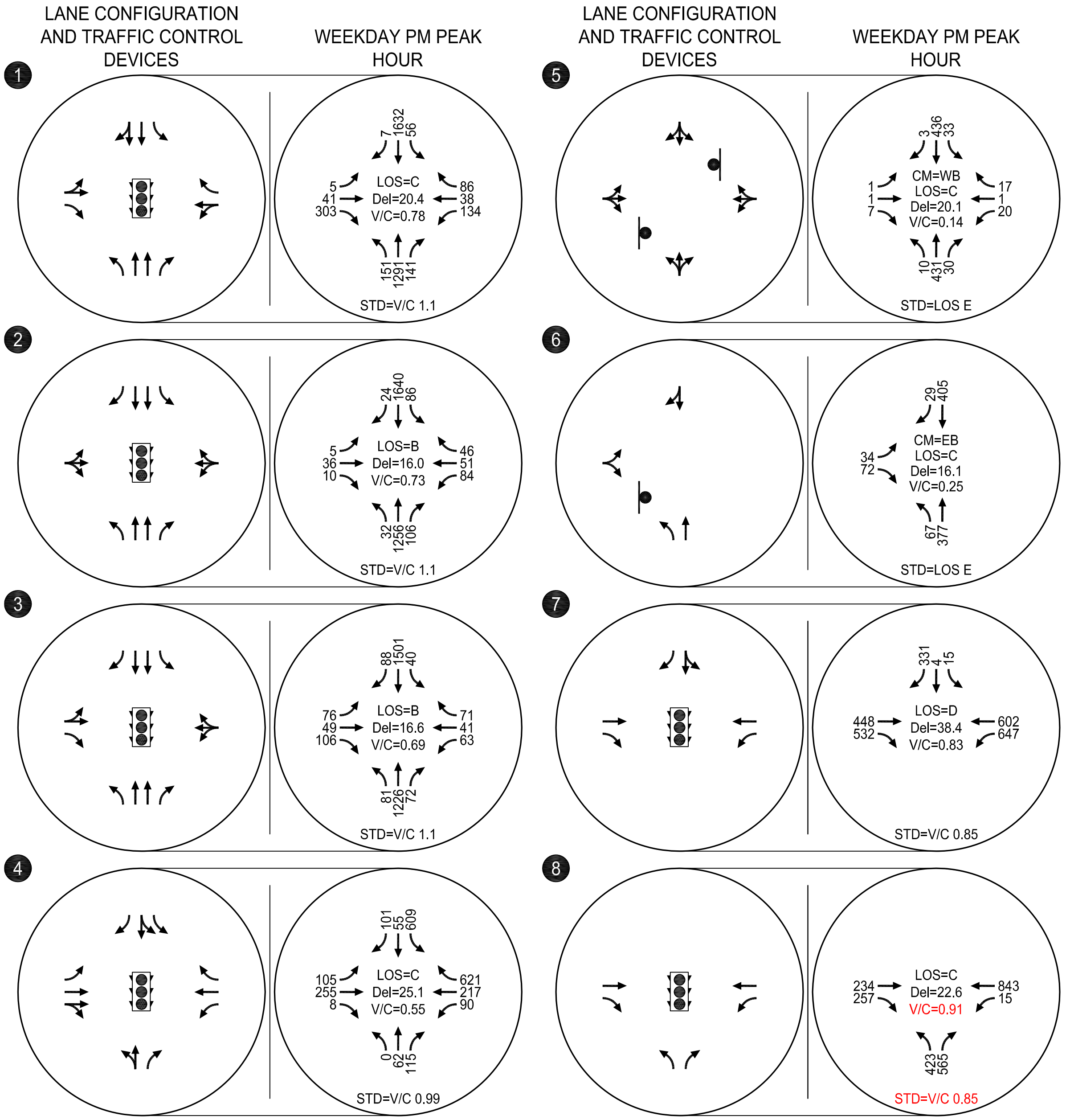
H:\projfile\19890 - Gladstone TSP Update\gis\TM5\09 Study Intersections.mxd - jsommerville - 9:15 AM 3/13/2017

Study Intersections
Gladstone, Oregon

Figure
9

KITTELSON & ASSOCIATES

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



H:\projfile\19890 - Gladstone TSP Update\dwgs\figs\19890_figures.dwg Mar 13, 2017 - 8:35am - jsommerville Layout Tab: Fig10

Year 2016 Existing Traffic Operations
Weekday PM Peak Hour
Gladstone, Oregon

Figure
10

The turning movement counts shown in Figure 10 along OR 99E and 82nd Drive were seasonally adjusted to 30th highest hour volumes (30HV) in accordance with the Seasonal Trend Table methodology identified in the ODOT *Analysis Procedures Manual*. A combination of the commuter and interstate urbanized trends were used to determine the seasonal adjustment factor for OR 99E and 82nd Drive, resulting in adjustment factors of 1.04 and 1.01, respectively. Figure 10 and Table 5 summarizes the results of the traffic operations analysis at the study intersection under existing traffic conditions. *Attachment "B" contains the year 2016 existing traffic conditions worksheets.*

Table 5: Weekday PM Peak Hour Intersection Operations

Map ID	Intersection	Level of Service (LOS)	Delay (Sec)	Volume/ Capacity (V/C)	Measure of Effectiveness (MOE)		MOE Met?
					Agency	Maximum	
	Signalized Intersections						
1	OR 99E/S Arlington Street	C	20.4	0.78	ODOT	v/c 1.1	Yes
2	OR 99E/W Gloucester Street	B	16.0	0.73	ODOT	v/c 1.1	Yes
3	OR 99E/Glen Echo Avenue	B	16.6	0.69	ODOT	v/c 1.1	Yes
4	Oatfield Road/SE 82nd Drive	C	25.1	0.55	ODOT	v/c 0.99	Yes
7	I-205 Southbound Ramp Terminal/SE 82nd Drive	D	38.4	0.83	ODOT	v/c 0.85	Yes
8	I-205 Northbound Ramp Terminal/SE 82nd Drive	C	22.6	0.91	ODOT	v/c 0.85	***No***
	Unsignalized Intersections						
5	Oatfield Road/Ridgegate Drive-Collins Crest Street	C	20.1	0.14	City	LOS E	Yes
6	Oatfield Road/Glen Echo Avenue	C	16.1	0.25	City	LOS E	Yes

Notes:
LOS = Intersection Level of Service (Signal), Critical Movement Level of Service (TWSC).
Delay = Intersection Average vehicle delay (Signal), critical movement vehicle delay (TWSC).
V/C = Intersection V/C (Signal) critical movement V/C (TWSC).
MOE = Measure of Effectiveness

As shown in Table 5, all of the study intersections currently operate acceptably per their respective mobility standards and targets, with the exception of the I-205 Northbound Ramp Terminal at SE 82nd Drive. Additional information about the operations issues identified at the ramp terminal area provided below.

I-205 Northbound Ramp Terminal/82nd Drive

The I-205 Northbound Ramp Terminal/82nd Drive intersection currently operates at LOS C with a V/C ratio of 0.91, which exceeds ODOT mobility target for the intersection. This is primarily due to the high volume of westbound through and northbound left-turning vehicles at the intersection.

Queueing

A queuing analysis was conducted at the signalized study intersections. Table 6 summarizes the 95th percentile queues during the weekday a.m. and p.m. peak hours under existing traffic conditions. The vehicle queue and storage lengths were rounded to the nearest 25-feet. The storage lengths reflect the striped storage for each movement at the intersections.

Table 6: Weekday PM Peak Hour Queuing

Intersection	Movement	95th Percentile Queue	Storage Length (feet)	Adequate?
OR 99E/Arlington Street	WBR	40	175	Yes
	NBL	131	200	Yes
	NBR	25	280	Yes
	SBL	m20	250	Yes
OR 99E/Gloucester Street	NBL	m19	220	Yes
	NBR	48	175	Yes
	SBL	m34	250	Yes
	SBR	m1	260	Yes
OR 99E/Glen Echo Avenue	EBR	51	100	Yes
	NBL	m61	185	Yes
	NBR	m13	160	Yes
	SBL	16	185	Yes
	SBR	28	160	Yes
Oatfield Road/82nd Drive	EBL	146	80	***No***
	WBL	130	170	Yes
	WBR	144	170	Yes
	NBR	59	100	Yes
	SBL	334	110	***No***
	SBR	33	110	Yes
I-205 SB Ramp Terminal/82nd Drive	WBL	m#506	310	***No***
	SBR	#83	360	Yes
I-205 NB Ramp Terminal/82nd Drive	EBR	m42	50	Yes
	WBL	25	200	Yes
	NBR	68	575	Yes

Where WB = Westbound, SB = Southbound, EB = Eastbound, NB = Northbound, L = Left, R = Right
#: 95th percentile volume exceeds capacity, queue may be longer.
m: Volume for 95th percentile queue is metered by upstream signal.

As shown in Table 6, two study intersections currently have 95th percentile queues that exceed the stripped storage for the movements:

- The eastbound left-turn movement at the Oatfield Road/82nd Drive intersection exceeds the stripped storage for the movement by approximately 66-feet.
- The southbound left-turn movement at the Oatfield Road/82nd Drive intersection exceeds the striped storage by approximately 224-feet.
- The westbound left-turn movement at the I-205 SB Ramp Terminal/82nd Drive intersection exceeds the striped storage by approximately 196-feet.

Traffic Safety

Intersection Crashes

The crash history of the study intersections was reviewed in an effort to identify any potential safety issues that could be addressed as part of the TSP update. ODOT provided crash records for the five-year period from January 1, 2010 through December 31, 2014 for the eight study intersections. The data provided by ODOT is summarized in Table 7.

Table 7: Intersection Crash Summary (January 1, 2010 to December 31, 2014)

Intersection	Crash Severity			Crash Type					Total Crashes
	Fatal	Injury	PDO[1]	Rear-end	Turning	Angle	Ped	Other[2]	
OR 99E/S Arlington Street	0	23	14	19	8	4	4	2	37
OR 99E/W Gloucester Street	0	9	8	9	5	2	0	1	17
OR 99E/Glen Echo Avenue	0	7	5	8	1	1	2	0	12
Oatfield Road/SE 82nd Drive	0	6	1	5	0	1	0	1	7
Oatfield Road/Ridgegate Drive	0	4	0	4	0	0	0	0	4
Oatfield Road/Glen Echo Avenue	0	2	1	0	2	0	0	1	3
I-205 SB Ramp Terminal/SE 82nd Drive	1	20	17	30	7	0	1	0	38
I-205 NB Ramp Terminal/SE 82nd Drive	0	9	6	10	3	0	0	2	15

[1] Property Damage Only
[2] Other includes head-on, sideswipe, no collision, and fixed object
[3] From ODOT Critical Crash Rate Calculator

Critical crash rates were calculated for each of the study intersections following the analysis methodology presented in ODOT's *SPR 667 Assessment of Statewide Intersection Safety Performance.* SPR 667 provided average crash rates at a variety of intersection configurations in Oregon based on number of approaches and traffic control types. The average crash rate represents the approximate number of crashes that are "expected" at a study intersection. The intersection critical crash rate assessment for the study intersections is summarized in Table 8. *Attachment "C" contains the crash data provided by ODOT and the critical crash rate worksheet.*

Table 8: Intersection Critical Crash Rate Assessment

Intersection	Total Crashes	Critical Crash Rate by Intersection	Critical Crash Rate by Volume	Observed Crash Rate at Intersection	Observed Crash Rate>Critical Crash Rate?
OR 99E/S Arlington Street	37	0.62	0.53	0.52	No
OR 99E/W Gloucester Street	17	0.63	0.54	0.27	No
OR 99E/Glen Echo Avenue	12	0.63	0.54	0.19	No
Oatfield Road/SE 82nd Drive	7	0.66	0.57	0.16	No
Oatfield Road/Ridgegate Drive-Collins Crest Street	4	0.40	0.41	0.22	No
Oatfield Road/Glen Echo Avenue	3	0.30	0.41	0.17	No
I-205 Southbound Ramp Terminal/SE 82nd Drive	38	0.65	0.56	0.81	***Yes***
I-205 Northbound Ramp Terminal/SE 82nd Drive	15	0.42	0.57	0.35	No

As shown in Table 8, the observed crash rate at the I-205 Southbound Ramp Terminal/SE 82nd Drive intersection exceeds the critical crash rate by both intersection type and by volume.

I-205 Southbound Ramp Terminal

The crash data summarized in Table 7 shows a trend for rear-end crashes at the intersection. Of the 30 rear-end crashes observed in the five years of data, 23 occurred on the north leg of the intersection as vehicles were exiting I-205, 22 of the crashes were caused by a driver following too closely.

Study Area Crashes

The crash history of the overall study area was also reviewed in an effort to identify any potential systemic safety issues or issues with pedestrian and bicycle safety that could be addressed as part of the TSP update. Crash records were obtained from ODOT for the five-year period from January 1, 2011 through December 31, 2015 for the overall study area. Figure 11 illustrates the location, severity, and type of crashes that occurred within the study area over the five-year period. Based on the data, a total of 622 crashes occurred within Gladstone, of which two resulted in fatalities, 346 resulted in injuries, and 274 resulted in property-damage-only. The fatal, sever injury, pedestrian, and bicycle crashes are described below.

Fatal Injury Crashes

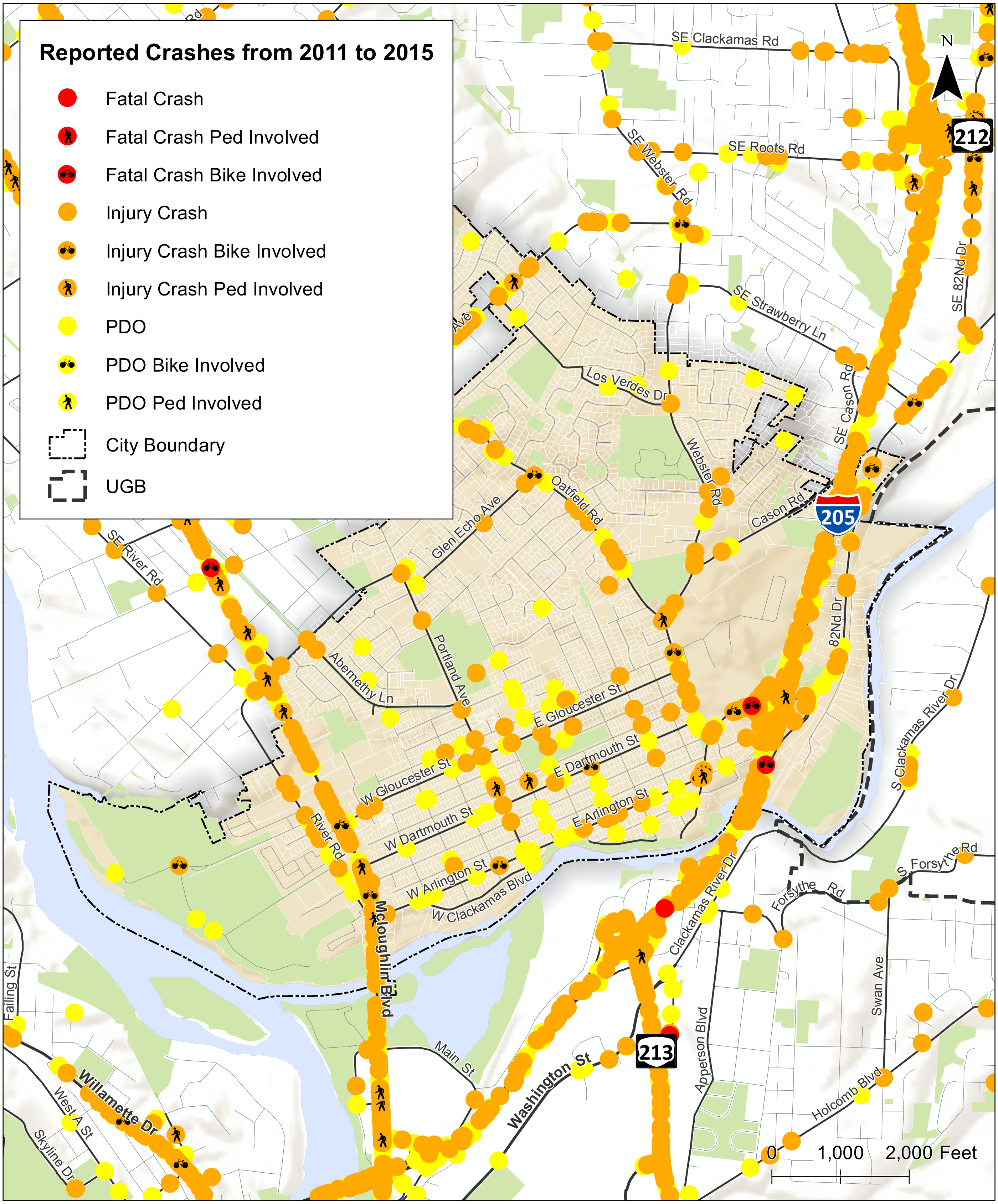
A total of two fatal injury crashes occurred within the city over the last five year period. Both crashes involved pedestrians and are described below under the pedestrian crashes section.

Severe Injury Crashes

A total of 10 severe injury crashes occurred within the city over the last five year period. Of the 10 severe injury crashes, three involved a pedestrian, and one involved a bicyclist. The pedestrian and bicycle crashes are described below. Of the remaining crashes they occurred along OR 99E, Oatfield Road, and 82nd Drive. Two of the remaining crashes were caused by motorists disregarding traffic signals, two by motorists driving faster than conditions allowed, one did not yield the right-of-way, and one motorist drove on the wrong side of the road.

Pedestrian Crashes

A total of 11 pedestrian-involved crashes occurred within Gladstone over the last five year period. Three of the crashes occurred along OR 99E, three along 82nd Drive, one each on I-205, Oatfield Road, Hereford Street, Chicago Avenue, and Jennings Avenue. Of the three on OR 99E, two crashes occurred at the intersection with Arlington Street. Four crashes were caused by the motorist failing to yield the right-of-way, four were caused by the non-motorist illegally present in the roadway, one motorist disregarded a traffic signal, one crash was caused by inadequate brakes, and one crash was caused through a “phantom/non-contact” vehicle.



Reported Crashes from 2011 to 2015
Gladstone, Oregon

Figure
11

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\11 Crashes.mxd - jsommerville - 9:15 AM 3/13/2017

KITTELSON & ASSOCIATES

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

All 11 pedestrian crashes involved at least one injury or fatality. The three severe injury crashes occurred at OR 99E/Arlington Street, OR 99E/Dartmouth Street, and Oatfield Road/Webster Road. All three were cause by the non-motorist illegally being in the street. For two of the severe injury crashes, it was also dark conditions and alcohol was involved. There were also two fatal pedestrian crashes. One occurred at night on the northbound direction of I-205 south of the 82nd Drive bridge. The non-motorist was illegally in the roadway, and the crash also involved alcohol, drugs, and the presence of a pet.

Bicycle Crashes

A total of 15 bicycle-related crashes occurred within the city of the last five year period. Five of the crashed occurred along OR 99E, four along 82nd Drive, two along Oatfield Road, and one each on Arlington Street, Dartmouth Street, Exeter Street, and Meldrum Bar Park Road. Of the five on OR 99E, three occurred at the intersection with Arlington Street. Eleven of the crashes were caused by the motorist not yielding the right-of-way, two of which where the non-motorist was not wearing visible clothing. Two the bicycle crashes were caused by the non-motorist present illegally in the roadway and two were caused by improper vehicle movements.

All 15 bicycle crashes involved at least one injury. Only one crash involved a severe injury. The motorist was making a left turning movement onto Hereford Street from Oatfield Road when the cyclist struck the vehicle, resulting in a severe injury.

Safety Priority Index System

The ODOT Statewide Priority Index System (SPIS) identifies sites along state highways where safety issues warrant further investigation. The SPIS is a method developed by ODOT for identifying hazardous locations on state highways through consideration of crash frequency, crash rate, and crash severity. Sites identified within the top 5 percent are investigated by ODOT staff and reported to the Federal Highway Administration (FHWA). Per the most recent SPIS list, the OR 99E/Arlington Street intersection is identified by ODOT as within the top five percent of crash site over the last five-year period.

Evacuation Routes

There are currently no designated evacuation routes within the city; however, earthquakes, flooding, landslides, wild fires, and other natural and man-made disasters may destroy or block key access routes to emergency facilities and create episodic demand for highway routes into and out of a stricken area. ODOT’s investment strategy recognizes the critical role that some highway facilities, particularly bridges, play in emergency response and evacuation. In some cases, the most cost-effective solution to maintaining security in these lifeline routes involves investment in roads or bridges owned by local jurisdictions. To the extent feasible, investments are made without regard to roadway jurisdiction in order to provide the greatest degree of lifeline security for the available resources. ODOT works with local governments to further define and map a network of lifeline routes. The lifeline network will focus on serving those communities which are particularly susceptible to isolation by virtue of their limited highway access.

Freight

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The designation of freight routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. Per the Oregon Highway Plan (OHP) The only designated freight route in Gladstone is I-205.

Traffic counts were conducted at the study intersections in 2016 as part of this TSP update. All the counts were conducted on a typical mid-week day during weekday evening (4:00 to 6:00 p.m.) peak time period. All of the counts include the total number of trucks that entered the intersections as a percentage of total vehicles. Truck percentages at study intersections are listed in Table 10. Freight routes are shown on Figure 12.

Table 9: PM Peak Hour Truck Volumes at Study Intersections

Map ID	Intersection	Intersection Truck Volume	Truck % of All Vehicular Traffic
1	OR 99E/S Arlington Street	118	3.1%
2	OR 99E/W Gloucester Street	93	2.9%
3	OR 99E/Glen Echo Avenue	89	2.7%
4	Oatfield Road/SE 82nd Drive	56	2.5%
5	Oatfield Road/Ridgegate Drive-Collins Crest Street	26	2.6%
6	Oatfield Road/Glen Echo Avenue	24	2.4%
7	I-205 Southbound Ramp Terminal/SE 82nd Drive	90	3.5%
8	I-205 Northbound Ramp Terminal/SE 82nd Drive	114	4.9%

Existing Gaps and Deficiencies

- There are several inconsistencies in how various jurisdictions classify streets within Gladstone.
- There are several arterial and collector streets that currently do not meet the city’s pavement width standard.
- The I-205 Northbound Ramp Terminal currently exceeds its applicable mobility standard during the weekday p.m. peak hour.
- Vehicles queues at two study intersections currently exceed the striped storage of the movement during the weekday p.m. peak hour.
- The crash rate at the I-205 Southbound Ramp Terminal currently exceeds the critical crash rate for similar facilities within the city.
- The OR 99E/Arlington Street intersection is identified in the top 5% of statewide SPIS sites.
- There are no designated emergency or evacuation routes with the city.
- There are no designated freight routes within the city to augment and support ODOT freight routes.

Freight Routes and Railroads
Gladstone, Oregon

Figure
12

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\12 Freight Routes and Railroads.mxd - jsommerville - 9:15 AM 3/13/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Merto Data Resurce Center

OTHER TRAVEL MODES

The following provides a summary of other travel modes within the city, including all major air, rail, water, and pipelines located within the City and in neighboring cities.

Rail

A Southern Pacific Railroad (SPRR) main line passes through the easternmost edge of the city, between the Clackamas River and I-205/82nd Drive. The SPRR tracks parallel Edgewater Road along its entire length. There is only one point of contact between the rail line and a city street, along the short access road connecting 82nd Drive to Edgewater Road. The at-grade rail crossing is controlled by signage, crossing gates, and flashing warning lights.

Freight Rail

On average, eight SPRR freight trains and two local freight trains travel along the SPRR main line each way each day, for a total of 16 SPRR freight trains and four local freight trains. The freight trains average approximately 100 cars each. There are currently no freight rail terminals in Gladstone. The closest freight rail terminal is located in Oregon City.

Passenger Rail

On Average, three Amtrak trains travel along the SPRR main line each way each day, for a total of six trains. The Amtrak trains average approximately 6-8 cars each. There are currently no passenger rail terminals in Gladstone. The closest passenger rail terminal is located at 1757 Washington Street in Oregon City (ORC). Amtrak provides service at this stop between Oregon City and downtown Portland at Union Station (PDX). Amtrak travels between ORC and PDX Monday through Friday at 7:24 a.m., 11:15 a.m., and 5:54 p.m. and between PDX and ORC at 6:00 a.m., 6:05 p.m., and 9:30 p.m. Travel times vary from 21 to 41 minutes depending on time of day and direction. From the ORC stop, Amtrak Cascades rail line also provides passenger service north to Vancouver, British Columbia and south to Eugene.

Air

There are no airports located within the city limits. The closest airports include the Portland International Airport located approximately 17 miles to the north via Interstate 205 (I-205), the Aurora State Airport located approximately 16 miles to the south via 99E, and the Mulino Airport located approximately 15 miles to the south via I-205 and OR 213.

Water

Although the western boundary of Gladstone is defined by the Willamette River and the southern boundary is defined by the Clackamas River, these waterways are rarely used to support transportation. They are, however, used for recreational purposes. In addition to several single-family residential homes with private access points to the rivers, Meldrum Bar Park provides a boat ramp and floating ramp located on the eastern bank of the Willamette River. The boat ramps offer river access for local residents as well as docking systems and wildlife viewing. Additional access to the rivers are provided by Dahl Beach located on the northern bank of the Clackamas River where the Clackamas River meets the Willamette River and High Rock Park located on the northern bank of the Clackamas River near the commercial area along 82nd Drive. These river accesses are used year-round by fishermen and experience volumes of visitors for swimming and recreation during the summer.

The Willamette Falls Locks located between Oregon City and West Linn is currently closed indefinitely by the U.S. Army Corps of Engineers due to needed gudgeon anchor repairs. All freight and recreational water travel has been eliminated during this closure.

Pipeline

Water

Three major municipal water transmission lines are routed through the city. The City of Gladstone 27" main water line delivers water from the Clackamas River (Clackamas Water District), north and east of the city, along Cason Road to the city reservoirs off Webster Road. While smaller diameter lines provide water to higher elevations in the city, the main water transmission line continues down to the lower/main part of the city along Webster Road (18") to Oatfield Road, Oatfield Road (18") to Herford Street, Hereford Street (24") to Union Avenue, Union Avenue (24") to Clarendon Street, Clarendon Street (24") to OR 99E, and OR 99E (24") to Clackamas River.

The Oak Lodge Water District 24" water transmission line delivers water from the Clackamas River, along Strawberry Lane and Valley View Road to the Oak Lodge reservoirs off Valley View Drive. These reservoirs provide water serve to a limited number of higher elevation city customers.

The City of Lake Oswego also routes a 27" water transmission line through the City of Gladstone and under the Willamette River to the west. The Lake Oswego water main takes in its supply at the Clackamas River at the foot Portland Avenue, and continues up Portland Avenue to Arlington Street; Arlington Street to Beatrice Avenue; Beatrice Avenue to Gloucester Street; Gloucester Street to River Road; River Road to Meldrum Bar Park Road; along Meldrum Bar Park Road and north to a point in the northwest point of the park where continues west under the river.

Natural Gas

The Northwest natural gas company operates a 12" High Pressure gas main (600 psi) in the city. It travels east and west through the southern portion of Gladstone from a point at the Willamette River in Meldrum Bar Park/Dahl Beach area to a point on the east city limits. The gas pipeline proceeds across Meldrum Bar Park to a point on River Road approximately 600' north of the intersection of OR 99E and River Road; south on River Road two point parallel to Clarendon Street, crossing under River Road and OR 99E to Clarendon Street; Clarendon Street to Barton Avenue; Barton Avenue to Berkeley Street; Berkeley Street to Columbia Avenue; Columbia Avenue to Arlington Street; east on Arlington Street, under I-205, to a point between Edgewater Road and 82nd Drive; and proceeding north parallel to the SPRR tracks between Edgewater Road and 82nd Drive out of the city.

TRANSPORTATION SYSTEM MANAGEMENT OPERATIONS

Transportation System Management and Operations (TSMO) measures are designed to increase the efficiency and safety of the transportation system without physically increasing roadway capacity. Typical TSMO measures include Intelligent Transportation System (ITS) solutions, real-time traveler information, and services that respond quickly to traffic incidents. Based on discussions with City staff, there are no TSMO measures currently being employed in Gladstone. Metro's 2040 Regional Transportation Plan (RTP) includes projects on regionally significant roadways throughout the region. However, none of the projects are TSMO related.

TRANSPORTATION DEMAND MANAGEMENT

The TPR requires all cities with populations greater than 25,000 people to develop a Transportation Demand Management (TDM) plan. The RTP also requires that TDM strategies be used to encourage alternative transportation modes and achieve higher vehicle occupancy targets. TDM measures are designed to change travel behavior in order to reduce the need for more road capacity and improve performance of the road system. The TDM programs and strategies in Gladstone are primarily implemented though City Municipal Code Title 17, Zoning and Development and include incentives for reduced vehicle parking requirements for private developments.

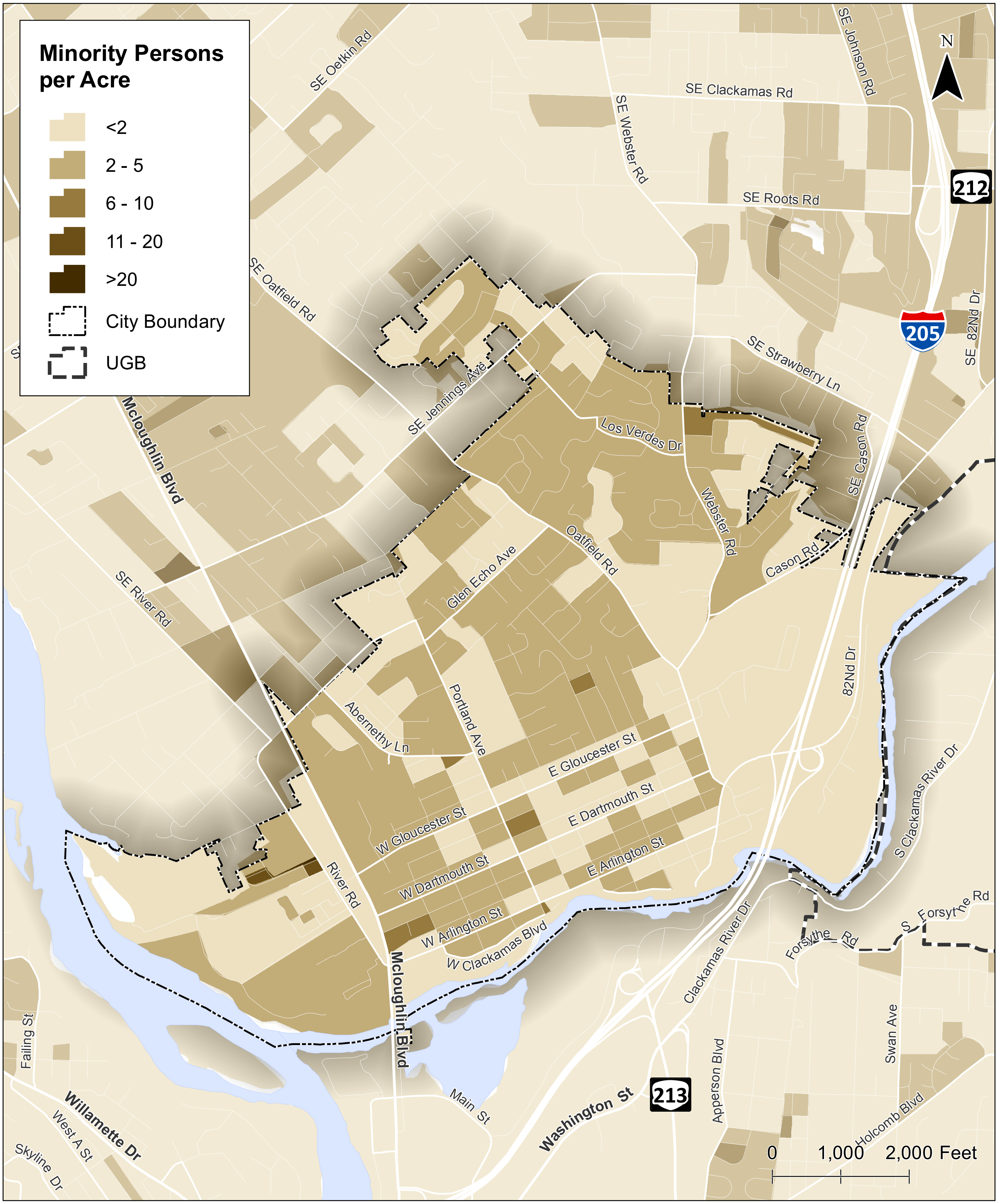
ENVIRONMENTAL JUSTICE

The socio-economically sensitive populations within Gladstone consist of minorities, elderly people (people 65 years of age or older), people with low-income (people who earn 0 to 1.99 times the federal poverty level), and people with disabilities. 2010 census data for minorities and elderly people was collected at the census block level and shows the concentrations of these populations on an individual basis. Data for people with low income and people with disabilities was collected at the census block group level and shows the concentration of these populations as a percentage of the overall population. The data was combined with a general understanding of local conditions to ensure that the existing transportation system meets the needs of these individuals. Figure 13 through 16 illustrate the populations within Gladstone.

- Minorities – As shown in Figure 13, there are no distinct areas with a high concentration of minorities within Gladstone. The area located east of OR 99E and along the north and south sides of Oatfield Road have the largest contiguous populations. Based on the data, there appears to be a relatively low number of minorities city-wide.
- Elderly People – As shown in Figure 14, there are a few areas with a high concentration of elderly people, particularly near the senior center and the Gladstone Mobile Home Park. There are also several areas located within the older parts of Gladstone and north and east of Oatfield Road. Based on the data, there appears to be a relatively high number of elderly people city-wide.

- People with Low Income – As shown in Figure 15, the areas with the highest concentrations of people with low income are located along the east side of OR 99E, north of Gloucester Street and east of I-205. Based on the data, there appears to be a relatively high concentration of people with low income city-wide, with a few exceptions in the northern parts of the city.
- People with Disabilities – As shown in Figure 16, the areas with the highest concentrations of people with disabilities are located along the east and west sides of OR 99E, particularly on the south side of Gloucester Street. Based on the data, there appears to be a high concentration of people with disabilities city-wide, with a few exceptions in the central and northern parts of the city.

The socioeconomic conditions within the city will be considered in the development of the TSP update to ensure that the future transportation system meets the needs of the entire population while not creating adverse conditions for select segments of the population.



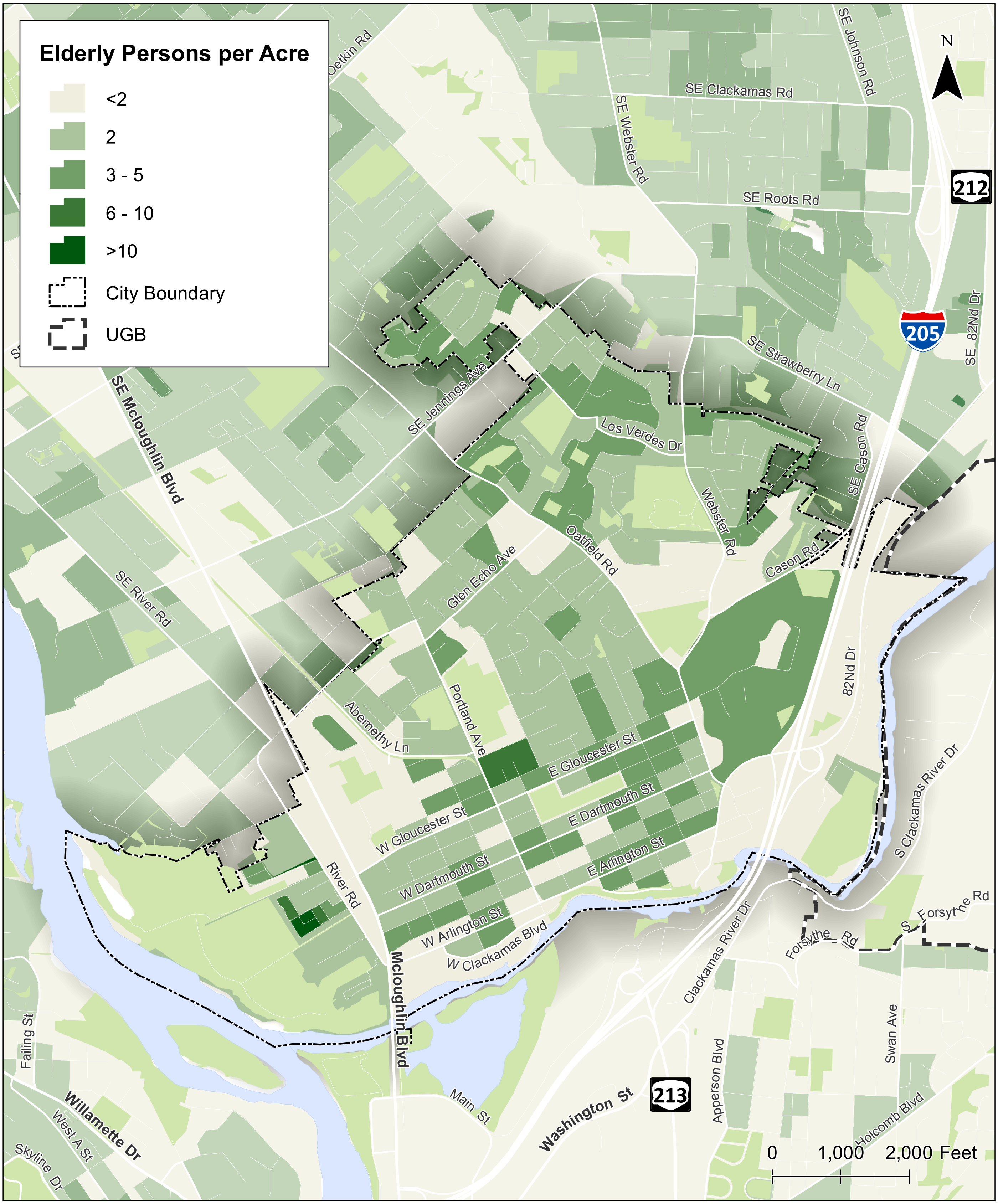
H:\projfile\19890 - Gladstone TSP Update\gis\TM5\13 Minority Population.mxd - jsommerville - 9:15 AM 3/13/2017

Minority Population by Census Blocks
Gladstone, Oregon

Figure
13

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Source: US Census Table P9 HISPANIC OR LATINO, AND NOT HISPANIC OR LATINO BY RACE / 2010 Census Summary File 1



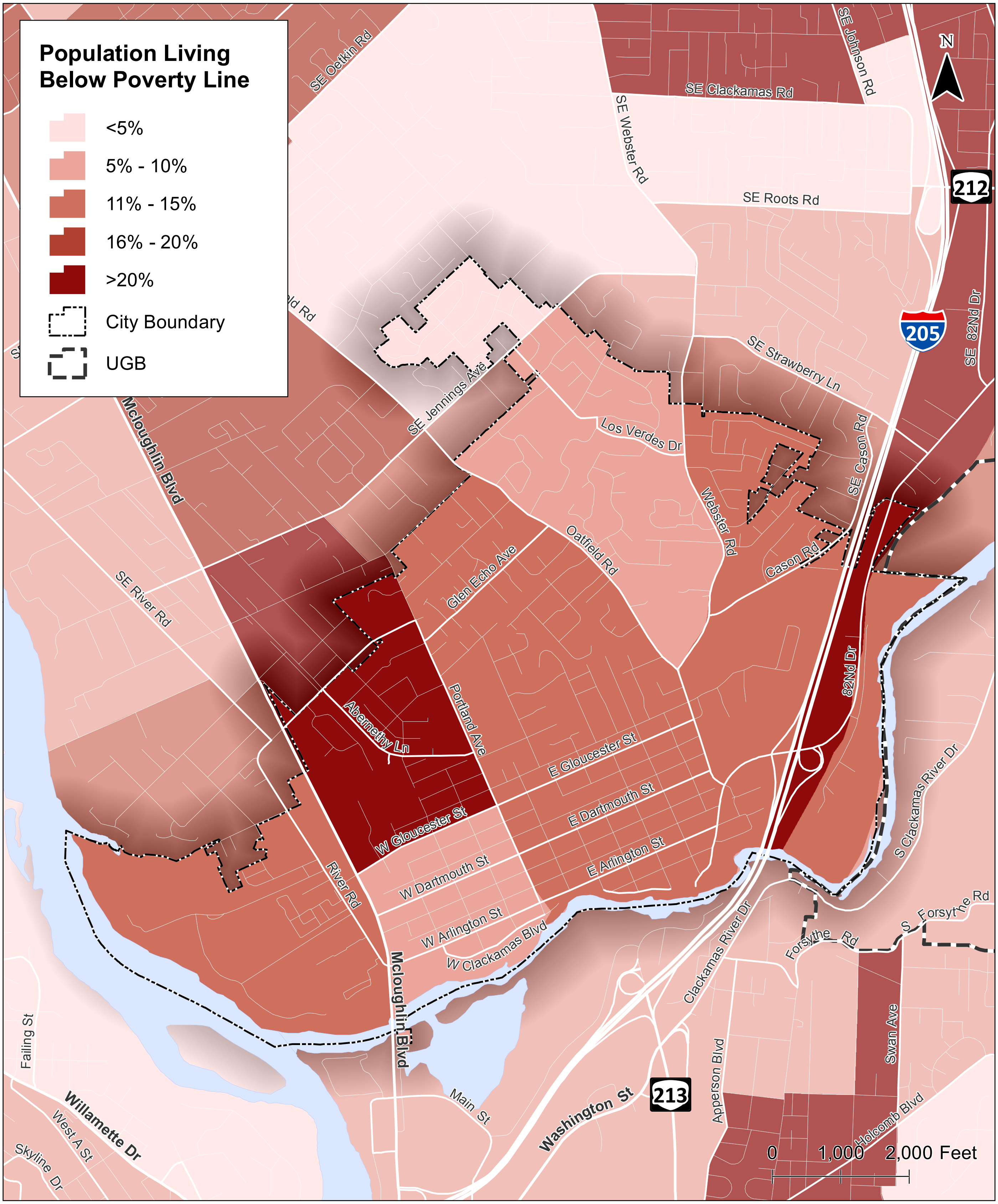
Elderly Population by Census Block
Gladstone, Oregon

Figure
14

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\14 Elderly Population.mxd - jsommerville - 9:15 AM 3/13/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Source: US Census Table P12 SEX BY AGE / 2010 Census Summary File 1



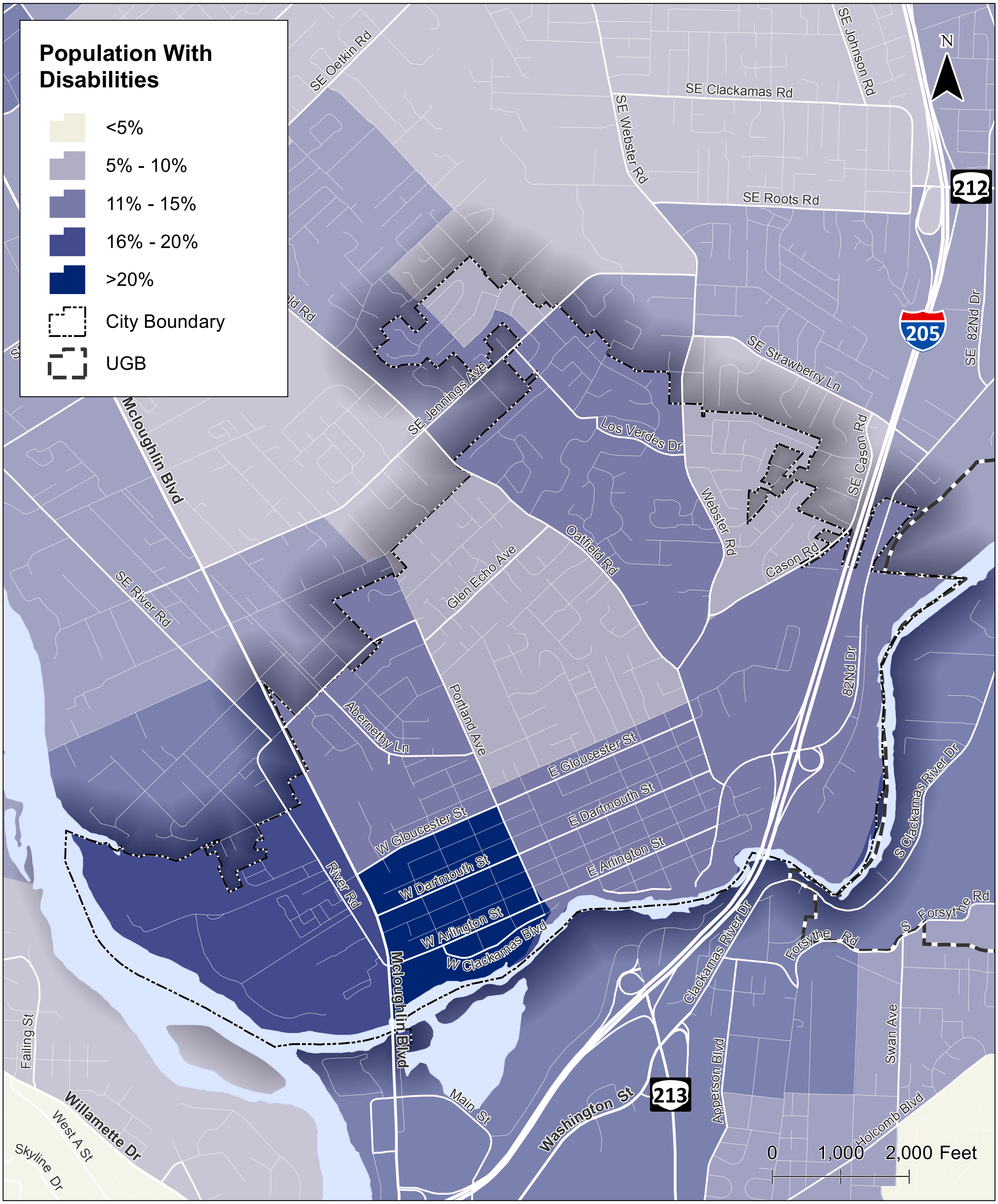
Poverty by Census Block Group
Gladstone, Oregon

Figure
15

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\15 Poverty Population.mxd - jsommerville - 9:16 AM 3/13/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Source: US Census Table B23024 POVERTY STATUS IN THE PAST 12 MONTHS BY DISABILITY STATUS BY EMPLOYMENT STATUS FOR THE POPULATION 20 TO 64 YEARS 2010-2014 American Community Survey 5-Year Estimates



Disabled Population by Census Block Group
Gladstone, Oregon

Figure
16

H:\projfile\19890 - Gladstone TSP Update\gis\TM5\16 Disabled Population.mxd - jsommerville - 9:16 AM 3/13/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Source: US Census Table B23024 POVERTY STATUS IN THE PAST 12 MONTHS BY DISABILITY STATUS BY EMPLOYMENT STATUS FOR THE POPULATION 20 TO 64 YEARS 2010-2014 American Community Survey 5-Year Estimates

Attachment A TriMet Ridership Data

TRIMET RIDERSHIP DATA

TriMet outlines standards for bus stop amenities in their Bus Stops Guidelines document. To warrant the provision of a bus stop shelter at a stop along a route with headways larger than 17 minutes, a minimum of 35 riders is necessary. Based on the Spring 2016 TriMet ridership data, six stops in Gladstone have ridership to support the installation of bus stop shelters: 10323, 10324, 10325, 10326, 10327, and 10328. Stops 10326 and 10328 currently provide shelters.

Table A-1: Route 32 Spring 2016 Ridership

Bus Stop ID	Location	Direction	Passengers On	Passengers Off	Total
4181	Oatfield & Oakridge	To Clackamas CC	1	5	6
4159	Oatfield & Glen Echo	To Clackamas CC	2	5	7
4148	Oatfield & Collins Crest	To Clackamas CC	2	5	7
4140	Oatfield & Stone Oaks Ct	To Clackamas CC	1	1	2
4171	Oatfield & E Kenmore	To Clackamas CC	1	4	5
4164	Oatfield & E Hereford	To Clackamas CC	0	3	3
4154	Oatfield & E Exeter	To Clackamas CC	2	1	3
4204	Oatfield & 82nd Dr	To Clackamas CC	1	2	3
141	82nd Dr & E Berkeley	To Clackamas CC	3	4	7
132	E Arlington & Cornell	To Clackamas CC	2	1	3
134	E Arlington & Harvard	To Clackamas CC	0	1	1
137	E Arlington & Portland Ave	To Clackamas CC	3	4	7
126	W Arlington & Bellevue	To Clackamas CC	0	1	1
124	W Arlington & Beatrice	To Clackamas CC	1	0	1
122	W Arlington & Barton	To Clackamas CC	1	1	2
135	W Arlington & McLoughlin	To Clackamas CC	2	4	6
121	W Arlington & Barton	To Oregon City TC	3	3	6
123	W Arlington & Beatrice	To Oregon City TC	1	3	4
125	W Arlington & Bellevue	To Oregon City TC	0	0	0
136	W Arlington & Portland Ave	To Oregon City TC	4	3	7
133	E Arlington & Harvard	To Oregon City TC	1	1	2
131	E Arlington & Cornell	To Oregon City TC	2	2	4
140	E Arlington & 82nd Dr	To Oregon City TC	6	7	13
10700	Oatfield & E Exeter	To Oregon City TC	3	2	5
13252	Oatfield & E Hereford	To Oregon City TC	3	1	4
13458	Oatfield & Webster	To Oregon City TC	6	3	9
4145	Oatfield & Stone Oaks Ct	To Oregon City TC	2	2	4
4191	Oatfield & Ridgegate	To Oregon City TC	5	2	7
4187	Oatfield & Park Way	To Oregon City TC	5	1	6
4182	Oatfield & Oakridge	To Oregon City TC	5	2	7

Table A-2: Route 33 Spring 2016 Ridership

Bus Stop ID	Location	Direction	Passengers On	Passengers Off	Total
10323	SE McLoughlin & Glen Echo	To Clackamas CC	19	52	71
10422	19300 Block McLoughlin	To Clackamas CC	3	17	20
10324	McLoughlin & Gloucester	To Clackamas CC	17	47	64
10325	McLoughlin & River Rd	To Clackamas CC	23	56	79
10328	McLoughlin & W Arlington	To Clackamas Town Center	88	30	118
10327	McLoughlin & W Gloucester	To Clackamas Town Center	42	17	59
10421	19300 Block McLoughlin	To Clackamas Town Center	8	4	12
10326	SE McLoughlin & Glen Echo	To Clackamas Town Center	51	27	78

Table A-3: Route 34 Spring 2016 Ridership

Bus Stop ID	Location	Direction	Passengers On	Passengers Off	Total
1993	Glen Echo & SE Mildred	To Oregon City TC	2	3	5
14	Abernethy & Duniway	To Oregon City TC	1	1	2
10	Abernethy & Barclay	To Oregon City TC	1	1	2
11	Abernethy & Beatrice	To Oregon City TC	0	1	1
17	Abernethy & Portland Ave	To Oregon City TC	1	4	5
4475	Portland Ave & W Ipswich	To Oregon City TC	0	2	2
4467	Portland Ave & W Fairfield	To Oregon City TC	1	1	2
4462	Portland Ave & W Dartmouth	To Oregon City TC	1	4	5
4456	Portland Ave & W Arlington	To Oregon City TC	2	2	4
126	W Arlington & Bellevue	To Oregon City TC	0	0	0
124	W Arlington & Beatrice	To Oregon City TC	1	0	1
122	W Arlington & Barton	To Oregon City TC	0	0	0
135	W Arlington & McLoughlin	To Oregon City TC	0	3	3
121	W Arlington & Barton	To Clackamas Town Center	4	1	5
123	W Arlington & Beatrice	To Clackamas Town Center	0	0	0
125	W Arlington & Bellevue	To Clackamas Town Center	0	0	0
136	W Arlington & Portland Ave	To Clackamas Town Center	1	1	2
4463	Portland Ave & E Dartmouth	To Clackamas Town Center	6	2	8
4468	Portland Ave & E Fairfield	To Clackamas Town Center	1	0	1
4472	Portland Ave & E Hereford	To Clackamas Town Center	3	1	4
16	Abernethy & Portland Ave	To Clackamas Town Center	6	1	7
12	Abernethy & Center	To Clackamas Town Center	1	0	1
9	Abernethy & Barclay	To Clackamas Town Center	1	0	1
13	Abernethy & Duniway	To Clackamas Town Center	1	0	1
1994	Glen Echo & Mildred	To Clackamas Town Center	4	3	7

Table A-4: Route 79 Spring 2016 Ridership

Bus Stop ID	Location	Direction	Passengers On	Passengers Off	Total
6201	Webster & Los Verdes	To Oregon City TC	7	9	16
6198	Webster & Kraxberger Middle School	To Oregon City TC	1	1	2
6194	Webster & Clayton	To Oregon City TC	4	5	9
13153	Webster & Cason	To Oregon City TC	2	5	7
6206	Webster & Oatfield	To Oregon City TC	2	9	11
4164	Oatfield & E Hereford	To Oregon City TC	1	5	6
4154	Oatfield & E Exeter	To Oregon City TC	3	7	10
1256	E Dartmouth & Cornell	To Oregon City TC	3	8	11
1258	E Dartmouth & Harvard	To Oregon City TC	0	2	2
1259	E Dartmouth & Portland Ave	To Oregon City TC	2	14	16
4456	Portland Ave & W Arlington	To Oregon City TC	2	4	6
126	W Arlington & Bellevue	To Oregon City TC	0	1	1
124	W Arlington & Beatrice	To Oregon City TC	1	2	3
122	W Arlington & Barton	To Oregon City TC	1	2	3
135	W Arlington & McLoughlin	To Oregon City TC	1	23	24
121	W Arlington & Barton	To Clackamas Town Center	19	1	20
123	W Arlington & Beatrice	To Clackamas Town Center	3	0	3
125	W Arlington & Bellevue	To Clackamas Town Center	1	0	1
136	W Arlington & Portland Ave	To Clackamas Town Center	5	1	6
4463	Portland Ave & E Dartmouth	To Clackamas Town Center	17	4	21
1257	E Dartmouth & Harvard	To Clackamas Town Center	2	0	2
1255	E Dartmouth & Cornell	To Clackamas Town Center	8	3	11
10700	Oatfield & E Exeter	To Clackamas Town Center	12	4	16
13252	Oatfield & E Hereford	To Clackamas Town Center	3	0	3
13459	Webster & Oatfield	To Clackamas Town Center	6	1	7
8763	Webster & Cason	To Clackamas Town Center	3	2	5
6196	18000 Block Webster	To Clackamas Town Center	0	1	1
6208	Webster & Kirkwood	To Clackamas Town Center	5	3	8
6197	17700 Block Webster	To Clackamas Town Center	1	3	4
6190	Webster & Charolais	To Clackamas Town Center	11	6	17

Table A-5: Route 99 Spring 2016 Ridership

Bus Stop ID	Location	Direction	Passengers On	Passengers Off	Total
10324	McLoughlin & W Gloucester	To Clackamas CC	2	15	17
10327	McLoughlin & W Gloucester	To Portland City Center	11	2	13

Attachment B Year 2016 Existing Traffic Conditions Worksheets

1: OR-99E & W Arlington St

	→	↘	←	↖	↖	↑	↗	↘	↓
Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	48	319	181	91	159	1359	148	59	1725
v/c Ratio	0.15	0.75	0.80	0.26	0.62	0.57	0.14	0.25	0.79
Control Delay	41.3	28.0	72.5	9.0	43.8	12.3	1.8	7.9	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	28.0	72.5	9.0	43.8	12.3	1.8	7.9	17.1
Queue Length 50th (ft)	32	85	135	0	53	277	0	18	422
Queue Length 95th (ft)	64	184	209	40	131	404	25	m20	817
Internal Link Dist (ft)	442		371			477			1350
Turn Bay Length (ft)				175	200		280	250	
Base Capacity (vph)	399	489	288	414	290	2399	1080	329	2195
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.65	0.63	0.22	0.55	0.57	0.14	0.18	0.79

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

1: OR-99E & W Arlington St

Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Configurations		↰	↱		↰	↱	↰	↑↑	↱	↰	↑↱	
Traffic Volume (vph)	5	41	303	134	38	86	151	1291	141	56	1632	7
Future Volume (vph)	5	41	303	134	38	86	151	1291	141	56	1632	7
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	4.8	4.8	4.0	4.8	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.97		1.00	0.98	1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1889	1529		1730	1564	1787	3505	1511	1770	3503	
Flt Permitted		0.97	1.00		0.74	1.00	0.07	1.00	1.00	0.13	1.00	
Satd. Flow (perm)		1845	1529		1333	1564	139	3505	1511	239	3503	
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)	5	43	319	141	40	91	159	1359	148	59	1718	7
RTOR Reduction (vph)	0	0	168	0	0	76	0	0	48	0	0	0
Lane Group Flow (vph)	0	48	151	0	181	15	159	1359	100	59	1725	0
Confl. Peds. (#/hr)	7		13	13		7	4		3	3		4
Confl. Bikes (#/hr)						1			2			
Heavy Vehicles (%)	0%	0%	3%	6%	0%	1%	1%	3%	4%	2%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)		20.4	20.4		20.4	20.4	82.1	81.3	81.3	74.3	74.3	
Effective Green, g (s)		20.4	20.4		20.4	20.4	82.1	81.3	81.3	74.3	74.3	
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.68	0.68	0.68	0.62	0.62	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	4.0	4.8	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		313	259		226	265	266	2374	1023	218	2168	
v/s Ratio Prot							0.06	c0.39		0.01	c0.49	
v/s Ratio Perm		0.03	0.10		c0.14	0.01	0.35		0.07	0.16		
v/c Ratio		0.15	0.58		0.80	0.06	0.60	0.57	0.10	0.27	0.80	
Uniform Delay, d1		42.4	45.9		47.8	41.7	32.4	10.2	6.7	12.0	17.1	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.58	0.81	
Incremental Delay, d2		0.2	2.8		17.7	0.1	2.8	1.0	0.2	0.3	2.2	
Delay (s)		42.6	48.7		65.5	41.8	35.2	11.2	6.9	7.3	16.1	
Level of Service		D	D		E	D	D	B	A	A	B	
Approach Delay (s)		47.9			57.6			13.1			15.8	
Approach LOS		D			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

2: OR-99E & W Gloucester St

	→	←	↖	↑	↗	↘	↓	↙
Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	55	194	34	1351	114	92	1763	26
v/c Ratio	0.20	0.82	0.20	0.57	0.11	0.28	0.70	0.02
Control Delay	38.3	71.0	9.7	17.8	5.0	9.8	9.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.3	71.0	9.7	17.8	5.0	9.8	9.7	1.2
Queue Length 50th (ft)	31	136	11	446	26	21	286	0
Queue Length 95th (ft)	69	#238	m19	606	48	m34	315	m1
Internal Link Dist (ft)	261	413		1350			2302	
Turn Bay Length (ft)			220		175	250		160
Base Capacity (vph)	314	272	283	2351	1029	414	2528	1092
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.71	0.12	0.57	0.11	0.22	0.70	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

2: OR-99E & W Gloucester St

Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (vph)	5	36	10	84	51	46	32	1256	106	86	1640	24
Future Volume (vph)	5	36	10	84	51	46	32	1256	106	86	1640	24
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	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00			1.00		1.00	1.00	0.95	1.00	1.00	0.96
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.97			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00			0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1756			1733		1805	3505	1487	1804	3505	1497
Flt Permitted		0.98			0.83		0.07	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)		1725			1478		129	3505	1487	310	3505	1497
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)	5	39	11	90	55	49	34	1351	114	92	1763	26
RTOR Reduction (vph)	0	8	0	0	10	0	0	0	33	0	0	8
Lane Group Flow (vph)	0	47	0	0	184	0	34	1351	81	92	1763	18
Confl. Peds. (#/hr)	6		11	11		6	5		10	10		5
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	6%	0%	2%	2%	4%	0%	3%	3%	0%	3%	4%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		18.6			18.6		78.8	78.8	78.8	85.7	84.9	84.9
Effective Green, g (s)		18.6			18.6		78.8	78.8	78.8	85.7	84.9	84.9
Actuated g/C Ratio		0.16			0.16		0.66	0.66	0.66	0.71	0.71	0.71
Clearance Time (s)		4.0			4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5			2.5		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		267			229		136	2301	976	343	2479	1059
v/s Ratio Prot							0.01	c0.39		0.02	c0.50	
v/s Ratio Perm		0.03			c0.12		0.16		0.05	0.17		0.01
v/c Ratio		0.18			0.80		0.25	0.59	0.08	0.27	0.71	0.02
Uniform Delay, d1		44.1			48.9		13.6	11.5	7.5	13.0	10.3	5.2
Progression Factor		1.00			1.00		0.87	1.42	1.80	0.82	0.75	1.33
Incremental Delay, d2		0.2			17.6		0.5	1.0	0.1	0.2	1.4	0.0
Delay (s)		44.3			66.6		12.4	17.3	13.6	10.9	9.1	6.9
Level of Service		D			E		B	B	B	B	A	A
Approach Delay (s)		44.3			66.6			17.0			9.2	
Approach LOS		D			E			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

3: OR-99E & Glen Echo Ave

	→	↘	←	↖	↑	↗	↘	↓	↙
Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	133	113	187	86	1304	77	43	1597	94
v/c Ratio	0.81	0.34	0.93	0.38	0.53	0.07	0.14	0.65	0.09
Control Delay	82.9	10.8	89.5	15.5	4.5	2.0	4.7	12.8	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.9	10.8	89.5	15.5	4.5	2.0	4.7	12.8	3.4
Queue Length 50th (ft)	98	0	123	4	33	0	7	365	8
Queue Length 95th (ft)	#194	51	#252	m61	146	m13	16	474	28
Internal Link Dist (ft)	271		213		2302			539	
Turn Bay Length (ft)		100		185		160	185		160
Base Capacity (vph)	185	360	225	341	2478	1096	436	2449	1100
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.31	0.83	0.25	0.53	0.07	0.10	0.65	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

3: OR-99E & Glen Echo Ave

Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		✣		↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (vph)	76	49	106	63	41	71	81	1226	72	40	1501	88
Future Volume (vph)	76	49	106	63	41	71	81	1226	72	40	1501	88
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	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00	0.95	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00		0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1813	1528		1717		1736	3505	1525	1804	3505	1548
Flt Permitted		0.57	1.00		0.67		0.10	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)		1062	1528		1172		190	3505	1525	323	3505	1548
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)	81	52	113	67	44	76	86	1304	77	43	1597	94
RTOR Reduction (vph)	0	0	95	0	21	0	0	0	18	0	0	19
Lane Group Flow (vph)	0	133	18	0	166	0	86	1304	59	43	1597	75
Confl. Peds. (#/hr)	3		4	4		3	4		8	8		4
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	4%	3%	2%	1%	4%	3%	1%	0%	3%	1%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		18.6	18.6		18.6		89.6	84.1	84.1	87.6	83.1	83.1
Effective Green, g (s)		18.6	18.6		18.6		89.6	84.1	84.1	87.6	83.1	83.1
Actuated g/C Ratio		0.16	0.16		0.16		0.75	0.70	0.70	0.73	0.69	0.69
Clearance Time (s)		4.0	4.0		4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5	2.5		2.5		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		164	236		181		212	2456	1068	291	2427	1071
v/s Ratio Prot							c0.02	0.37		0.01	c0.46	
v/s Ratio Perm		0.13	0.01		c0.14		0.28		0.04	0.10		0.05
v/c Ratio		0.81	0.07		0.92		0.41	0.53	0.06	0.15	0.66	0.07
Uniform Delay, d1		49.0	43.3		49.9		8.9	8.6	5.6	5.7	10.4	6.0
Progression Factor		1.00	1.00		1.00		3.20	0.42	0.79	1.00	1.00	1.00
Incremental Delay, d2		24.7	0.1		43.4		0.6	0.7	0.1	0.1	1.4	0.1
Delay (s)		73.7	43.4		93.3		29.1	4.3	4.5	5.9	11.8	6.1
Level of Service		E	D		F		C	A	A	A	B	A
Approach Delay (s)		59.8			93.3			5.8			11.4	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

4: Oatfield Rd & 82nd Dr

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	111	276	95	228	654	65	121	346	353	106
v/c Ratio	0.49	0.30	0.46	0.58	0.62	0.35	0.46	0.64	0.65	0.18
Control Delay	49.4	31.5	50.1	40.8	5.9	49.5	15.4	32.5	32.6	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.4	31.5	50.1	40.8	5.9	49.5	15.4	32.5	32.6	5.1
Queue Length 50th (ft)	56	65	48	110	44	33	0	164	167	0
Queue Length 95th (ft)	146	139	130	251	144	98	59	334	342	33
Internal Link Dist (ft)		452		736		230			650	
Turn Bay Length (ft)	80		170		170		100	110		110
Base Capacity (vph)	532	2121	429	1008	1337	343	379	1002	1010	965
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.13	0.22	0.23	0.49	0.19	0.32	0.35	0.35	0.11

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱		↰↑	↱	↰	↰↓	↱
Traffic Volume (vph)	105	255	8	90	217	621	0	62	115	609	55	101
Future Volume (vph)	105	255	8	90	217	621	0	62	115	609	55	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0	5.0		5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00		1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1770	3523		1787	1863	1567		1900	1553	1665	1679	1539
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	1770	3523		1787	1863	1567		1900	1553	1665	1679	1539
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)	111	268	8	95	228	654	0	65	121	641	58	106
RTOR Reduction (vph)	0	1	0	0	0	202	0	0	109	0	0	71
Lane Group Flow (vph)	111	275	0	95	228	452	0	65	12	346	353	35
Confl. Peds. (#/hr)	2		3	3		2	5					5
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	2%	2%	0%	1%	2%	2%	0%	0%	4%	3%	4%	2%
Turn Type	Prot	NA		Prot	NA	pm+ov		NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4		8		4	4	
Permitted Phases						6	8		8			4
Actuated Green, G (s)	11.3	23.1		8.5	20.3	49.3		8.8	8.8	29.0	29.0	29.0
Effective Green, g (s)	11.3	23.1		8.5	20.3	49.3		8.8	8.8	29.0	29.0	29.0
Actuated g/C Ratio	0.13	0.26		0.10	0.23	0.55		0.10	0.10	0.33	0.33	0.33
Clearance Time (s)	4.5	5.0		4.5	5.0	5.0		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.3	4.2		2.3	4.2	2.5		2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	224	915		170	425	957		188	153	543	547	502
v/s Ratio Prot	c0.06	c0.08		0.05	c0.12	0.15		c0.03		0.21	c0.21	
v/s Ratio Perm						0.13			0.01			0.02
v/c Ratio	0.50	0.30		0.56	0.54	0.47		0.35	0.08	0.64	0.65	0.07
Uniform Delay, d1	36.1	26.4		38.4	30.2	11.9		37.4	36.4	25.5	25.6	20.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.3		2.8	1.8	0.3		0.8	0.2	2.1	2.3	0.0
Delay (s)	37.2	26.7		41.2	32.0	12.2		38.2	36.5	27.6	27.9	20.7
Level of Service	D	C		D	C	B		D	D	C	C	C
Approach Delay (s)		29.7			19.6			37.1			26.8	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	19.5
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

5: Oatfield Rd & Collins Crest St/Ridgegate Dr

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	1	1	7	20	1	17	10	431	30	33	436	3
Future Vol, veh/h	1	1	7	20	1	17	10	431	30	33	436	3
Conflicting Peds, #/hr	2	0	2	2	0	2	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	10	0	6	0	2	3	0	3	0
Mvmt Flow	1	1	7	21	1	18	11	454	32	35	459	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1034	1040	465	1029	1027	473	464	0	0	487	0	0
Stage 1	532	532	-	493	493	-	-	-	-	-	-	-
Stage 2	502	508	-	536	534	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.2	6.5	6.26	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.59	4	3.354	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	212	232	602	205	236	583	1108	-	-	1086	-	-
Stage 1	535	529	-	543	550	-	-	-	-	-	-	-
Stage 2	555	542	-	514	528	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	195	218	600	192	222	581	1106	-	-	1084	-	-
Mov Cap-2 Maneuver	195	218	-	192	222	-	-	-	-	-	-	-
Stage 1	527	505	-	534	541	-	-	-	-	-	-	-
Stage 2	528	533	-	484	504	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.7	20.3	0.2	0.6
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1106	-	-	421	275	1084	-	-
HCM Lane V/C Ratio	0.01	-	-	0.023	0.145	0.032	-	-
HCM Control Delay (s)	8.3	0	-	13.7	20.3	8.4	0	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.5	0.1	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	34	72	67	377	405	29
Future Vol, veh/h	34	72	67	377	405	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	120	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	6	1	0	3	3	0
Mvmt Flow	35	74	69	389	418	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	959	432	447	0	-	0
Stage 1	432	-	-	-	-	-
Stage 2	527	-	-	-	-	-
Critical Hdwy	6.46	6.21	4.1	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.309	2.2	-	-	-
Pot Cap-1 Maneuver	280	626	1124	-	-	-
Stage 1	646	-	-	-	-	-
Stage 2	584	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	263	626	1124	-	-	-
Mov Cap-2 Maneuver	263	-	-	-	-	-
Stage 1	646	-	-	-	-	-
Stage 2	548	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.1	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1124	-	434	-	-
HCM Lane V/C Ratio	0.061	-	0.252	-	-
HCM Control Delay (s)	8.4	-	16.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1	-	-

	→	↘	↙	←	↓	↙
Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	462	548	667	621	19	341
v/c Ratio	0.74	0.74	1.12	0.44	0.10	0.71
Control Delay	30.8	16.6	92.2	3.5	31.2	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	16.6	92.2	3.5	31.2	13.2
Queue Length 50th (ft)	187	91	~361	60	8	0
Queue Length 95th (ft)	#306	218	m#506	m89	27	#83
Internal Link Dist (ft)	736			638	725	
Turn Bay Length (ft)			310			
Base Capacity (vph)	621	737	596	1403	196	483
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.74	1.12	0.44	0.10	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱	↰	↑						↰	↱
Traffic Volume (vph)	0	448	532	647	602	0	0	0	0	15	4	331
Future Volume (vph)	0	448	532	647	602	0	0	0	0	15	4	331
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5						5.5	5.5
Lane Util. Factor		1.00	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
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1827	1568	1687	1863						1732	1599
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		1827	1568	1687	1863						1732	1599
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)	0	462	548	667	621	0	0	0	0	15	4	341
RTOR Reduction (vph)	0	0	204	0	0	0	0	0	0	0	0	302
Lane Group Flow (vph)	0	462	344	667	621	0	0	0	0	0	19	39
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	3%	7%	2%	0%	0%	0%	0%	7%	0%	1%
Turn Type		NA	Perm	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			2									
Actuated Green, G (s)		25.5	25.5	26.5	56.5						8.5	8.5
Effective Green, g (s)		25.5	25.5	26.5	56.5						8.5	8.5
Actuated g/C Ratio		0.34	0.34	0.35	0.75						0.11	0.11
Clearance Time (s)		4.5	4.5	4.5	4.5						5.5	5.5
Vehicle Extension (s)		4.2	4.2	2.3	0.2						6.0	6.0
Lane Grp Cap (vph)		621	533	596	1403						196	181
v/s Ratio Prot		c0.25		c0.40	0.33						0.01	c0.02
v/s Ratio Perm			0.22									
v/c Ratio		0.74	0.65	1.12	0.44						0.10	0.21
Uniform Delay, d1		21.9	20.9	24.2	3.4						29.8	30.2
Progression Factor		1.00	1.00	0.98	0.81						1.00	1.00
Incremental Delay, d2		7.9	5.9	66.2	0.6						0.6	1.7
Delay (s)		29.7	26.9	90.0	3.3						30.4	31.9
Level of Service		C	C	F	A						C	C
Approach Delay (s)		28.2			48.2			0.0			31.8	
Approach LOS		C			D			A			C	

Intersection Summary

HCM 2000 Control Delay	38.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

8: I-205 NB Ramps & 82nd Dr

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	249	273	16	897	450	601
v/c Ratio	0.26	0.29	0.12	0.86	0.84	0.69
Control Delay	10.4	3.9	34.0	26.9	39.4	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	3.9	34.0	26.9	39.4	6.5
Queue Length 50th (ft)	25	7	7	340	189	0
Queue Length 95th (ft)	m74	m42	25	#632	#288	68
Internal Link Dist (ft)	638			440	402	
Turn Bay Length (ft)		50	200			575
Base Capacity (vph)	965	945	240	1037	619	912
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.29	0.07	0.86	0.73	0.66

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

8: I-205 NB Ramps & 82nd Dr

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (vph)	234	257	15	843	423	565
Future Volume (vph)	234	257	15	843	423	565
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.0	4.5	5.5	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1810	1568	1805	1845	1752	1482
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1810	1568	1805	1845	1752	1482
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	249	273	16	897	450	601
RTOR Reduction (vph)	0	119	0	0	0	418
Lane Group Flow (vph)	249	154	16	897	450	183
Heavy Vehicles (%)	5%	3%	0%	3%	3%	9%
Turn Type	NA	Perm	Prot	NA	Prot	Prot
Protected Phases	2		1	6	8	8
Permitted Phases		2				
Actuated Green, G (s)	36.8	36.8	1.4	42.2	22.8	22.8
Effective Green, g (s)	36.8	36.8	1.4	42.2	22.8	22.8
Actuated g/C Ratio	0.49	0.49	0.02	0.56	0.30	0.30
Clearance Time (s)	4.5	4.5	4.0	4.5	5.5	5.5
Vehicle Extension (s)	0.2	0.2	2.3	4.2	2.3	2.3
Lane Grp Cap (vph)	888	769	33	1038	532	450
v/s Ratio Prot	0.14		0.01	c0.49	c0.26	0.12
v/s Ratio Perm		0.10				
v/c Ratio	0.28	0.20	0.48	0.86	0.85	0.41
Uniform Delay, d1	11.3	10.8	36.4	14.0	24.5	20.7
Progression Factor	0.84	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.4	6.4	9.5	11.5	0.3
Delay (s)	10.0	11.3	42.8	23.5	36.0	21.1
Level of Service	B	B	D	C	D	C
Approach Delay (s)	10.7			23.8	27.5	
Approach LOS	B			C	C	

Intersection Summary

HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Attachment C ODOT Crash Data

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SE McLoughlin Blvd 99E (Hwy 081) & Glen Echo Ave
January 1, 2010 through December 31, 2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2014														
PEDESTRIAN	0	1	0	1	0	1	0	0	1	0	1	1	0	0
REAR-END	0	3	0	3	0	6	0	1	2	3	0	3	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	1	0	1	1	0	1	0	0
2014 TOTAL	0	4	1	5	0	7	1	1	4	4	1	5	0	0
YEAR: 2013														
REAR-END	0	1	2	3	0	2	0	3	0	2	1	3	0	0
2013 TOTAL	0	1	2	3	0	2	0	3	0	2	1	3	0	0
YEAR: 2011														
ANGLE	0	0	1	1	0	0	0	0	0	1	0	1	0	0
REAR-END	0	1	1	2	0	1	0	0	2	1	1	2	0	0
2011 TOTAL	0	1	2	3	0	1	0	0	2	2	1	3	0	0
YEAR: 2010														
PEDESTRIAN	0	1	0	1	0	1	0	1	0	0	1	1	0	0
2010 TOTAL	0	1	0	1	0	1	0	1	0	0	1	1	0	0
FINAL TOTAL	0	7	5	12	0	11	1	5	6	8	4	12	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

```
                                                                   OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
                                                                        TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                       CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                         SE McLoughlin Blvd 99E (Hwy 081) & Glen Echo Ave
                                                                                    January 1, 2010 through December 31, 2014

      S  D
      P  R S W                                    RD#  FC   CONN #                         INT-TYP                                      SPCL USE
SER#   E A U C O DATE        COUNTY               CMPT/MLG FIRST  STREET        RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                        A S
INVEST E L G H R DAY/TIME    CITY                 MILEPNT  SECOND STREET        DIRECT    LEGS    TRAF-   RNDBT SURF  COLL TYP     OWNER     FROM      PRTC INJ     G E LICNS PED
UNLOC? D C S L K LAT/LONG    URBAN AREA           LRS      INTERSECTION SEQ#    LOCTN   (#LANES) CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO     P# TYPE SVRTY  E X RES   LOC ERROR         ACTN EVENT      CAUSE

00052  N N N     01/06/2011 CLACKAMAS         1    14                          INTER      4-LEG  N           N UNK  S-1STOP    01 NONE   0 STRGHT                                                             07
NONE             Thu    8A                    MN    0                          UN                TRF SIGNAL  N WET  REAR          PRVTE     SE NW                                            000             00
                            PORTLAND UA        10.30                           06           0                N DAY  INJ          PSNGR CAR        01 DRVR NONE  22 M UNK        026         000             07
No     45 23  6.17  -122  36 29.41            008100100S00                                                                                                    OR<25

                                                                                                                               02 NONE   0 STOP
                                                                                                                                  PRVTE     SE NW                                            011             00
                                                                                                                                 PSNGR CAR        01 DRVR INJC  43 M OR-Y       000         000             00
                                                                                                                                                                     OR<25

01498  N N N N N 05/03/2013 CLACKAMAS         1    14                          INTER      CROSS  N           N CLR  S-1STOP    01 NONE   0 STRGHT                                                 013         07
COUNTY           Fri    1P                    MN    0                          UN                TRF SIGNAL  N DRY  REAR          PRVTE     SE NW                                            000             00
                            PORTLAND UA        10.30                           06           0                N DAY  INJ          PSNGR CAR        01 DRVR NONE  33 M OR-Y       026         000             07
No     45 23  6.17  -122  36 29.41            008100100S00                                                                                                    OR<25

                                                                                                                               02 NONE   0 STOP
                                                                                                                                  PRVTE     SE NW                                            011  013        00
                                                                                                                                 PSNGR CAR        01 DRVR NONE  60 F OR-Y       000         000             00
                                                                                                                                                                     OR<25
                                                                                                                                                  02 PSNG INJC  83 F            000         000             00

                                                                                                                               03 NONE   0 STOP
                                                                                                                                  PRVTE     SE NW                                            022  013        00
                                                                                                                                 PSNGR CAR        01 DRVR NONE  60 M OR-Y       000         000             00
                                                                                                                                                                     OR<25

                                                                                                                               04 NONE   0 STOP
                                                                                                                                  PRVTE     SE NW                                            022             00
                                                                                                                                 PSNGR CAR        01 DRVR NONE  44 F OR-Y       000         000             00
                                                                                                                                                                     OR<25
                                                                                                                                                  02 PSNG INJC  26 M            000         000             00

00771  N N N N N 03/05/2011 CLACKAMAS         1    14                          INTER      CROSS  N           N RAIN S-1STOP    01 NONE   0 STRGHT                                                             27,07
COUNTY           Sat    2A                    MN    0                          N                 TRF SIGNAL  N WET  REAR          PRVTE     N  S                                             000             00
                            PORTLAND UA        10.30                           06           0                N DLIT PDO          PSNGR CAR        01 DRVR NONE  22 F OR-Y       016,026     000             27,07
No     45 23  6.17  -122  36 29.41            008100100S00                                                                                                    OR<25

                                                                                                                               02 NONE   0 STOP
                                                                                                                                  PRVTE     N  S                                             011             00
                                                                                                                                 PSNGR CAR        01 DRVR NONE  25 M SUSP       000         000             00
                                                                                                                                                                     OR<25

04211  N N N N N 11/10/2010 CLACKAMAS         1    14                          INTER      CROSS  N           N FOG  PED        01 NONE   0 TURN-L                                                             02
STATE            Wed    9P                    MN    0                          SE                TRF SIGNAL  N DRY  PED           PRVTE     NE SE                                            000             00
                            PORTLAND UA        10.30                           05           0                N DLIT INJ          PSNGR CAR        01 DRVR NONE  18 M OR-Y       029         000             02
No     45 23  6.17  -122  36 29.41            008100100S00                                                                                                    OR<25
                                                                                                                                            STRGHT 01 PED  INJC  18 M        01 000         035             00
                                                                                                                                            SW NE
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST

SE McLoughlin Blvd 99E (Hwy 081) & Glen Echo Ave
January 1, 2010 through December 31, 2014

```
       S   D
       P   R S W                              RD#  FC  CONN #                        INT-TYP                                  SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG FIRST  STREET        RD CHAR (MEDIAN) INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                   A S
INVEST E L G H R DAY/TIME   CITY              MILEPNT  SECOND STREET        DIRECT     LEGS  TRAF-   RNDBT SURF  COLL TYP     OWNER     FROM       PRTC INJ    G E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS      INTERSECTION SEQ#    LOCTN   (#LANES) CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO      P# TYPE SVRTY  E X RES   LOC ERROR         ACTN EVENT       CAUSE

00882  Y N N N N 03/02/2014 CLACKAMAS         1    14                       INTER     CROSS  N           N RAIN S-1STOP    01 NONE    0 STRGHT                                                  013        01,07,32
STATE            Sun   12P                    MN    0                       SE               TRF SIGNAL  N WET  REAR          PRVTE     SE NW                                              000              00
                            PORTLAND UA        10.30                        06          0                N DAY  INJ          PSNGR CAR          01 DRVR NONE  18 F OR-Y       047,026,052  000              01,07,32
No     45 23   6.17  -122 36 29.41            008100100S00
                                                                                                                                                                   OR<25

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     SE NW                                              011  013         00
                                                                                                                             PSNGR CAR          01 DRVR INJC  19 M OR-Y       000          000              00
                                                                                                                                                                   OR<25

                                                                                                                           03 NONE    0 STOP
                                                                                                                              PRVTE     SE NW                                              022              00
                                                                                                                             PSNGR CAR          01 DRVR NONE  44 M OR-Y       000          000              00
                                                                                                                                                                   OR>25

01530  N N N     04/22/2014 CLACKAMAS         1    14                       INTER     CROSS  N           N RAIN S-1STOP    01 NONE    0 STRGHT                                                              29
NONE             Tue    3P                    MN    0                       SE               TRF SIGNAL  N WET  REAR          PRVTE     SE NW                                              000              00
                            PORTLAND UA        10.30                        06          0                N DAY  INJ          PSNGR CAR          01 DRVR NONE  21 M OR-Y       026          000              29
No     45 23   6.17  -122 36 29.41            008100100S00
                                                                                                                                                                   OR<25

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     SE NW                                              011              00
                                                                                                                             PSNGR CAR          01 DRVR INJC  38 F OR-Y       000          000              00
                                                                                                                                                                   OR<25
                                                                                                                                                02 PSNG INJC  19 M            000          000              00

04336  N N N N N 10/29/2014 CLACKAMAS         1    14                       INTER     CROSS  N           N RAIN  PED       01 NONE    0 TURN-L                                                              19,02
STATE            Wed    4A                    MN    0                       NW               TRF SIGNAL  N WET   PED          PRVTE     SW NW                                              000              00
                            PORTLAND UA        10.30                        05          0                N DLIT INJ          PSNGR CAR          01 DRVR NONE  62 F OR-Y       029          000              02
No     45 23   6.17  -122 36 29.41            008100100S00
                                                                                                                                                                   OR<25
                                                                                                                                        STRGHT  01 PED  INJB  24 F        01  000          035              19
                                                                                                                                        NE SW

02254  N N N     06/25/2013 CLACKAMAS         1    14                       INTER     CROSS  N           N CLR  S-1STOP    01 NONE    0 STRGHT                                                              07
NONE             Tue    8A                    MN    0                       NW               TRF SIGNAL  N DRY  REAR          PRVTE     NW SE                                              000              00
                            PORTLAND UA        10.30                        06          0                N DAY  PDO          PSNGR CAR          01 DRVR NONE  30 F OR-Y       026          000              07
No     45 23   6.17  -122 36 29.41            008100100S00
                                                                                                                                                                   OR<25

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     NW SE                                              011              00
                                                                                                                             PSNGR CAR          01 DRVR NONE  60 M OR-Y       000          000              00
                                                                                                                                                                   OR<25

05088  Y Y N     12/31/2013 CLACKAMAS         1    14                       INTER     CROSS  N           N CLD  S-1STOP    01 NONE    0 STRGHT                                                              01,07
STATE            Tue    5P                    MN    0                       NW               TRF SIGNAL  N DRY  REAR          PRVTE     NW SE                                              000              00
                            PORTLAND UA        10.30                        06          0                N DARK PDO          PSNGR CAR          01 DRVR NONE  31 M OR-Y       047,026      000              01,07
No     45 23   6.17  -122 36 29.41            008100100S00
                                                                                                                                                                   OR<25

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     NW SE                                              011              00
                                                                                                                             PSNGR CAR          01 DRVR NONE  46 M OR-Y       000          000              00
                                                                                                                                                                   OR<25
```

```
                                                                                         TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                    CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                                   SE McLoughlin Blvd 99E (Hwy 081) & Glen Echo Ave
                                                                                            January 1, 2010 through December 31, 2014

       S   D
       P   R S W                              RD#  FC   CONN #                        INT-TYP                                 SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP   TRLR QTY  MOVE                A S
INVEST E L G H R DAY/TIME   CITY              MILEPNT   SECOND STREET        DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP    OWNER     FROM      PRTC INJ   G E  LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS       INTERSECTION SEQ#    LOCTN    (#LANES) CNTL     DRVWY LIGHT SVRTY    V# VEH TYPE  TO     P# TYPE SVRTY E X  RES   LOC ERROR        ACTN EVENT        CAUSE

02150  N N N     06/05/2014 CLACKAMAS         1    14                        INTER      CROSS  N            N CLR  S-1STOP   01 NONE   0 STRGHT                                                     013        32,29
NO RPT           Thu    8A                    MN    0                        CN                TRF SIGNAL   N DRY  REAR         PRVTE     NW SE                                               000                 00
                            PORTLAND UA        10.30                         01           0                 N DAY  INJ         PSNGR CAR          01 DRVR INJC  23 F OR-Y      052,026      000                 32,29
No     45 23  6.17  -122 36 29.41             008100100S00                                                                                                         OR<25

                                                                                                                             02 NONE   0 STOP
                                                                                                                                PRVTE     NW SE                                               011  013            00
                                                                                                                               PSNGR CAR          01 DRVR INJC  22 F OTH-Y     000          000                 00
                                                                                                                                                                   OR<25

                                                                                                                             03 NONE   0 STOP
                                                                                                                                PRVTE     NW SE                                               022  013            00
                                                                                                                               PSNGR CAR          01 DRVR NONE  62 M OR-Y      000          000                 00
                                                                                                                                                                   OR<25
                                                                                                                                                  02 PSNG INJC  55 F           000          000                 00

                                                                                                                             04 NONE   0 STOP
                                                                                                                                PRVTE     NW SE                                               022                 00
                                                                                                                               PSNGR CAR          01 DRVR NONE  40 M OR-Y      000          000                 00
                                                                                                                                                                   OR<25
04328  N N N     10/28/2014 CLACKAMAS         1    14                        INTER      CROSS  N            N RAIN ANGL-OTH  01 NONE   0 STRGHT                                                                    02
NONE             Tue    8A                    MN    0                        CN                TRF SIGNAL   N WET  TURN         PRVTE     SE NW                                               000                 00
                            PORTLAND UA        10.30                         02           0                 N DAY  PDO           TRUCK            01 DRVR NONE  29 M OR-Y      000          000                 00
No     45 23  6.17  -122 36 29.41             008100100S00                                                                                                         OR<25

                                                                                                                             02 NONE   0 TURN-R
                                                                                                                                UNKN      NE NW                                               016                 00
                                                                                                                                UNKNOWN           01 DRVR NONE  00 M OR-Y      028          000                 02
                                                                                                                                                                   UNK
03487  N N N     09/22/2011 CLACKAMAS         1    14                        INTER      CROSS  N            N UNK  ANGL-OTH  01 UNKN   0 TURN-L                                                                    02
NONE             Thu   10A                    MN    0                        CN                TRF SIGNAL   N UNK  ANGL         UNKN      NE SE                                               000                 00
                            PORTLAND UA        10.30                         04           0                 N DAY  PDO          UNKNOWN           01 DRVR NONE  00 U UNK       028          000                 02
No     45 23  6.17  -122 36 29.41             008100100S00                                                                                                         UNK

                                                                                                                             02 NONE   0 STRGHT
                                                                                                                                PRVTE     SE NW                                               000                 00
                                                                                                                               PSNGR CAR          01 DRVR NONE  26 F OR-Y      000          000                 00
                                                                                                                                                                   OR<25
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SE McLoughlin Blvd 99E (Hwy 081) & Gloucester St
January 1, 2010 through December 31, 2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2014														
REAR-END	0	3	2	5	0	3	0	4	1	4	1	5	0	0
TURNING MOVEMENTS	0	1	1	2	0	1	0	2	0	1	1	2	0	0
2014 TOTAL	0	4	3	7	0	4	0	6	1	5	2	7	0	0
YEAR: 2013														
ANGLE	0	1	0	1	0	1	0	1	0	0	1	1	0	0
REAR-END	0	1	2	3	0	1	0	1	2	2	1	3	0	0
2013 TOTAL	0	2	2	4	0	2	0	2	2	2	2	4	0	0
YEAR: 2012														
TURNING MOVEMENTS	0	1	1	2	0	2	0	2	0	2	0	2	0	0
2012 TOTAL	0	1	1	2	0	2	0	2	0	2	0	2	0	0
YEAR: 2011														
ANGLE	0	1	0	1	0	2	0	0	1	1	0	1	0	0
FIXED / OTHER OBJECT	0	0	1	1	0	0	0	0	1	0	1	1	0	0
REAR-END	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2011 TOTAL	0	2	1	3	0	3	0	1	2	2	1	3	0	0
YEAR: 2010														
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	0	1	0	1	0	0
2010 TOTAL	0	0	1	1	0	0	0	0	0	1	0	1	0	0
FINAL TOTAL	0	9	8	17	0	11	0	11	5	12	5	17	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

```
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                                SE McLoughlin Blvd 99E (Hwy 081) & Gloucester St
                                                                                           January 1, 2010 through December 31, 2014

       S   D
       P   R S W                              RD#  FC   CONN #                        INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                  A S
INVEST E L G H R DAY/TIME   CITY              MILEPNT   SECOND STREET        DIRECT     LEGS   TRAF-   RNDBT SURF  COLL TYP     OWNER     FROM      PRTC INJ    G E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS       INTERSECTION SEQ#    LOCTN    (#LANES) CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO     P# TYPE SVRTY  E X RES   LOC ERROR         ACTN EVENT       CAUSE

04570  N N N N N 11/11/2014 CLACKAMAS         1    14                        INTER     CROSS   N           N CLR  BIKE       01 NONE   0  TURN-L                                                             02
CITY             Tue    2P  GLADSTONE         MN    0   GLOUCESTER ST        SE                TRF SIGNAL  N DRY  TURN          PRVTE     NE SE                                             000           00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      05           0                N DAY  INJ         PSNGR CAR         01 DRVR NONE  35 F OR-Y      027           000           02
No     45 22 45.37  -122 36 13.46             008100100S00              1                                                                                           OR<25
                                                                                                                                          STRGHT 01 BIKE INJB  28 M       01  000           035           00
                                                                                                                                          SW NE

04661  N N N     11/17/2014 CLACKAMAS         1    14                        INTER     CROSS   N           N CLR  S-1STOP    01 NONE   0  STRGHT                                                             07
NONE             Mon    1P  GLADSTONE         MN    0   GLOUCESTER ST        SE                TRF SIGNAL  N DRY  REAR          PRVTE     SE NW                                             000           00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      06           0                N DAY  PDO         PSNGR CAR         01 DRVR NONE  63 M OR-Y      043,026       000           07
No     45 22 45.37  -122 36 13.46             008100100S00              1                                                                                           OR<25

                                                                                                                             02 NONE   0  STOP
                                                                                                                                PRVTE     SE NW                                             011           00
                                                                                                                               PSNGR CAR         01 DRVR NONE  59 M OR-Y      000           000           00
                                                                                                                                                                    OR<25

                                                                                                                             03 NONE   0  STOP
                                                                                                                                PRVTE     SE NW                                             011           00
                                                                                                                               PSNGR CAR         01 DRVR NONE  68 M OR-Y      000           000           00
                                                                                                                                                                    OR<25

02200  N N N     06/21/2011 CLACKAMAS         1    14                        INTER     CROSS   N           N CLR  S-1STOP    01 NONE   0  STRGHT                                                 013         07
NONE             Tue   11A  GLADSTONE         MN    0   GLOUCESTER ST        NW                TRF SIGNAL  N DRY  REAR          PRVTE     NW SE                                             000           00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      06           0                N DAY  INJ         PSNGR CAR         01 DRVR NONE  21 F OR-Y      026           000           07
No     45 22 45.37  -122 36 13.46             008100100S00              1                                                                                           OR>25

                                                                                                                             02 NONE   0  STOP
                                                                                                                                PRVTE     NW SE                                             011  013         00
                                                                                                                               PSNGR CAR         01 DRVR INJC  20 F OR-Y      000           000           00
                                                                                                                                                                    OR<25
                                                                                                                                                 02 PSNG NO<5  01 M           000           000           00

                                                                                                                             03 NONE   0  STOP
                                                                                                                                PRVTE     NW SE                                             022           00
                                                                                                                               PSNGR CAR         01 DRVR NONE  32 M OR-Y      000           000           00
                                                                                                                                                                    OR<25

00938  N N N     02/20/2013 CLACKAMAS         1    14                        INTER     CROSS   N           N CLD  S-1STOP    01 NONE   0  STRGHT                                                             07
NONE             Wed    4P  GLADSTONE         MN    0   GLOUCESTER ST        NW                TRF SIGNAL  N WET  REAR          PRVTE     NW SE                                             000           00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      06           0                N DUSK PDO         PSNGR CAR         01 DRVR NONE  37 F OR-Y      026           000           07
No     45 22 45.37  -122 36 13.46             008100100S00              1                                                                                           OR<25

                                                                                                                             02 NONE   0  STOP
                                                                                                                                UNKN      NW SE                                             011           00
                                                                                                                               PSNGR CAR         01 DRVR NONE  00 F OR-Y      000           000           00
                                                                                                                                                                    UNK

01620  N N N     05/10/2013 CLACKAMAS         1    14                        INTER     CROSS   N           N CLR  S-1STOP    01 NONE   0  STRGHT                                                 013         07
NONE             Fri    1P  GLADSTONE         MN    0   GLOUCESTER ST        NW                TRF SIGNAL  N DRY  REAR          UNKN      NW SE                                             000           00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      06           0                N DAY  PDO         PSNGR CAR         01 DRVR NONE  00 M UNK       026           000           07
No     45 22 45.37  -122 36 13.46             008100100S00              1                                                                                           UNK
```

```
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                 CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                                SE McLoughlin Blvd 99E (Hwy 081) & Gloucester St
                                                                                            January 1, 2010 through December 31, 2014

       S   D
       P   R S W                               RD#  FC  CONN #                      INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY             CMPT/MLG FIRST  STREET       RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP   TRLR QTY  MOVE                   A S
INVEST E L G H R DAY/TIME   CITY               MILEPNT  SECOND STREET       DIRECT     LEGS   TRAF-   RNDBT SURF  COLL TYP    OWNER     FROM      PRTC INJ     G E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA         LRS      INTERSECTION SEQ#   LOCTN   (#LANES)  CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO     P# TYPE SVRTY   E X RES   LOC   ERROR        ACTN EVENT        CAUSE

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     NW SE                                               011  013         00
                                                                                                                               PSNGR CAR         01 DRVR NONE   41 M OR-Y        000          000              00
                                                                                                                                                                     OR>25

                                                                                                                             03 NONE    0 STOP
                                                                                                                                PRVTE     NW SE                                               022              00
                                                                                                                               PSNGR CAR         01 DRVR NONE   00 M UNK         000          000              00
                                                                                                                                                                     UNK

03523  N N N     09/05/2013 CLACKAMAS          1   14                        INTER     CROSS  N           N UNK  S-1STOP     01 NONE    0 STRGHT                                                   013         07
NONE             Thu   UNK  GLADSTONE          MN   0   GLOUCESTER ST        NW                TRF SIGNAL  N WET  REAR           PRVTE     NW SE                                               000              00
                            PORTLAND UA         10.75   MCLOUGHLIN BLVD      06           0               N DAY  INJ           PSNGR CAR         01 DRVR NONE   21 M OR-Y        026          000              07
No     45 22 45.37  -122 36 13.46              008100100S00              1                                                                                           OR<25

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     NW SE                                               011  013         00
                                                                                                                               PSNGR CAR         01 DRVR NONE   27 F OR-Y        000          000              00
                                                                                                                                                                     OR<25

                                                                                                                             03 NONE    0 STOP
                                                                                                                                PRVTE     NW SE                                               022              00
                                                                                                                               PSNGR CAR         01 DRVR INJC   31 F OR-Y        000          000              00
                                                                                                                                                                     OR<25

02021  N N N     05/28/2014 CLACKAMAS          1   14                        INTER     CROSS  N           N CLR  S-1STOP     01 NONE    0 STRGHT                                                               29
NONE             Wed     5P GLADSTONE          MN   0   GLOUCESTER ST        NW                NONE        N DRY  REAR           UNKN      NW SE                                               000              00
                            PORTLAND UA         10.75   MCLOUGHLIN BLVD      06           0               N DAY  INJ           PSNGR CAR         01 DRVR NONE   00 M UNK         026          000              29
No     45 22 45.37  -122 36 13.46              008100100S00              1                                                                                           UNK

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     NW SE                                               011              00
                                                                                                                               PSNGR CAR         01 DRVR INJC   33 F OR-Y        000          000              00
                                                                                                                                                                     OR<25

03121  N N N N N 08/12/2014 CLACKAMAS          1   14                        INTER     CROSS  N           N CLR  S-1STOP     01 NONE    0 STRGHT                                                   003         27,04,29
CITY             Tue     4A GLADSTONE          MN   0   GLOUCESTER ST        NW                TRF SIGNAL  N DRY  REAR           PRVTE     NW SE                                               000              00
                            PORTLAND UA         10.75   MCLOUGHLIN BLVD      06           0               N DLIT PDO           PSNGR CAR         01 DRVR NONE   27 F OR-Y        016,020,026  038  003         27,04,29
No     45 22 45.37  -122 36 13.46              008100100S00              1                                                                                           OR<25

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     NW SE                                               011              00
                                                                                                                               PSNGR CAR         01 DRVR NONE   49 M OR-Y        000          000              00
                                                                                                                                                                     OR<25

03971  N N N     10/08/2014 CLACKAMAS          1   14                        INTER     CROSS  N           N CLR  S-1STOP     01 NONE    0 STRGHT                                                               29
NONE             Wed    11A GLADSTONE          MN   0   GLOUCESTER ST        NW                TRF SIGNAL  N DRY  REAR           UNKN      NW SE                                               000              00
                            PORTLAND UA         10.75   MCLOUGHLIN BLVD      06           0               N DAY  INJ           PSNGR CAR         01 DRVR NONE   00 F OR-Y        026          000              29
No     45 22 45.37  -122 36 13.46              008100100S00              1                                                                                           UNK
```

```
CDS380     10/5/2016                                                      OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                                           PAGE: 3
                                                                                   TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                 CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                                 SE McLoughlin Blvd 99E (Hwy 081) & Gloucester St
                                                                                            January 1, 2010 through December 31, 2014

       S   D
       P   R S W                              RD#  FC   CONN #                         INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                  A  S
INVEST E L G H R DAY/TIME   CITY              MILEPNT   SECOND STREET        DIRECT      LEGS  TRAF-    RNDBT SURF  COLL TYP     OWNER     FROM      PRTC INJ    G  E LICNS  PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS       INTERSECTION SEQ#    LOCTN   (#LANES)  CNTL     DRVWY LIGHT SVRTY     V# VEH TYPE  TO     P# TYPE SVRTY  E  X RES    LOC ERROR        ACTN EVENT       CAUSE

                                                                                                                              02 NONE    0 STOP
                                                                                                                                 PRVTE     NW SE                                              011              00
                                                                                                                                PSNGR CAR         01 DRVR INJC   36 F OR-Y       000          000              00
                                                                                                                                                                      OR>25
                                                                                                                                                  02 PSNG NO<5   01 F            000          000              00

04404  N N N     11/01/2014 CLACKAMAS         1     14                       INTER      CROSS  N            N RAIN  S-1STOP   01 NONE    0 STRGHT                                                              29
NONE             Sat    3P  GLADSTONE         MN     0  GLOUCESTER ST        NW                TRF SIGNAL   N WET   REAR         PRVTE     NW SE                                              000              00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      06            0                N DAY   INJ     PSNGR CAR         01 DRVR NONE   46 F OR-Y       026          000              29
No      45 22 45.37   -122 36 13.46           008100100S00               1                                                                                            OR<25

                                                                                                                              02 NONE    0 STOP
                                                                                                                                 PRVTE     NW SE                                              011              00
                                                                                                                                PSNGR CAR         01 DRVR INJC   33 M OR-Y       000          000              00
                                                                                                                                                                      OR<25

03933  N N N N N 10/15/2013 CLACKAMAS         1     14                       INTER      CROSS  N            N CLR   ANGL-OTH  01 NONE    0 STRGHT                                                              04
STATE            Tue    7P  GLADSTONE         MN     0  GLOUCESTER ST        CN                TRF SIGNAL   N DRY   ANGL         PRVTE     E  W                                               000              00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      01            0                N DLIT  INJ     PSNGR CAR         01 DRVR NONE   49 F NONE       020          000              04
No      45 22 45.37   -122 36 13.46           008100100S00               1                                                                                            OR<25

                                                                                                                              02 NONE    0 STRGHT
                                                                                                                                 PRVTE     N  S                                               000              00
                                                                                                                                PSNGR CAR         01 DRVR INJC   45 F OR-Y       000          000              00
                                                                                                                                                                      OR<25

00885  N N N     02/28/2011 CLACKAMAS         1     14                       INTER      CROSS  N            N RAIN  OTH OBJ   01 NONE    0 STRGHT                                                    078       12
NONE             Mon    8P  GLADSTONE         MN     0  GLOUCESTER ST        CN                TRF SIGNAL   N WET   FIX          PRVTE     SE NW                                              000   078       00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      02            0                N DLIT  PDO     PSNGR CAR         01 DRVR NONE   54 M OR-Y       000          000              12
No      45 22 45.37   -122 36 13.46           008100100S00               1                                                                                            OR<25
00115  N N N     01/10/2012 CLACKAMAS         1     14                       INTER      CROSS  N            N CLR   S-OTHER   01 NONE    0 TURN-R                                                              06
NO RPT           Tue    3P  GLADSTONE         MN     0  GLOUCESTER ST        CN                TRF SIGNAL   N DRY   TURN         PRVTE     NE NW                                              031              00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      02            0                N DAY   PDO     PSNGR CAR         01 DRVR NONE   40 F OR-Y       031          000              06
No      45 22 45.37   -122 36 13.46           008100100S00               1                                                                                            OR<25
                                                                                                                                                  02 PSNG NO<5   03 M            000          000              00

                                                                                                                              02 NONE    0 TURN-R
                                                                                                                                 PRVTE     NE NW                                              000              00
                                                                                                                                PSNGR CAR         01 DRVR NONE   88 M OR-Y       000          000              00
                                                                                                                                                                      OR<25

00887  N N N     03/13/2011 CLACKAMAS         1     14                       INTER      CROSS  N            N RAIN  ANGL-OTH  01 NONE    0 STRGHT                                                              04
NO RPT           Sun   10A  GLADSTONE         MN     0  GLOUCESTER ST        CN                TRF SIGNAL   N WET   ANGL         PRVTE     NW SE                                              000              00
                            PORTLAND UA        10.75    MCLOUGHLIN BLVD      03            0                N DAY   INJ     PSNGR CAR         01 DRVR NONE   16 F OR-Y       020          000              04
No      45 22 45.37   -122 36 13.46           008100100S00               1                                                                                            OR<25
                                                                                                                                                  02 PSNG INJC   16 F            000          000              00

                                                                                                                              02 NONE    0 STRGHT
                                                                                                                                 PRVTE     SW NE                                              000              00
                                                                                                                                PSNGR CAR         01 DRVR INJA   64 F OR-Y       000          000              00
                                                                                                                                                                      OR<25
```

```
                                                                                       TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                      CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                                  SE McLoughlin Blvd 99E (Hwy 081) & Gloucester St
                                                                                             January 1, 2010 through December 31, 2014

       S   D
       P   R S W                                    RD#  FC   CONN #                       INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG FIRST  STREET      RD CHAR (MEDIAN)  INT-REL  OFFRD WHTR  CRASH TYP    TRLR QTY  MOVE                 A S
INVEST E L G H R DAY/TIME   CITY              MILEPNT  SECOND STREET      DIRECT    LEGS    TRAF-    RNDBT SURF  COLL TYP     OWNER     FROM       PRTC INJ   G E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS      INTERSECTION SEQ#  LOCTN   (#LANES)  CNTL     DRVWY LIGHT SVRTY     V# VEH TYPE  TO      P# TYPE SVRTY E X RES   LOC ERROR        ACTN EVENT       CAUSE

04388  N N N N N 10/31/2014 CLACKAMAS         1    14                     INTER      CROSS  N            N CLD  O-1 L-TURN 01 NONE   0 TURN-L                                                               02
CITY             Fri    6P  GLADSTONE         MN   0   GLOUCESTER ST      CN                TRF SIGNAL   N DRY  TURN          PRVTE     NE SE                                                    000             00
                            PORTLAND UA        10.75   MCLOUGHLIN BLVD    03            0                N DUSK PDO          PSNGR CAR          01 DRVR NONE  17 F OR-Y      028            000             02
No     45 22 45.37  -122 36 13.46             008100100S00              1                                                                              OR<25

                                                                                                                      02 NONE   0 STRGHT
                                                                                                                         PRVTE     SW NE                                                    000             00
                                                                                                                        PSNGR CAR          01 DRVR NONE  17 M OR-Y      000            000             00
                                                                                                                                                             OR<25

02456  Y N N N N 07/08/2012 CLACKAMAS         1    14                     INTER      CROSS  N            N CLR  O-1 L-TURN 01 NONE   0 TURN-L                                                               02,30
STATE            Sun    9A  GLADSTONE         MN   0   GLOUCESTER ST      CN                TRF SIGNAL   N DRY  TURN          PRVTE     NW NE                                                    000             00
                            PORTLAND UA        10.75   MCLOUGHLIN BLVD    04            0                N DAY  INJ          PSNGR CAR          01 DRVR NONE  45 F SUSP      028            000             02
No     45 22 45.37  -122 36 13.46             008100100S00              1                                                                              OR<25

                                                                                                                      02 NONE   0 STRGHT
                                                                                                                         PRVTE     SE NW                                                    000             00
                                                                                                                        PSNGR CAR          01 DRVR INJC  53 M SUSP      050            000             30
                                                                                                                                                             OR<25
                                                                                                                                           02 PSNG INJC  52 F           000            000             00

01444  N N N     05/01/2010 CLACKAMAS         1    14                     INTER      CROSS  N            N UNK  S-OTHER    01 NONE   0 TURN-R                                                               08
NONE             Sat   12P  GLADSTONE         MN   0   GLOUCESTER ST      CN                TRF SIGNAL   N UNK  TURN          PRVTE     SE NE                                                    000             00
                            PORTLAND UA        10.76   MCLOUGHLIN BLVD    04            0                N DAY  PDO          PSNGR CAR          01 DRVR NONE  00 F OR-Y      006            000             08
No     45 22 44.96  -122 36 13.14             008100100S00              1                                                                              UNK

                                                                                                                      02 NONE   0 TURN-R
                                                                                                                         PRVTE     SE NE                                                    000             00
                                                                                                                        PSNGR CAR          01 DRVR NONE  32 M OTH-Y     000            000             00
                                                                                                                                                             N-RES
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SE McLoughlin Blvd 99E (Hwy 081) & Arlington St / River Rd
January 1, 2010 through December 31, 2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2014														
ANGLE	0	1	0	1	0	3	0	0	1	0	1	1	0	0
FIXED / OTHER OBJECT	0	1	0	1	0	1	0	1	0	1	0	1	0	1
REAR-END	0	4	2	6	0	5	0	5	1	4	2	6	0	0
TURNING MOVEMENTS	0	4	0	4	0	5	0	3	1	4	0	4	0	0
2014 TOTAL	0	10	2	12	0	14	0	9	3	9	3	12	0	1
YEAR: 2013														
PEDESTRIAN	0	1	0	1	0	1	0	1	0	0	1	1	0	0
REAR-END	0	4	4	8	0	8	0	7	1	5	3	8	0	0
SIDESWIPE - OVERTAKING	0	0	1	1	0	0	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	2	0	2	0	3	0	1	1	2	0	2	0	0
2013 TOTAL	0	7	5	12	0	12	0	10	2	8	4	12	0	0
YEAR: 2012														
ANGLE	0	1	0	1	0	1	0	1	0	1	0	1	0	0
REAR-END	0	1	1	2	0	3	0	1	1	2	0	2	0	0
2012 TOTAL	0	2	1	3	0	4	0	2	1	3	0	3	0	0
YEAR: 2011														
ANGLE	0	1	1	2	0	1	0	2	0	1	1	2	0	0
PEDESTRIAN	0	1	0	1	0	1	0	1	0	0	1	1	0	0
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2011 TOTAL	0	2	3	5	0	2	0	5	0	3	2	5	0	0
YEAR: 2010														
PEDESTRIAN	0	2	0	2	0	2	0	1	1	2	0	2	0	0
REAR-END	0	0	2	2	0	0	0	2	0	2	0	2	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	0	1	1	0	0
2010 TOTAL	0	2	3	5	0	2	0	4	1	4	1	5	0	0
FINAL TOTAL	0	23	14	37	0	34	0	30	7	27	10	37	0	1

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

```
CDS380     10/5/2016                                                                    OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                                    PAGE: 1
                                                                                               TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                           CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                                   SE McLoughlin Blvd 99E (Hwy 081) & Arlington St / River Rd
                                                                                                   January 1, 2010 through December 31, 2014

        S  D
        P  R S W                                          RD#  FC   CONN #                         INT-TYP                                       SPCL USE
SER#   E A U C O  DATE        COUNTY                      CMPT/MLG  FIRST  STREET       RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP      TRLR QTY  MOVE                    A  S
INVEST E L G H R  DAY/TIME    CITY                        MILEPNT   SECOND STREET       DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP       OWNER     FROM       PRTC INJ     G  E  LICNS PED
UNLOC? D C S L K  LAT/LONG    URBAN AREA                  LRS       INTERSECTION SEQ#   LOCTN    (#LANES) CNTL     DRVWY LIGHT SVRTY      V#  VEH TYPE  TO     P#  TYPE SVRTY   E  X  RES   LOC ERROR            ACTN EVENT        CAUSE

00676  N Y N N N  02/26/2013  CLACKAMAS                   1    14                       INTER     CROSS  N         N CLD   PED         01 NONE   0 STRGHT                                                                  18,14
STATE             Tue    6P   GLADSTONE                   MN    0   ARLINGTON ST        N                TRF SIGNAL N DRY   PED            PRVTE    N  S                                                 000                 00
                              PORTLAND UA                  11.02    MCLOUGHLIN BLVD     06          0              N DUSK  INJ           PSNGR CAR        01 DRVR NONE  68 F OR-Y       000             000                 00
No       45 22 32.10  -122 36  6.28                        008100100S00            1                                                                                    OR<25
                                                                                                                                                    STRGHT  01 PED  INJA  41 M        01 055,020          035                 18,14
                                                                                                                                                    E  W

01355  N N N      04/22/2013  CLACKAMAS                   1    14                       INTER     CROSS  N         N CLR   S-1STOP     01 NONE   0 STRGHT                                                                  07
NONE              Mon    9A   GLADSTONE                   MN    0   MCLOUGHLIN BLVD     N                TRF SIGNAL N DRY   REAR           UNKN     N  S                                                 000                 00
                              PORTLAND UA                  11.02    RIVER RD            06          0              N DAY   PDO           PSNGR CAR        01 DRVR NONE  00 F UNK        026             000                 07
No       45 22 32.10  -122 36  6.28                        008100100S00            1                                                                                    UNK

                                                                                                                                     02 NONE   0 STOP
                                                                                                                                        PRVTE    N  S                                                 011                 00
                                                                                                                                       PSNGR CAR        01 DRVR NONE  38 F OTH-Y      000             000                 00
                                                                                                                                                                          N-RES

02239  N N N      06/24/2013  CLACKAMAS                   1    14                       INTER     CROSS  N         N CLR   S-1STOP     01 NONE   0 STRGHT                                                                  07
NONE              Mon   12P   GLADSTONE                   MN    0   MCLOUGHLIN BLVD     N                TRF SIGNAL N DRY   REAR           PRVTE    N  S                                                 000                 00
                              PORTLAND UA                  11.02    RIVER RD            06          0              N DAY   PDO           PSNGR CAR        01 DRVR NONE  00 F OR-Y       026             000                 07
No       45 22 32.10  -122 36  6.28                        008100100S00            1                                                                                    OR<25

                                                                                                                                     02 NONE   0 STOP
                                                                                                                                        PRVTE    N  S                                                 011                 00
                                                                                                                                       PSNGR CAR        01 DRVR NONE  63 M OR-Y       000             000                 00
                                                                                                                                                                          OR<25

02505  N N N N N  07/13/2013  CLACKAMAS                   1    14                       INTER     CROSS  N         N CLR   S-1STOP     01 NONE   0 STRGHT                                                                  07
NONE              Sat   10P   GLADSTONE                   MN    0   MCLOUGHLIN BLVD     N                TRF SIGNAL N DRY   REAR           PRVTE    N  S                                                 000                 00
                              PORTLAND UA                  11.02    RIVER RD            06          0              N DLIT  INJ           PSNGR CAR        01 DRVR NONE  33 F OR-Y       043,026         000                 07
No       45 22 32.10  -122 36  6.28                        008100100S00            1                                                                                    OR<25

                                                                                                                                     02 NONE   0 STOP
                                                                                                                                        PRVTE    N  S                                                 011                 00
                                                                                                                                       PSNGR CAR        01 DRVR INJC  20 M OR-Y       000             000                 00
                                                                                                                                                                          OR<25
                                                                                                                                                        02 PSNG INJC  20 M            000             000                 00

04404  N N N N N  11/14/2013  CLACKAMAS                   1    14                       INTER     CROSS  N         N CLD   S-1STOP     01 NONE   0 STRGHT                                                                  07
CITY              Thu    6A   GLADSTONE                   MN    0   ARLINGTON ST        N                TRF SIGNAL N DRY   REAR           PRVTE    N  S                                                 000                 00
                              PORTLAND UA                  11.02    MCLOUGHLIN BLVD     06          0              N DAWN  INJ           PSNGR CAR        01 DRVR INJC  37 F OR-Y       043,026         000                 07
No       45 22 32.10  -122 36  6.28                        008100100S00            1                                                                                    OR<25
                                                                                                                                                        02 PSNG INJC  41 M            000             000                 00

                                                                                                                                     02 NONE   0 STOP
                                                                                                                                        PRVTE    N  S                                                 011                 00
                                                                                                                                       PSNGR CAR        01 DRVR INJC  44 F OR-Y       000             000                 00
                                                                                                                                                                          OR<25
```

```
                                                                            OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                 CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                           SE McLoughlin Blvd 99E (Hwy 081) & Arlington St / River Rd
                                                                                            January 1, 2010 through December 31, 2014

       S   D
       P   R S W                             RD#  FC   CONN #                        INT-TYP                                  SPCL USE
SER#   E A U C O DATE       COUNTY           CMPT/MLG  FIRST  STREET     RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP  TRLR QTY  MOVE                 A S
INVEST E L G H R DAY/TIME   CITY             MILEPNT   SECOND STREET     DIRECT     LEGS   TRAF-   RNDBT SURF  COLL TYP   OWNER     FROM      PRTC INJ   G E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA       LRS       INTERSECTION SEQ# LOCTN   (#LANES)  CNTL    DRVWY LIGHT SVRTY   V# VEH TYPE  TO     P# TYPE SVRTY E X RES   LOC ERROR         ACTN EVENT       CAUSE

01142  N N N N N 03/22/2014 CLACKAMAS        1    14                     INTER     CROSS   N           Y CLR  FIX OBJ  01 NONE   0 TURN-L                                                  040          08
NONE             Sat   10A  GLADSTONE        MN    0   ARLINGTON ST      NE                TRF SIGNAL  N DRY  FIX         PRVTE     N  NE                                            000  040          00
                            PORTLAND UA       11.02   MCLOUGHLIN BLVD    05          0                 N DAY  INJ        MTRCYCLE          01 DRVR INJC  35 M OR-Y      001          000              08
No     45 22 32.10  -122 36  6.28            008100100S00             1                                                                                  OR<25
00904  N N N N N 03/19/2010 CLACKAMAS        1    14                     INTER     CROSS   N           N CLR  S-1STOP  01 NONE   0 STRGHT                                                                07
COUNTY           Fri    5P  GLADSTONE        MN    0   ARLINGTON ST      NE                TRF SIGNAL  N DRY  REAR        PRVTE     NE SW                                           000               00
                            PORTLAND UA       11.02   MCLOUGHLIN BLVD    06          0                 N DAY  PDO        PSNGR CAR         01 DRVR NONE  31 F OR-Y      026          000              07
No     45 22 32.10  -122 36  6.28            008100100S00             1                                                                                  OR<25

                                                                                                                     02 NONE   0 STOP
                                                                                                                        PRVTE     NE S                                            013               00
                                                                                                                       PSNGR CAR         01 DRVR NONE  43 M OR-Y      000          000              00
                                                                                                                                                            OR<25

04407  N N N N N 11/19/2011 CLACKAMAS        1    14                     INTER     CROSS   N           N CLR  PED      01 NONE   0 TURN-L                                                                02
STATE            Sat    9P  GLADSTONE        MN    0   MCLOUGHLIN BLVD   SE                TRF SIGNAL  N DRY  PED         PRVTE     NE SE                                           000               00
                            PORTLAND UA       11.02   RIVER RD           05          0                 N DLIT INJ        PSNGR CAR         01 DRVR NONE  50 M OR-Y      029          000              02
No     45 22 32.10  -122 36  6.28            008100100S00             1                                                                                  OR<25
                                                                                                                                  STRGHT 01 PED  INJB  25 F       01  000          035              00
                                                                                                                                  NE SW

00135  N N N N N 01/13/2010 CLACKAMAS        1    14                     INTER     CROSS   N           N RAIN PED      01 NONE   0 TURN-L                                                                02
STATE            Wed    1P  GLADSTONE        MN    0   ARLINGTON ST      S                 TRF SIGNAL  N WET  PED         PRVTE     NE S                                            000               00
                            PORTLAND UA       11.02   MCLOUGHLIN BLVD    05          0                 N DAY  INJ        PSNGR CAR         01 DRVR NONE  74 F OR-Y      029          000              02
No     45 22 32.10  -122 36  6.28            008100100S00             1                                                                                  OR<25
                                                                                                                                  STRGHT 01 PED  INJC  50 M       02  000          035              00
                                                                                                                                  W  E

00320  N N N N N 01/28/2010 CLACKAMAS        1    14                     INTER     CROSS   N           N CLD  PED      01 NONE   0 TURN-R                                                                02,19
STATE            Thu    2P  GLADSTONE        MN    0   MCLOUGHLIN BLVD   S                 TRF SIGNAL  N DRY  PED         PRVTE     W  S                                            000               00
                            PORTLAND UA       11.02   RIVER RD           05          0                 N DAY  INJ        PSNGR CAR         01 DRVR NONE  31 M OR-Y      029          000              02
No     45 22 32.10  -122 36  6.28            008100100S00             1                                                                                  OR<25
                                                                                                                                  STRGHT 01 PED  INJB  18 M       01  000          035              19
                                                                                                                                  E  W

04237  N N N N N 11/04/2013 CLACKAMAS        1    14                     INTER     CROSS   N           N CLD  BIKE     01 NONE   0 TURN-R                                                                02,27,19
CITY             Mon    1P  GLADSTONE        MN    0   MCLOUGHLIN BLVD   S                 TRF SIGNAL  N WET  TURN        PRVTE     W  S                                            000               00
                            PORTLAND UA       11.02   RIVER RD           05          0                 N DAY  INJ        PSNGR CAR         01 DRVR NONE  96 M OR-Y      027,016      000              02,27
No     45 22 32.10  -122 36  6.28            008100100S00             1                                                                                  OR<25
                                                                                                                                  STRGHT 01 BIKE INJB  36 F       01  055          035              19
                                                                                                                                  E  W

03388  N N N        09/14/2011 CLACKAMAS     1    14                     INTER     CROSS   N           N CLR  S-1STOP  01 NONE   0 STRGHT                                                                07
NONE             Wed    2P  GLADSTONE        MN    0   ARLINGTON ST      S                 TRF SIGNAL  N DRY  REAR        PRVTE     S  N                                            000               00
                            PORTLAND UA       11.02   MCLOUGHLIN BLVD    06          0                 N DAY  PDO        PSNGR CAR         01 DRVR NONE  51 M OR-Y      026          000              07
No     45 22 32.10  -122 36  6.28            008100100S00             1                                                                                  OR<25

                                                                                                                     02 NONE   0 STOP
                                                                                                                        PRVTE     S  N                                            011               00
                                                                                                                       PSNGR CAR         01 DRVR NONE  00 U UNK       000          000              00
                                                                                                                                                            UNK
```

```
       S  D
       P   R S W                               RD#  FC   CONN #                          INT-TYP                                SPCL USE
SER#   E A U C O DATE       COUNTY             CMPT/MLG FIRST  STREET        RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                A  S
INVEST E L G H R DAY/TIME   CITY               MILEPNT  SECOND STREET        DIRECT    LEGS    TRAF-   RNDBT SURF  COLL TYP     OWNER     FROM      PRTC INJ   G  E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA         LRS      INTERSECTION SEQ#    LOCTN   (#LANES)  CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO     P# TYPE SVRTY E  X RES   LOC ERROR        ACTN EVENT        CAUSE

01424  N N N     04/17/2012 CLACKAMAS          1    14                       INTER      CROSS  N           N RAIN  S-STRGHT  01 NONE    0 STRGHT                                                          07
NONE             Tue    4P  GLADSTONE          MN    0   ARLINGTON ST        S                 TRF SIGNAL  N WET   REAR         PRVTE     S  N                                            000            00
                            PORTLAND UA         11.02    MCLOUGHLIN BLVD     06           0                N DAY   PDO         PSNGR CAR         01 DRVR NONE  00 M OR-Y       042          000            07
No     45 22 32.10  -122 36  6.28              008100100S00                1                                                                                        OR<25

                                                                                                                             02 NONE    0 STRGHT
                                                                                                                                PRVTE     S  N                                            006            00
                                                                                                                               PSNGR CAR         01 DRVR NONE  54 M OR-Y       000          000            00
                                                                                                                                                                    OR<25

01705  N N N N N 05/12/2012 CLACKAMAS          1    14                       INTER      CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                          27,07,32
STATE            Sat    6P  GLADSTONE          MN    0   ARLINGTON ST        S                 TRF SIGNAL  N DRY   REAR         PRVTE     S  N                                            000            00
                            PORTLAND UA         11.02    MCLOUGHLIN BLVD     06           0                N DAY   INJ         PSNGR CAR         01 DRVR NONE  25 F OR-Y       016,026,052  038            27,07,32
No     45 22 32.10  -122 36  6.28              008100100S00                1                                                                                        OR<25
                                                                                                                                                 02 PSNG NO<5  03 M            000          000            00
                                                                                                                                                 03 PSNG NO<5  01 F            000          000            00

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     S  N                                            011            00
                                                                                                                               PSNGR CAR         01 DRVR INJC  30 F OR-Y       000          000            00
                                                                                                                                                                    OR<25
                                                                                                                                                 02 PSNG INJC  49 F            000          000            00
                                                                                                                                                 03 PSNG INJC  04 F            000          000            00

00536  N N N     02/16/2013 CLACKAMAS          1    14                       INTER      CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                          07
NO RPT           Sat   10A  GLADSTONE          MN    0   ARLINGTON ST        S                 TRF SIGNAL  N DRY   REAR         PRVTE     S  N                                            000            00
                            PORTLAND UA         11.02    MCLOUGHLIN BLVD     06           0                N DAY   INJ         PSNGR CAR         01 DRVR NONE  57 M OR-Y       026          000            07
No     45 22 32.10  -122 36  6.28              008100100S00                1                                                                                        OR<25
                                                                                                                                                 02 PSNG INJC  00 F            000          000            00

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     S  N                                            012            00
                                                                                                                               PSNGR CAR         01 DRVR INJC  50 M OR-Y       000          000            00
                                                                                                                                                                    OR<25

03282  N N N N N 09/04/2013 CLACKAMAS          1    14                       INTER      CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                          07
NONE             Wed   12P  GLADSTONE          MN    0   ARLINGTON ST        S                 TRF SIGNAL  N DRY   REAR         UNKN      S  N                                            000            00
                            PORTLAND UA         11.02    MCLOUGHLIN BLVD     06           0                N DAY   INJ         PSNGR CAR         01 DRVR NONE  00 M UNK        026          000            07
No     45 22 32.10  -122 36  6.28              008100100S00                1                                                                                        UNK

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     S  N                                            011            00
                                                                                                                               PSNGR CAR         01 DRVR NONE  23 M OR-Y       000          000            00
                                                                                                                                                                    OR<25
                                                                                                                                                 02 PSNG INJC  00 M            000          000            00

00903  N N N N N 03/03/2014 CLACKAMAS          1    14                       INTER      CROSS  N           N RAIN  S-1STOP   01 NONE    0 STRGHT                                                          07
CITY             Mon    4A  GLADSTONE          MN    0   ARLINGTON ST        S                 TRF SIGNAL  N WET   REAR         PRVTE     S  N                                            000            00
                            PORTLAND UA         11.02    MCLOUGHLIN BLVD     06           0                N DLIT  INJ         PSNGR CAR         01 DRVR INJB  29 F OR-Y       026,043      000            07
No     45 22 32.10  -122 36  6.28              008100100S00                1                                                                                        OR<25
```

```
CDS380     10/5/2016                                                       OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                                        PAGE: 4
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                           SE McLoughlin Blvd 99E (Hwy 081) & Arlington St / River Rd
                                                                                           January 1, 2010 through December 31, 2014

       S D
       P R S W                                RD#  FC   CONN #                        INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN) INT-REL  OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                 A  S
INVEST E L G H R DAY/TIME   CITY              MILEPNT   SECOND STREET        DIRECT    LEGS   TRAF-    RNDBT SURF  COLL TYP     OWNER     FROM      PRTC INJ   G  E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS       INTERSECTION SEQ#    LOCTN   (#LANES) CNTL     DRVWY LIGHT SVRTY    V#  VEH TYPE  TO     P# TYPE SVRTY E  X RES   LOC   ERROR        ACTN EVENT       CAUSE

                                                                                                                            02 NONE     0 STOP
                                                                                                                                PRVTE     S  N                                               011              00
                                                                                                                               PSNGR CAR         01 DRVR NONE  41 M OR-Y        000          000              00
                                                                                                                                                                    OR<25

03092  Y N N     08/09/2014 CLACKAMAS         1    14                        INTER     CROSS  N            N CLR   S-1STOP  01 NONE     0 STRGHT                                                              27,01,29
CITY             Sat     1P GLADSTONE         MN    0   ARLINGTON ST         S                TRF SIGNAL   N DRY   REAR         PRVTE     S  N                                               000              00
                            PORTLAND UA        11.02    MCLOUGHLIN BLVD      06          0                 N DAY   INJ         PSNGR CAR         01 DRVR INJC  42 F OR-Y        016,047,026  000              27,01,29
No     45 22 32.10  -122 36  6.28             008100100S00               1                                                                                          OR<25

                                                                                                                            02 NONE     0 STOP
                                                                                                                                PRVTE     S  N                                               011              00
                                                                                                                               PSNGR CAR         01 DRVR NONE  67 M OR-Y        000          000              00
                                                                                                                                                                    OR<25

00383  N N N     02/04/2010 CLACKAMAS         1    14                        INTER     5-LEG  N            N CLR   S-1STOP  01 NONE     0 STRGHT                                                              07
NONE             Thu     9A GLADSTONE         MN    0   MCLOUGHLIN BLVD      NW               TRF SIGNAL   N DRY   REAR         PRVTE     NW SE                                              000              00
                            PORTLAND UA        11.02    RIVER RD             06          0                 N DAY   PDO         PSNGR CAR         01 DRVR NONE  00 F OR-Y        026          000              07
No     45 22 32.10  -122 36  6.28             008100100S00               1                                                                                          OR<25

                                                                                                                            02 NONE     0 STOP
                                                                                                                                PRVTE     NW SE                                              011              00
                                                                                                                               PSNGR CAR         01 DRVR NONE  42 F OR-Y        000          000              00
                                                                                                                                                                    OR<25

01898  N N N N N 05/31/2013 CLACKAMAS         1    14                        INTER     CROSS  N            N CLR   O-1 L-TURN 01 NONE   0 STRGHT                                                              04
STATE            Fri     6A GLADSTONE         MN    0   MCLOUGHLIN BLVD      CN               TRF SIGNAL   N DRY   TURN         PRVTE     N  S                                               000              00
                            PORTLAND UA        11.02    RIVER RD             01          0                 N DAY   INJ         PSNGR CAR         01 DRVR INJC  25 F OR-Y        020          000              04
No     45 22 32.10  -122 36  6.28             008100100S00               1                                                                                          OR<25

                                                                                                                            02 NONE     0 TURN-L
                                                                                                                                PRVTE     S  W                                               000              00
                                                                                                                               PSNGR CAR         01 DRVR INJC  44 M OR-Y        000          000              00
                                                                                                                                                                    OR<25

02313  N N N N N 06/16/2014 CLACKAMAS         1    14                        INTER     CROSS  N            N RAIN  O-1 L-TURN 01 NONE   0 TURN-L                                                              02
STATE            Mon     4P GLADSTONE         MN    0   ARLINGTON ST         CN               TRF SIGNAL   N WET   TURN         PRVTE     S  W                                               000              00
                            PORTLAND UA        11.02    MCLOUGHLIN BLVD      01          0                 N DAY   INJ         PSNGR CAR         01 DRVR NONE  35 F OR-Y        028          000              02
No     45 22 32.10  -122 36  6.28             008100100S00               1                                                                                          OR<25

                                                                                                                            02 NONE     0 STRGHT
                                                                                                                                PRVTE     N  S                                               000              00
                                                                                                                               PSNGR CAR         01 DRVR INJC  37 F OR-Y        000          000              00
                                                                                                                                                                    OR<25

04033  N N N N N 10/10/2014 CLACKAMAS         1    14                        INTER     CROSS  N            N CLR   O-1 L-TURN 01 NONE   0 STRGHT                                                  013         02,08
STATE            Fri    11A GLADSTONE         MN    0   MCLOUGHLIN BLVD      CN               TRF SIGNAL   N DRY   TURN         PRVTE     N  S                                               000              00
                            PORTLAND UA        11.02    RIVER RD             01          0                 N DAY   INJ         PSNGR CAR         01 DRVR NONE  48 M OR-Y        000          000              00
No     45 22 32.10  -122 36  6.28             008100100S00               1                                                                                          OR<25
```

```
       S   D
       P   R S W                               RD#  FC   CONN #                          INT-TYP                                  SPCL USE
SER#   E A U C O  DATE       COUNTY            CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP     TRLR QTY  MOVE                A  S
INVEST E L G H R  DAY/TIME   CITY              MILEPNT   SECOND STREET        DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP      OWNER     FROM      PRTC INJ   G  E  LICNS PED
UNLOC? D C S L K  LAT/LONG   URBAN AREA        LRS       INTERSECTION SEQ#    LOCTN    (#LANES) CNTL     DRVWY LIGHT SVRTY      V# VEH TYPE  TO     P# TYPE SVRTY E  X  RES   LOC ERROR          ACTN EVENT        CAUSE

                                                                                                                             02 NONE   0 TURN-L
                                                                                                                                PRVTE     S  W                                                       000  013          00
                                                                                                                               PSNGR CAR         01 DRVR NONE  24 M OR-Y      028,004       000                02,08
                                                                                                                                                                      OR<25

                                                                                                                             03 NONE   0 STOP
                                                                                                                                PRVTE     W  E                                                       022               00
                                                                                                                               PSNGR CAR         01 DRVR INJC  67 M OR-Y      000           000                00
                                                                                                                                                                      OR<25

04705  N N N N N 11/20/2014 CLACKAMAS         1    14                        INTER     CROSS  N          N CLD  O-1 L-TURN 01 NONE   0 STRGHT                                                                        02,08
NONE            Thu    2P  GLADSTONE         MN    0   MCLOUGHLIN BLVD      CN                TRF SIGNAL N DRY  TURN          PRVTE     N  S                                                       000               00
                           PORTLAND UA        11.02   RIVER RD             01          0                N DAY  INJ          PSNGR CAR         01 DRVR NONE  60 M OR-Y      000           000                00
No      45 22 32.10  -122 36  6.28            008100100S00             1                                                                                      OR<25

                                                                                                                             02 NONE   0 TURN-L
                                                                                                                                PRVTE     S  NW                                                      000               00
                                                                                                                               PSNGR CAR         01 DRVR INJB  77 F OR-Y      028,004       000                02,08
                                                                                                                                                                      OR<25
                                                                                                                                                 02 PSNG INJC  12 F           000           000                00

03630  N N N     10/08/2010 CLACKAMAS         1    14                        INTER     CROSS  N          N CLR  O-1 L-TURN 01 NONE   0 STRGHT                                                                        02
NONE            Fri    9P  GLADSTONE         MN    0   MCLOUGHLIN BLVD      CN                TRF SIGNAL N DRY  TURN          PRVTE     E  W                                                       000               00
                           PORTLAND UA        11.02   RIVER RD             02          0                N DLIT PDO          PSNGR CAR         01 DRVR NONE  50 F OR-Y      000           000                00
No      45 22 32.10  -122 36  6.28            008100100S00             1                                                                                      OR<25

                                                                                                                             02 NONE   0 TURN-L
                                                                                                                                PRVTE     W  N                                                       000               00
                                                                                                                               PSNGR CAR         01 DRVR NONE  19 M OTH-Y     028,004       000                02
                                                                                                                                                                      N-RES

01325  N N N     04/19/2011 CLACKAMAS         1    14                        INTER     CROSS  N          N CLR  S-1TURN    01 NONE   0 STRGHT                                                                        07
NONE            Tue    2P  GLADSTONE         MN    0   ARLINGTON ST         CN                TRF SIGNAL N DRY  TURN          PRVTE     NE SW                                                      000               00
                           PORTLAND UA        11.02   MCLOUGHLIN BLVD      02          0                N DAY  PDO          PSNGR CAR         01 DRVR NONE  21 F OR-Y      026           000                07
No      45 22 31.59  -122 36  6.24            008100100S00             1                                                                                      OR<25

                                                                                                                             02 NONE   0 STOP
                                                                                                                                PRVTE     NE SW                                                      013               00
                                                                                                                               PSNGR CAR         01 DRVR NONE  55 F OR-Y      000           000                00
                                                                                                                                                                      OR<25

02356  N N N     07/05/2011 CLACKAMAS         1    14                        INTER     CROSS  N          N CLR  ANGL-OTH   01 NONE   0 STRGHT                                                                        04
NONE            Tue    7P  GLADSTONE         MN    0   ARLINGTON ST         CN                TRF SIGNAL N DRY  ANGL          PRVTE     NE SW                                                      000               00
                           PORTLAND UA        11.02   MCLOUGHLIN BLVD      02          0                N DAY  PDO          PSNGR CAR         01 DRVR NONE  00 U UNK       020           000                04
No      45 22 32.10  -122 36  6.28            008100100S00             1                                                                                      UNK

                                                                                                                             02 NONE   0 STRGHT
                                                                                                                                PRVTE     S  N                                                       000               00
                                                                                                                               PSNGR CAR         01 DRVR NONE  40 M OR-Y      000           000                00
                                                                                                                                                                      OR<25
```

```
                                                                               OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
                                                                                     TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                   CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                               SE McLoughlin Blvd 99E (Hwy 081) & Arlington St / River Rd
                                                                                                January 1, 2010 through December 31, 2014

       S  D
       P  R S W                                                                   INT-TYP                                SPCL USE
SER#   E A U C O  DATE        COUNTY              RD#  FC   CONN #             RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                  A  S
INVEST E L G H R  DAY/TIME    CITY                CMPT/MLG  FIRST  STREET      DIRECT    LEGS    TRAF-    RNDBT SURF  COLL TYP     OWNER     FROM       PRTC INJ   G  E LICNS PED
UNLOC? D C S L K  LAT/LONG    URBAN AREA          MILEPNT   SECOND STREET      LOCTN   (#LANES)  CNTL     DRVWY LIGHT SVRTY     V# VEH TYPE  TO     P# TYPE SVRTY E  X RES   LOC ERROR        ACTN EVENT     CAUSE
                                                  LRS       INTERSECTION SEQ#
01410  N N N     04/25/2011 CLACKAMAS           1    14                        INTER     CROSS   N           N CLR   ANGL-OTH   01 NONE   0 STRGHT                                                        04
NONE             Mon   10P  GLADSTONE           MN    0   ARLINGTON ST         CN                TRF SIGNAL  N DRY   ANGL          PRVTE     NE SW                                           000           00
                            PORTLAND UA          11.02    MCLOUGHLIN BLVD      03          0                 N DLIT  INJ          PSNGR CAR         01 DRVR INJC  67 M OR-Y        000        000           00
No     45 22 32.10  -122 36  6.28               008100100S00            1                                                                                 OR<25

                                                                                                                          02 NONE   0 STRGHT
                                                                                                                             PRVTE     N  S                                             000           00
                                                                                                                            PSNGR CAR         01 DRVR NONE  00 M OTH-Y       020        000           04
                                                                                                                                                                 OR<25

01514  N N N     04/24/2012 CLACKAMAS           1    14                        INTER     CROSS   N           N CLR   ANGL-OTH   01 NONE   0 STRGHT                                                        04
NO RPT           Tue    7A  GLADSTONE           MN    0   MCLOUGHLIN BLVD      CN                TRF SIGNAL  N DRY   ANGL          PRVTE     S  N                                            000           00
                            PORTLAND UA          11.02    RIVER RD             03          0                 N DAY   INJ          PSNGR CAR         01 DRVR NONE  44 M OR-Y        020        000           04
No     45 22 32.10  -122 36  6.28               008100100S00            1                                                                                 OR<25

                                                                                                                          02 NONE   0 STRGHT
                                                                                                                             PRVTE     W  E                                             000           00
                                                                                                                            PSNGR CAR         01 DRVR INJC  47 M OR-Y        000        000           00
                                                                                                                                                                 OR<25

04538  N N N N N 11/22/2013 CLACKAMAS           1    14                        INTER     CROSS   N           N CLR   S-STRGHT   01 NONE   0 STRGHT                                                        14,13
CITY             Fri    9A  GLADSTONE           MN    0   MCLOUGHLIN BLVD      CN                R-GRN-SIG   N DRY   SS-O          PRVTE     NW SE                                           000           00
                            PORTLAND UA          11.02    RIVER RD             03          0                 N DAY   PDO          PSNGR CAR         01 DRVR NONE  76 F OR-Y        003,045    000           14,13
No     45 22 32.10  -122 36  6.28               008100100S00            1                                                                                 OR<25

                                                                                                                          02 NONE   0 STRGHT
                                                                                                                             PRVTE     NW SE                                           000           00
                                                                                                                            PSNGR CAR         01 DRVR NONE  39 M OR-Y        000        000           00
                                                                                                                                                                 OR<25

03323  N N N N Y 08/26/2014 CLACKAMAS           1    14                        INTER     CROSS   N           N CLR   S-1STOP    01 NONE   0 STRGHT                                                013       07
STATE            Tue    1P  GLADSTONE           MN    0   ARLINGTON ST         CN                TRF SIGNAL  N DRY   REAR          PRVTE     N  S                                            000           00
                            PORTLAND UA          11.02    MCLOUGHLIN BLVD      03          0                 N DAY   PDO          PSNGR CAR         01 DRVR NONE  22 M OR-Y        043,026    000           07
No     45 22 32.10  -122 36  6.28               008100100S00            1                                                                                 OR<25

                                                                                                                          02 NONE   0 STOP
                                                                                                                             PRVTE     N  S                                            011  013      00
                                                                                                                            PSNGR CAR         01 DRVR NONE  21 F OR-Y        000        000           00
                                                                                                                                                                 OR<25

                                                                                                                          03 NONE   0 STOP
                                                                                                                             PRVTE     N  S                                            022           00
                                                                                                                            PSNGR CAR         01 DRVR NONE  79 M OR-Y        000        000           00
                                                                                                                                                                 OR<25

05221  N N N N N 12/23/2014 CLACKAMAS           1    14                        INTER     CROSS   N           N RAIN  ANGL-OTH   01 NONE   0 STRGHT                                                        04
STATE            Tue    6A  GLADSTONE           MN    0   MCLOUGHLIN BLVD      CN                TRF SIGNAL  N WET   ANGL          PRVTE     N  S                                            000           00
                            PORTLAND UA          11.02    RIVER RD             03          0                 N DAWN  INJ          PSNGR CAR         01 DRVR INJC  54 F OR-Y        000        000           00
No     45 22 32.10  -122 36  6.28               008100100S00            1                                                                                 OR<25
```

```
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                CONTINUOUS SYSTEM CRASH LISTING

081 PACIFIC HIGHWAY EAST                                                           SE McLoughlin Blvd 99E (Hwy 081) & Arlington St / River Rd
                                                                                            January 1, 2010 through December 31, 2014

       S   D
       P   R S W                               RD#  FC  CONN #                        INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY             CMPT/MLG FIRST  STREET        RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                   A S
INVEST E L G H R DAY/TIME   CITY               MILEPNT  SECOND STREET        DIRECT     LEGS   TRAF-   RNDBT SURF  COLL TYP     OWNER     FROM       PRTC INJ    G E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA         LRS      INTERSECTION SEQ#    LOCTN   (#LANES) CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO      P# TYPE SVRTY  E X RES   LOC ERROR          ACTN EVENT       CAUSE

                                                                                                                             02 NONE    0 STRGHT
                                                                                                                                PRVTE     W  E                                                000           00
                                                                                                                               PSNGR CAR          01 DRVR INJC  44 F OR-Y      020         000           04
                                                                                                                                                                     OR<25
                                                                                                                                                  02 PSNG INJC  19 M           000         000           00

02806  N N N N N 07/21/2014 CLACKAMAS          1    14                      INTER     CROSS  N           N  CLR  ANGL-OTH   01 NONE    0 STRGHT                                                               04
CITY              Mon   12P GLADSTONE          MN    0  ARLINGTON ST        CN               TRF SIGNAL  N DRY  TURN          PRVTE     S  N                                                000           00
                            PORTLAND UA         11.02   MCLOUGHLIN BLVD     04           0               N DAY  INJ          PSNGR CAR          01 DRVR INJC  33 F OR-Y      000         000           00
No      45 22 32.10  -122 36  6.28             008100100S00              1                                                                                           OR<25

                                                                                                                             02 NONE    0 TURN-L
                                                                                                                                PRVTE     E  S                                                000           00
                                                                                                                               PSNGR CAR          01 DRVR NONE  63 F OR-Y      003         000           04
                                                                                                                                                                     OR<25
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
URBAN NON-SYSTEM CRASH LISTING

CITY OF GLADSTONE, CLACKAMAS COUNTY

SE McLoughlin Blvd 99E (Hwy 081) & Arlington St / River Rd
January 1, 2010 through December 31, 2014

```
       S   D
       P   R S W                    CITY STREET                     INT-TYP                                     SPCL USE
SER#   E A U C O DATE               FIRST STREET          RD CHAR   (MEDIAN) INT-REL OFF-RD WTHR  CRASH TYP     TRLR QTY MOVE                 A  S
INVEST E L G H R DAY/TIME    FC     SECOND STREET         DIRECT      LEGS   TRAF-    RNDBT SURF  COLL TYP      OWNER    FROM      PRTC INJ   G  E LICNS PED
UNLOC? D C S L K LAT/LONG    DISTNC INTERSECTION SEQ #    LOCTN     (#LANES) CONTL   DRVWY  LIGHT SVRTY      V# VEH TYPE TO      P# TYPE SVRTY E  X RES   LOC ERROR      ACTN EVENT      CAUSE
04489  N N N     11/19/2013  16     ARLINGTON ST          INTER      CROSS  N            N RAIN  S-1STOP    01 NONE   0 STRGHT                                                        07
NONE             Tue    8A    0     MCLOUGHLIN BLVD       NE                L-GRN-SIG    N WET   REAR          PRVTE   NE  SW                                        000            00
No     45 22 32.10 -122 36  6.28    1                     06          0                  N DAWN  PDO          PSNGR CAR        01 DRVR NONE  00 M UNK         026        000            07
                                                                                                                                                   OR<25

                                                                                                             02 NONE   0 STOP
                                                                                                                PRVTE   NE  SW                                        012            00
                                                                                                               PSNGR CAR        01 DRVR NONE  39 M OTH-Y       000        000            00
                                                                                                                                                   N-RES
00262  N N N     01/20/2014  16     ARLINGTON ST          INTER      CROSS  N            N CLR   S-1STOP    01 NONE   0 STRGHT                                                        07
STATE            Mon    4P    0     MCLOUGHLIN BLVD       NE                TRF SIGNAL   N DRY   REAR          UNKN    NE  SW                                        000            00
No     45 22 32.10 -122 36  6.28    1                     06          0                  N DAY   INJ          UNKNOWN          01 DRVR NONE  00 U UNK         026        000            07
                                                                                                                                                   UNK

                                                                                                             02 NONE   0 STOP
                                                                                                                PRVTE   NE  SW                                        012            00
                                                                                                               PSNGR CAR        01 DRVR INJC  58 M OR-Y        000        000            00
                                                                                                                                                   OR>25
                                                                                                                                02 PSNG INJC  83 F             000        000            00
01593  N N N     04/26/2014  16     ARLINGTON ST          INTER      CROSS  N            N CLR   S-1STOP    01 NONE   0 STRGHT                                                        07
NONE             Sat   UNK    0     MCLOUGHLIN BLVD       NE                TRF SIGNAL   N DRY   REAR          PRVTE   NE  SW                                        000            00
No     45 22 32.10 -122 36  6.28    1                     06          0                  N DAY   PDO          PSNGR CAR        01 DRVR NONE  32 F OR-Y        026        000            07
                                                                                                                                                   OR<25

                                                                                                             02 NONE   0 STOP
                                                                                                                UNKN    NE  SW                                        011            00
                                                                                                               PSNGR CAR        01 DRVR NONE  00 F UNK         000        000            00
                                                                                                                                                   UNK
04655  N N N     11/17/2014  16     ARLINGTON ST          INTER      CROSS  N            N CLR   S-1STOP    01 NONE   0 STRGHT                                                        29
NONE             Mon    6A    0     MCLOUGHLIN BLVD       NE                TRF SIGNAL   N DRY   REAR          PRVTE   NE  SW                                        000            00
No     45 22 32.10 -122 36  6.28    1                     06          0                  N DLIT  INJ          PSNGR CAR        01 DRVR NONE  19 F OR-Y        026        000            29
                                                                                                                                                   OR<25

                                                                                                             02 NONE   0 STOP
                                                                                                                PRVTE   NE  SW                                        011            00
                                                                                                               PSNGR CAR        01 DRVR INJC  46 M OR-Y        000        000            00
                                                                                                                                                   OR<25
03174  N N N     08/26/2013  16     MCLOUGHLIN BLVD       INTER      CROSS  N            N CLR   S-1STOP    01 NONE   0 STRGHT                                             013        07
NONE             Mon    6A    0     RIVER RD              NW                TRF SIGNAL   N DRY   REAR          UNKN    NW  SE                                        000            00
No     45 22 32.10 -122 36  6.28    1                     06          0                  N DAY   PDO          PSNGR CAR        01 DRVR NONE  00 M OR-Y        026        000            07
                                                                                                                                                   UNK

                                                                                                             02 NONE   0 STOP
                                                                                                                UNKN    NW  SE                                        011 013        00
                                                                                                               PSNGR CAR        01 DRVR NONE  00 F OR-Y        000        000            00
                                                                                                                                                   UNK

                                                                                                             03 NONE     STOP
                                                                                                                PRVTE   NW  SE                                        022            00
                                                                                                               PSNGR CAR        01 DRVR NONE  40 F OR-Y        000        000            00
                                                                                                                                                   OR<25
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Oatfield Rd & Glen Echo Ave
January 1, 2010 through December 31, 2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2012														
TURNING MOVEMENTS	0	1	0	1	0	1	0	0	1	1	0	1	0	0
2012 TOTAL	0	1	0	1	0	1	0	0	1	1	0	1	0	0
YEAR: 2010														
FIXED / OTHER OBJECT	0	1	0	1	0	1	0	1	0	1	0	1	0	1
TURNING MOVEMENTS	0	0	1	1	0	0	0	0	0	1	0	1	0	0
2010 TOTAL	0	1	1	2	0	1	0	1	0	2	0	2	0	1
FINAL TOTAL	0	2	1	3	0	2	0	1	1	3	0	3	0	1

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

```
CDS380     10/6/2016                                                        OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                                         PAGE: 1
                                                                                   TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                  URBAN NON-SYSTEM CRASH LISTING

CITY OF GLADSTONE,  CLACKAMAS COUNTY                                                                Oatfield Rd & Glen Echo Ave
                                                                                             January 1, 2010 through December 31, 2014

        S   D
        P   R S W                        CITY STREET                           INT-TYP                                         SPCL USE
SER#    E A U C O   DATE                 FIRST STREET              RD CHAR    (MEDIAN) INT-REL OFF-RD  WTHR   CRASH TYP       TRLR QTY   MOVE                    A  S
INVEST  E L G H R   DAY/TIME     FC      SECOND STREET             DIRECT       LEGS   TRAF-    RNDBT  SURF   COLL TYP           OWNER   FROM        PRTC INJ    G  E LICNS  PED
UNLOC?  D C S L K   LAT/LONG     DISTNC  INTERSECTION SEQ #        LOCTN      (#LANES) CONTL   DRVWY   LIGHT  SVRTY       V#  VEH TYPE   TO      P#  TYPE SVRTY  E  X RES    LOC  ERROR        ACTN EVENT        CAUSE

00733   Y N N N N   03/06/2010   16      GLEN ECHO AVE             INTER       3-LEG   N            Y  CLR    FIX OBJ     01  NONE    0  TURN-L                                                      054           01,08
CITY                Sat    3P     0      OATFIELD RD               SW                  FLASHBCN-A   N  DRY    FIX             PRVTE      SE  SW                                                 000 054           00
No     45 23 36.46  -122 35 35.94         1                        05             0                 N  DAY    INJ           PSNGR CAR            01  DRVR INJB   34 F OR-Y        047,006      000               01,08
                                                                                                                                                                       OR<25

02238   N N N N N   06/22/2012   16      GLEN ECHO AVE             INTER       3-LEG   N            N  RAIN   BIKE        01  NONE    0  TURN-R                                                                   19,02,18
NONE                Fri    7P     0      OATFIELD RD               SW                  STOP SIGN    N  WET    TURN            PRVTE      SW  SE                                                 015               00
No     45 23 36.46  -122 35 35.94         1                        06             0                 N  DAY    INJ           PSNGR CAR            01  DRVR NONE   22 F OR-Y        027          000               02
                                                                                                                                                                       OR<25
                                                                                                                                          STRGHT  01  BIKE INJB   17 M        02   060          034               19,18
                                                                                                                                          SE  NW

02692   N N N       08/03/2010   16      GLEN ECHO AVE             INTER       3-LEG   N            N  UNK    ANGL-OTH    01  NONE    0  STRGHT                                                                   02
NO RPT              Tue    2P     0      OATFIELD RD               CN                  STOP SIGN    N  UNK    TURN            PRVTE      NW  SE                                                 000               00
No     45 23 36.46  -122 35 35.94         1                        04             0                 N  DAY    PDO           MTRCYCLE             01  DRVR NONE   22 M OR-Y        000          000               00
                                                                                                                                                                       OR<25

                                                                                                                           02  NONE    0  TURN-L
                                                                                                                               PRVTE      SW  NW                                                 015               00
                                                                                                                             PSNGR CAR            01  DRVR NONE   81 M OR-Y        028          000               02
                                                                                                                                                                       OR<25
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Oatfield Rd & Collins Crest St / Ridgegate Dr
January 1, 2010 through December 31, 2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2013														
REAR-END	0	2	0	2	0	2	0	2	0	2	0	2	0	0
2013 TOTAL	0	2	0	2	0	2	0	2	0	2	0	2	0	0
YEAR: 2012														
REAR-END	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2012 TOTAL	0	1	0	1	0	1	0	1	0	1	0	1	0	0
YEAR: 2010														
REAR-END	0	1	0	1	0	1	0	0	1	1	0	1	0	0
2010 TOTAL	0	1	0	1	0	1	0	0	1	1	0	1	0	0
FINAL TOTAL	0	4	0	4	0	4	0	3	1	4	0	4	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

```
CDS380     10/6/2016                                                           OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                                      PAGE: 1
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                 URBAN NON-SYSTEM CRASH LISTING

CITY OF GLADSTONE,  CLACKAMAS COUNTY                                                     Oatfield Rd & Collins Crest St / Ridgegate Dr
                                                                                           January 1, 2010 through December 31, 2014

        S   D
        P   R S W                                                                INT-TYP                                    SPCL USE
SER#    E A U C O  DATE                CITY STREET                 RD CHAR    (MEDIAN)  INT-REL OFF-RD  WTHR   CRASH TYP        TRLR QTY   MOVE                    A  S
INVEST  E L G H R  DAY/TIME     FC     FIRST STREET                DIRECT       LEGS    TRAF-   RNDBT   SURF   COLL TYP         OWNER      FROM        PRTC  INJ    G  E  LICNS  PED
UNLOC?  D C S L K  LAT/LONG     DISTNC SECOND STREET               LOCTN      (#LANES)  CONTL   DRVWY   LIGHT  SVRTY       V#   VEH TYPE   TO       P# TYPE  SVRTY  E  X  RES    LOC  ERROR          ACTN  EVENT          CAUSE
                                       INTERSECTION SEQ #
00201   N N N      01/19/2010   16     COLLINS CREST               INTER        CROSS   N            N  RAIN   S-1STOP     01  NONE    0  STRGHT                                                                    07
NONE               Tue    3P     0     OATFIELD RD                 SE                   SCHL X-ING   N  WET    REAR            PRVTE      SE  NW                                                      000            00
No      45 23 32.27  -122 35 27.65      1                          06             0                  N  DAY    INJ           PSNGR CAR              01 DRVR  NONE  30  M  OR-Y        026            000            07
                                                                                                                                                                 OR<25

                                                                                                                       02  NONE    0  STOP
                                                                                                                           PRVTE      SE  NW                                                      011            00
                                                                                                                         PSNGR CAR              01 DRVR  INJC  38  F  OR-Y        000            000            00
                                                                                                                                                                 OR<25

03364   N N N      09/11/2013   16     OATFIELD RD                 INTER        CROSS   N            N  CLR    S-1STOP     01  NONE    0  STRGHT                                                                    07
CITY               Wed    5P     0     RIDGEGATE DR                SE                   NONE         N  DRY    REAR            PRVTE      SE  NW                                                      000            00
No      45 23 32.27  -122 35 27.65      1                          06             0                  N  DAY    INJ           MTRCYCLE               01 DRVR  INJB  25  M  OR-Y        026            000            07
                                                                                                                                                                 OR<25

                                                                                                                       02  NONE    0  STOP
                                                                                                                           PUBLC      SE  NW                                                      011            00
                                                                                                                         OTH BUS                01 DRVR  NONE  31  M  OR-Y        000            000            00
                                                                                                                                                                 OR<25

03756   N N N N N  10/09/2012   16     OATFIELD RD                 INTER        CROSS   N            N  CLR    S-1STOP     01  NONE    0  STRGHT                                                                    27,07
CITY               Tue    5P     0     RIDGEGATE DR                CN                   NONE         N  DRY    REAR            PRVTE      SE  NW                                                      000            00
No      45 23 32.27  -122 35 27.65      1                          04             0                  N  DAY    INJ           PSNGR CAR              01 DRVR  NONE  27  M  OR-Y        016,026        038            27,07
                                                                                                                                                                 OR<25

                                                                                                                       02  NONE    0  STOP
                                                                                                                           PRVTE      SE  NW                                                      011            00
                                                                                                                         PSNGR CAR              01 DRVR  INJC  29  M  OR-Y        000            000            00
                                                                                                                                                                 OR<25

04415   N N N Y N  11/13/2013   16     OATFIELD RD                 INTER        CROSS   N            N  CLR    S-1STOP     01  NONE    0  STRGHT                                                              004   07
CITY               Wed    3P     0     RIDGEGATE DR                CN                   NONE         N  DRY    REAR            PRVTE      SE  NW                                                      000            00
No      45 23 32.27  -122 35 27.65      1                          04             0                  N  DAY    INJ           PSNGR CAR              01 DRVR  NONE  31  M  SUSP        026            000            07
                                                                                                                                                                 OR<25

                                                                                                                       02  NONE    0  STOP
                                                                                                                           PRVTE      SE  NW                                                      011   004      00
                                                                                                                         PSNGR CAR              01 DRVR  INJC  37  M  OR-Y        000            000            00
                                                                                                                                                                 OR<25
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Oatfield Rd / Princeton Ave & 82nd Dr (Hwy 064)
January 1, 2010 through December 31, 2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2014														
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2014 TOTAL	0	0	1	1	0	0	0	1	0	1	0	1	0	0
YEAR: 2012														
NON-COLLISION	0	1	0	1	0	1	0	1	0	1	0	1	0	0
REAR-END	0	2	0	2	0	2	0	2	0	2	0	2	0	0
2012 TOTAL	0	3	0	3	0	3	0	3	0	3	0	3	0	0
YEAR: 2011														
REAR-END	0	1	0	1	0	1	0	0	1	0	1	1	0	0
2011 TOTAL	0	1	0	1	0	1	0	0	1	0	1	1	0	0
YEAR: 2010														
ANGLE	0	1	0	1	0	2	0	0	1	0	1	1	0	0
REAR-END	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2010 TOTAL	0	2	0	2	0	3	0	1	1	1	1	2	0	0
FINAL TOTAL	0	6	1	7	0	7	0	5	2	5	2	7	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

```
CDS380     10/6/2016                                                       OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                                       PAGE: 1
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                               Oatfield Rd / Princeton Ave & 82nd Dr (Hwy 064)
                                                                                           January 1, 2010 through December 31, 2014

       S   D
       P   R S W                              RD#  FC   CONN #                        INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN) INT-REL OFFRD WTHR  CRASH TYP     TRLR QTY  MOVE                  A S
INVEST E L G H R DAY/TIME   CITY              MILEPNT   SECOND STREET        DIRECT     LEGS  TRAF-   RNDBT SURF  COLL TYP      OWNER     FROM      PRTC INJ    G E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS       INTERSECTION SEQ#    LOCTN   (#LANES) CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE   TO     P# TYPE SVRTY  E X RES   LOC ERROR         ACTN EVENT       CAUSE

01165  N N N     04/07/2010 CLACKAMAS         1  16     5                    INTER     CROSS  N           N CLR  S-1STOP    01 NONE     0 STRGHT                                                              07
NO RPT           Wed    2P  GLADSTONE         CN    0   OATFIELD RD          NE               TRF SIGNAL  N DRY  REAR          PRVTE      NE SW                                              000              00
                            PORTLAND UA        11.39    82ND DR              06          0               N DAY  INJ          PSNGR CAR          01 DRVR NONE  84 M OR-Y       026          000              07
No     45 22 59.78  -122 34 58.64             0064BB100S00              1                                                                                            OR<25

                                                                                                                            02 NONE     0 STOP
                                                                                                                               PRVTE      NE SW                                              011              00
                                                                                                                              PSNGR CAR          01 DRVR INJC  66 F OR-Y       000          000              00
                                                                                                                                                                     OR>25

04210  N N N N N 11/08/2012 CLACKAMAS         1  16     5                    INTER     CROSS  N           N CLD  NON-COLL   01 NONE     0 TURN-L                                                              26
CITY             Thu   10A  GLADSTONE         CN    0   PRINCETON AVE        SE               TRF SIGNAL  N DRY  NCOL          PRVTE      NE SE                                              007              00
                            PORTLAND UA        11.39    82ND DR              05          0               N DAY  INJ          MTRCYCLE           01 DRVR INJC  62 M OR-Y       000          017              26
No     45 22 59.78  -122 34 58.64             0064BB100S00              1                                                                                            OR<25

00547  N N N N N 02/15/2011 CLACKAMAS         1  16     5                    INTER     CROSS  N           N RAIN S-1STOP    01 NONE     0 STRGHT                                                              07
CITY             Tue    4P  GLADSTONE         CN    0   OATFIELD RD          SW               TRF SIGNAL  N WET  REAR          PRVTE      SW NE                                              000              00
                            PORTLAND UA        11.39    82ND DR              06          0               N DUSK INJ          PSNGR CAR          01 DRVR NONE  00 F UNK        026          000              07
No     45 22 59.78  -122 34 58.64             0064BB100S00              1                                                                                            UNK

                                                                                                                            02 NONE     0 STOP
                                                                                                                               PRVTE      SW NE                                              012              00
                                                                                                                              PSNGR CAR          01 DRVR INJC  24 F OR-Y       000          000              00
                                                                                                                                                                     OR<25

02621  N N N     07/19/2012 CLACKAMAS         1  16     5                    INTER     CROSS  N           N CLR  S-1STOP    01 NONE     0 STRGHT                                                              27,07
NONE             Thu    9A  GLADSTONE         CN    0   OATFIELD RD          SW               TRF SIGNAL  N DRY  REAR          PRVTE      SW NE                                              000              00
                            PORTLAND UA        11.39    82ND DR              06          0               N DAY  INJ          PSNGR CAR          01 DRVR NONE  55 F OR-Y       016,026      038              27,07
No     45 22 59.78  -122 34 58.64             0064BB100S00              1                                                                                            OR<25

                                                                                                                            02 NONE     0 STOP
                                                                                                                               PRVTE      SW NE                                              011              00
                                                                                                                              PSNGR CAR          01 DRVR INJC  53 F OR-Y       000          000              00
                                                                                                                                                                     OR<25

02885  N N N     07/28/2014 CLACKAMAS         1  16     5                    INTER     CROSS  N           N CLR  S-1STOP    01 NONE     0 STRGHT                                                              29
NONE             Mon    2P  GLADSTONE         CN    0   OATFIELD RD          SW               TRF SIGNAL  N DRY  REAR          PRVTE      SW NE                                              000              00
                            PORTLAND UA        11.39    82ND DR              06          0               N DAY  PDO          PSNGR CAR          01 DRVR NONE  65 M OR-Y       026          000              29
No     45 22 59.71  -122 34 58.67             0064BB100S00              1                                                                                            OR<25

                                                                                                                            02 NONE     0 STOP
                                                                                                                               PRVTE      SW NE                                              011              00
                                                                                                                              PSNGR CAR          01 DRVR NONE  57 M OR-Y       000          000              00
                                                                                                                                                                     OR<25

03883  N N N N N 10/23/2010 CLACKAMAS         1  16     5                    INTER     CROSS  N           N RAIN ANGL-OTH   01 NONE     0 STRGHT                                                              04
CITY             Sat   11P  GLADSTONE         CN    0   OATFIELD RD          CN               TRF SIGNAL  N WET  ANGL          PRVTE      SW NE                                              000              00
                            PORTLAND UA        11.39    82ND DR              04          0               N DLIT INJ          PSNGR CAR          01 DRVR INJC  67 F OR-Y       000          000              00
No     45 22 59.78  -122 34 58.64             0064BB100S00              1                                                                                            OR<25
```

```
                                                                           OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                               Oatfield Rd / Princeton Ave & 82nd Dr (Hwy 064)
                                                                                           January 1, 2010 through December 31, 2014

       S   D
       P   R S W                              RD#  FC   CONN #                        INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                  A  S
INVEST E L G H R DAY/TIME   CITY              MILEPNT   SECOND STREET        DIRECT     LEGS   TRAF-   RNDBT SURF  COLL TYP     OWNER     FROM       PRTC INJ    G  E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS       INTERSECTION SEQ#    LOCTN    (#LANES) CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO      P# TYPE SVRTY E  X RES   LOC ERROR         ACTN EVENT       CAUSE
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
                                                                                                                             02 NONE    0 STRGHT
                                                                                                                                PRVTE     NW SE                                               000              00
                                                                                                                               PSNGR CAR          01 DRVR INJC  18 M OR-Y       020           000              04
                                                                                                                                                                     OR<25
```

```
                                                     OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
                                                           TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                         URBAN NON-SYSTEM CRASH LISTING
CITY OF GLADSTONE,  CLACKAMAS COUNTY                                    Oatfield Rd / Princeton Ave & 82nd Dr (Hwy 064)
                                                                          January 1, 2010 through December 31, 2014
        S   D
        P   R S W                    CITY STREET                       INT-TYP                                         SPCL USE
SER#    E A U C O  DATE              FIRST STREET             RD CHAR  (MEDIAN) INT-REL OFF-RD WTHR  CRASH TYP         TRLR QTY  MOVE                     A S
INVEST  E L G H R  DAY/TIME    FC    SECOND STREET            DIRECT     LEGS   TRAF-   RNDBT  SURF  COLL TYP          OWNER     FROM       PRTC  INJ    G E LICNS  PED
UNLOC?  D C S L K  LAT/LONG    DISTNC INTERSECTION SEQ #      LOCTN   (#LANES)  CONTL   DRVWY  LIGHT SVRTY        V#   VEH TYPE  TO     P#  TYPE  SVRTY  E X RES    LOC ERROR       ACTN EVENT       CAUSE
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
03517   N N N N N  09/22/2012  19    PRINCETON AVE            INTER      CROSS  N            N CLR   S-1STOP      01   NONE   0  STRGHT                                                          07,27
CITY               Sat    1P    0    82ND DR                  SE                R-GRN-SIG    N DRY   REAR              PRVTE     SE  NW                                            000              00
No      45 22 59.78  -122 34 58.64    1                       06           0                 N DAY   INJ             PSNGR CAR          01  DRVR  NONE  59 M OR-Y        026,016,043 038              07,27
                                                                                                                                                             OR<25

                                                                                                              02   NONE   0  STOP
                                                                                                                   PRVTE     SE  NW                                            011              00
                                                                                                                 MTRCYCLE           01  DRVR  INJC  50 M OTH-Y       000         000              00
                                                                                                                                                             N-RES
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

I-205 SB ramps (Hwy 064) & 82nd Dr (Hwy 064)
January 1, 2010 through December 31, 2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2014														
PEDESTRIAN	1	0	0	1	1	0	0	1	0	1	0	1	0	0
REAR-END	0	1	2	3	0	1	0	3	0	3	0	3	0	0
TURNING MOVEMENTS	0	0	2	2	0	0	0	2	0	1	1	2	0	0
2014 TOTAL	1	1	4	6	1	1	0	6	0	5	1	6	0	0
YEAR: 2013														
REAR-END	0	5	1	6	0	6	0	4	2	6	0	6	0	0
TURNING MOVEMENTS	0	1	1	2	0	2	0	2	0	1	1	2	0	0
2013 TOTAL	0	6	2	8	0	8	0	6	2	7	1	8	0	0
YEAR: 2012														
REAR-END	0	2	1	3	0	2	0	3	0	3	0	3	0	0
TURNING MOVEMENTS	0	1	1	2	0	3	0	2	0	2	0	2	0	0
2012 TOTAL	0	3	2	5	0	5	0	5	0	5	0	5	0	0
YEAR: 2011														
REAR-END	0	5	3	8	0	6	0	6	2	8	0	8	0	0
TURNING MOVEMENTS	0	1	0	1	0	2	0	1	0	1	0	1	0	0
2011 TOTAL	0	6	3	9	0	8	0	7	2	9	0	9	0	0
YEAR: 2010														
REAR-END	0	4	6	10	0	5	0	7	3	7	3	10	0	0
2010 TOTAL	0	4	6	10	0	5	0	7	3	7	3	10	0	0
FINAL TOTAL	1	20	17	38	1	27	0	31	7	33	5	38	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

```
CDS380     10/6/2016                                                       OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                                       PAGE: 1
                                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                                 I-205 SB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                                           January 1, 2010 through December 31, 2014

       S   D
       P   R S W                              RD#  FC   CONN #                        INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                  A  S
INVEST E L G H R DAY/TIME   CITY              MILEPNT   SECOND STREET        DIRECT     LEGS   TRAF-   RNDBT SURF  COLL TYP     OWNER     FROM      PRTC INJ    G  E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS       INTERSECTION SEQ#    LOCTN    (#LANES) CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO     P# TYPE SVRTY  E  X RES   LOC  ERROR        ACTN EVENT        CAUSE

02456  N N N     07/12/2011 CLACKAMAS         1    19   4                    INTER     3-LEG  N           N  UNK  S-1STOP    01 NONE    0 STRGHT                                                               07
NONE             Tue    7P  GLADSTONE         CN    0   SB ENFR 82ND DR      N                YIELD       N  WET  REAR          PRVTE     N  S                                               000               00
                            PORTLAND UA        10.59    SB LEG FR 82ND DR    06           0               N  DAY  PDO          PSNGR CAR         01 DRVR NONE   29 M OR-Y       026          000               07
No     45 23   2.53  -122 34 48.71            0064BA100S00              1                                                                                            OR<25

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     N  S                                               011               00
                                                                                                                               PSNGR CAR         01 DRVR NONE   23 F OR-Y       000          000               00
                                                                                                                                                                     OR<25
                                                                                                                                                 02 PSNG NO<5   02 F            000          000               00

04605  N N N     11/27/2013 CLACKAMAS         1    11   4                    INTER     3-LEG  N           N  CLR  ANGL-OTH   01 NONE    0 TURN-R                                                               02
NONE             Wed    5A  GLADSTONE         CN    0   SB ENFR 82ND DR      CN               YIELD       N  DRY  TURN          UNKN      NW S                                               000               00
                            PORTLAND UA        10.59    SB LEG FR 82ND DR    03           0               N  DLIT PDO          PSNGR CAR         01 DRVR NONE   00 M OR-Y       028          000               02
No     45 23   2.53  -122 34 48.71            0064BA100S00              1                                                                                            UNK

                                                                                                                             02 NONE    0 STRGHT
                                                                                                                                PRVTE     N  S                                               000               00
                                                                                                                               PSNGR CAR         01 DRVR NONE   53 M OR-Y       000          000               00
                                                                                                                                                                     OR>25

02338  N N N     06/18/2014 CLACKAMAS         1    11   4                    INTER     3-LEG  N           N  CLR  ANGL-OTH   01 NONE    0 TURN-R                                                               02
NONE             Wed    2P  GLADSTONE         CN    0   SB ENFR 82ND DR      CN               YIELD       N  DRY  TURN          PRVTE     N  SW                                              000               00
                            PORTLAND UA        10.59    SB LEG FR 82ND DR    03           0               N  DAY  PDO          PSNGR CAR         01 DRVR NONE   60 M OR-Y       028          000               02
No     45 23   2.53  -122 34 48.71            0064BA100S00              1                                                                                            OR<25

                                                                                                                             02 NONE    0 STRGHT
                                                                                                                                UNKN      NE SW                                              000               00
                                                                                                                               PSNGR CAR         01 DRVR NONE   00 M UNK        000          000               00
                                                                                                                                                                     UNK

00969  N N N     03/08/2014 CLACKAMAS         1    16   5                    INTER     CROSS  N           N  CLR  O-1 L-TURN 01 NONE    0 TURN-L                                                               02
NONE             Sat    6A  GLADSTONE         CN    0   82ND DR              E                TRF SIGNAL  N  DRY  TURN          PRVTE     E  S                                               000               00
                            PORTLAND UA        11.23    SB ENFR 82ND DR      03           2               N  DLIT PDO          PSNGR CAR         01 DRVR NONE   34 F OR-Y       028          000               02
No     45 23   4.34  -122 34 49.02            0064BB100S00              1                                                                                            OR<25

                                                                                                                             02 NONE    0 STRGHT
                                                                                                                                UNKN      W  E                                               000               00
                                                                                                                                UNKNOWN          01 DRVR NONE   00 U UNK        000          000               00
                                                                                                                                                                     UNK

00346  N N N     01/29/2013 CLACKAMAS         1    16   5                    INTER     CROSS  N           N  CLR  S-1STOP    01 NONE    0 STRGHT                                                               07
NONE             Tue    3P  GLADSTONE         CN    0   82ND DR              E                TRF SIGNAL  N  DRY  REAR          PRVTE     E  W                                               000               00
                            PORTLAND UA        11.23    SB EXTO 82ND DR      06           2               N  DAY  INJ          PSNGR CAR         01 DRVR NONE   00 F OR-Y       026          000               07
No     45 23   4.34  -122 34 49.02            0064BB100S00              1                                                                                            OR<25

                                                                                                                             02 NONE    0 STOP
                                                                                                                                PRVTE     E  W                                               011               00
                                                                                                                               PSNGR CAR         01 DRVR INJC   49 F OR-Y       000          000               00
                                                                                                                                                                     OR<25
```

```
064 EAST PORTLAND FREEWAY                                                                I-205 SB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                                          January 1, 2010 through December 31, 2014

       S  D
       P   R S W                                    RD#  FC   CONN #                          INT-TYP                                     SPCL USE
SER#   E A U C O  DATE        COUNTY               CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP     TRLR QTY  MOVE                    A  S
INVEST E L G H R  DAY/TIME    CITY                 MILEPNT   SECOND STREET        DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP      OWNER     FROM        PRTC  INJ   G  E  LICNS  PED
UNLOC? D C S L K  LAT/LONG    URBAN AREA           LRS       INTERSECTION SEQ#    LOCTN   (#LANES) CNTL     DRVWY LIGHT SVRTY      V# VEH TYPE  TO      P# TYPE  SVRTY E  X  RES    LOC  ERROR          ACTN EVENT        CAUSE

01454  N N N      04/28/2011  CLACKAMAS            1    16   5                    INTER      CROSS  N             N CLD   ANGL-OTH   01 NONE    0 STRGHT                                                                                04
CITY              Thu   12P   GLADSTONE            CN    0   82ND DR              CN                TRF SIGNAL    N DRY   TURN          PRVTE      E  W                                                                      000               00
                              PORTLAND UA           11.23    SB EXTO 82ND DR      02           2                N DAY   INJ           PSNGR CAR          01 DRVR  NONE  30 F  OR-Y         020            000               04
No       45 23  4.34  -122 34 49.02                0064BB100S00               1                                                                                      OR<25

                                                                                                                               02 NONE    0 TURN-L
                                                                                                                                  PRVTE      N  E                                                                      000               00
                                                                                                                                  PSNGR CAR          01 DRVR  INJC  41 M  OR-Y         000            000               00
                                                                                                                                                                          OR<25
                                                                                                                                                     02 PSNG  INJA  38 F               000            000               00

02855  N Y N N N  08/04/2012  CLACKAMAS            1    16   5                    INTER      CROSS  N             N CLR   O-1 L-TURN 01 NONE    0 STRGHT                                                                                02,33
CITY              Sat   10A   GLADSTONE            CN    0   82ND DR              CN                TRF SIGNAL    N DRY   TURN          PRVTE      E  W                                                                      000               00
                              PORTLAND UA           11.23    SB ENFR 82ND DR      03           2                N DAY   INJ           PSNGR CAR          01 DRVR  INJC  30 M  OR-Y         000            000               00
No       45 23  4.34  -122 34 49.02                0064BB100S00               1                                                                                      OR<25
                                                                                                                                                     02 PSNG  INJC  39 F               000            000               00

                                                                                                                               02 NONE    0 TURN-R
                                                                                                                                  PRVTE      W  S                                                                      000               00
                                                                                                                                  PSNGR CAR          01 DRVR  INJB  59 F  OR-Y         051,028        000               02,33
                                                                                                                                                                          OR<25

03598  N N N      09/28/2012  CLACKAMAS            1    16   5                    INTER      CROSS  N             N CLR   O-1 L-TURN 01 NONE    0 TURN-L                                                                                04
NO RPT            Fri   10A   GLADSTONE            CN    0   82ND DR              CN                TRF SIGNAL    N DRY   TURN          PRVTE      E  S                                                                      000               00
                              PORTLAND UA           11.23    SB ENFR 82ND DR      03           2                N DAY   PDO           PSNGR CAR          01 DRVR  NONE  33 F  OR-Y         000            000               00
No       45 23  4.34  -122 34 49.02                0064BB100S00               1                                                                                      OR<25
                                                                                                                                                     02 PSNG  NO<5  04 M               000            000               00

                                                                                                                               02 NONE    0 STRGHT
                                                                                                                                  PRVTE      W  E                                                                      000               00
                                                                                                                                  PSNGR CAR          01 DRVR  NONE  62 F  OTH-Y        020            000               02
                                                                                                                                                                          N-RES

01426  N N N      04/26/2013  CLACKAMAS            1    16   5                    INTER      CROSS  N             N CLR   O-1 L-TURN 01 NONE    0 STRGHT                                                                                04
NONE              Fri    4P   GLADSTONE            CN    0   82ND DR              CN                TRF SIGNAL    N DRY   TURN          PRVTE      W  E                                                                      000               00
                              PORTLAND UA           11.23    SB ENFR 82ND DR      03           2                N DAY   INJ           PSNGR CAR          01 DRVR  NONE  26 M  OR-Y         020            000               04
No       45 23  4.34  -122 34 49.02                0064BB100S00               1                                                                                      OR<25

                                                                                                                               02 NONE    0 TURN-L
                                                                                                                                  PRVTE      E  S                                                                      000               00
                                                                                                                                  PSNGR CAR          01 DRVR  INJB  25 M  OR-Y         000            000               00
                                                                                                                                                                          OR<25
                                                                                                                                                     02 PSNG  INJB  21 F               000            000               00

04221  N N N      10/25/2013  CLACKAMAS            1    16   5                    INTER      CROSS  N             N UNK   S-1STOP    01 NONE    0 STRGHT                                                                                07
NONE              Fri    5P   GLADSTONE            CN    0   82ND DR              N                 TRF SIGNAL    N WET   REAR          UNKN       N  S                                                                      000               00
                              PORTLAND UA           11.24    SB EXTO 82ND DR      06           2                N DAY   PDO           PSNGR CAR          01 DRVR  NONE  00 F  OR-Y         026            000               07
No       45 23  4.18  -122 34 50.28                0064BB100S00               1                                                                                      UNK
```

```
                                                                               OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
                                                                                      TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                    CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                                          I-205 SB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                                                    January 1, 2010 through December 31, 2014

       S  D
       P   R S W                                      RD#  FC   CONN #                             INT-TYP                                     SPCL USE
SER#   E A U C O  DATE        COUNTY                  CMPT/MLG  FIRST  STREET       RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP   TRLR QTY  MOVE                    A  S
INVEST E L G H R  DAY/TIME    CITY                    MILEPNT   SECOND STREET       DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP    OWNER     FROM       PRTC  INJ    G  E  LICNS  PED
UNLOC? D C S L K  LAT/LONG    URBAN AREA              LRS       INTERSECTION SEQ#   LOCTN    (#LANES) CNTL     DRVWY LIGHT SVRTY    V# VEH TYPE  TO      P# TYPE SVRTY  E  X  RES    LOC ERROR          ACTN EVENT          CAUSE

                                                                                                                                   02 NONE    0  STOP
                                                                                                                                      PRVTE      N  S                                                       011                 00
                                                                                                                                     PSNGR CAR            01 DRVR NONE  45 M OR-Y       000             000                 00
                                                                                                                                                                                OR<25

02157  N N N     06/16/2011 CLACKAMAS             1    16   5                      INTER      CROSS  N          N CLR   S-1STOP    01 NONE    0  STRGHT                                                                         07
NONE             Thu     6P  GLADSTONE             CN    0   82ND DR                E                TRF SIGNAL  N DRY   REAR          PRVTE      E  W                                                       000                 00
                             PORTLAND UA           11.24    SB ENFR 82ND DR         06           2              N DAY   INJ          PSNGR CAR            01 DRVR NONE  00 F UNK        026             000                 07
No      45 23  4.18  -122  34 50.28                 0064BB100S00             1                                                                                            OR<25

                                                                                                                                   02 NONE    0  STOP
                                                                                                                                      PRVTE      E  W                                                       012                 00
                                                                                                                                     PSNGR CAR            01 DRVR INJC  28 F OR-Y       000             000                 00
                                                                                                                                                                                OR<25

00237  Y N N N N 01/21/2010 CLACKAMAS             1    16   5                      INTER      CROSS  N          N CLR   S-1STOP    01 NONE    0  STRGHT                                                                         01,07
STATE            Thu     7P  GLADSTONE             CN    0   82ND DR                W                TRF SIGNAL  N DRY   REAR          PRVTE      W  E                                                       000                 00
                             PORTLAND UA           11.24    SB ENFR 82ND DR         06           2              N DLIT  PDO          PSNGR CAR            01 DRVR NONE  24 F OTH-Y      047,026         000                 01,07
No      45 23  4.18  -122  34 50.28                 0064BB100S00             1                                                                                            N-RES

                                                                                                                                   02 NONE    0  STOP
                                                                                                                                      PRVTE      W  E                                                       011                 00
                                                                                                                                     PSNGR CAR            01 DRVR NONE  49 F OR-Y       000             000                 00
                                                                                                                                                                                OR<25

02888  N N N     08/16/2010 CLACKAMAS             1    16   5                      INTER      CROSS  N          N CLR   S-1STOP    01 POLCE   0  STRGHT                                                                         07
CITY             Mon    11A  GLADSTONE             CN    0   82ND DR                W                TRF SIGNAL  N DRY   REAR          PUBLC      W  E                                                       000                 00
                             PORTLAND UA           11.24    SB EXTO 82ND DR         06           2              N DAY   INJ          PSNGR CAR            01 DRVR NONE  60 M OR-Y       043,026         000                 07
No      45 23  4.18  -122  34 50.28                 0064BB100S00             1                                                                                            OR<25

                                                                                                                                   02 NONE    0  STOP
                                                                                                                                      PRVTE      W  E                                                       011                 00
                                                                                                                                     PSNGR CAR            01 DRVR INJC  46 F OR-Y       000             000                 00
                                                                                                                                                                                OR<25
                                                                                                                                                          02 PSNG NO<5  04 M            000             000                 00

04711  N N N     12/10/2010 CLACKAMAS             1    19   5                      INTER      CROSS  N          N RAIN  S-1STOP    01 NONE    0  STRGHT                                                                         07
NONE             Fri     6P  GLADSTONE             CN    0   82ND DR                W                TRF SIGNAL  N WET   REAR          PRVTE      W  E                                                       000                 00
                             PORTLAND UA           11.24    SB ENFR 82ND DR         06           2              N DLIT  PDO          PSNGR CAR            01 DRVR NONE  47 M OR-Y       026             000                 07
No      45 23  4.18  -122  34 50.28                 0064BB100S00             1                                                                                            OR<25

                                                                                                                                   02 NONE    0  STOP
                                                                                                                                      PRVTE      W  E                                                       011                 00
                                                                                                                                     PSNGR CAR            01 DRVR NONE  43 F OR-Y       000             000                 00
                                                                                                                                                                                OR<25

00783  N N N N N 03/05/2011 CLACKAMAS             1    16   5                      INTER      CROSS  N          N CLR   S-1STOP    01 NONE    0  STRGHT                                                                         07
STATE            Sat    11A  GLADSTONE             CN    0   82ND DR                W                TRF SIGNAL  N DRY   REAR          PRVTE      W  E                                                       000                 00
                             PORTLAND UA           11.24    SB ENFR 82ND DR         06           2              N DAY   INJ          PSNGR CAR            01 DRVR NONE  41 F OR-Y       043,026         000                 07
No      45 23  4.18  -122  34 50.28                 0064BB100S00             1                                                                                            OR<25
```

```
       S   D
       P   R S W                                 RD#  FC   CONN #                         INT-TYP                                     SPCL USE
SER#   E A U C O  DATE       COUNTY              CMPT/MLG  FIRST  STREET         RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP     TRLR QTY   MOVE                    A S
INVEST E L G H R  DAY/TIME   CITY                MILEPNT   SECOND STREET         DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP      OWNER      FROM       PRTC INJ     G E LICNS  PED
UNLOC? D C S L K  LAT/LONG   URBAN AREA          LRS       INTERSECTION SEQ#     LOCTN    (#LANES) CNTL     DRVWY LIGHT SVRTY      V# VEH TYPE   TO      P# TYPE SVRTY   E X RES    LOC  ERROR         ACTN EVENT        CAUSE
                                                                                                                                   02 NONE     0 STOP
                                                                                                                                      PRVTE      W  E                                                  011               00
                                                                                                                                     PSNGR CAR           01 DRVR INJC   42 F OR-Y        000           000               00
                                                                                                                                                                             OR<25
00099  N N N      01/10/2010 CLACKAMAS           1    16   3                     INTER      3-LEG  N            N RAIN  S-1STOP    01 NONE     0 STRGHT                                                                  07
NONE              Sun    6P  GLADSTONE           CN    0   82ND DR               N                 TRF SIGNAL   N WET   REAR          PRVTE      N  S                                                  000               00
                             PORTLAND UA          11.45    SB EXTO 82ND DR       06           1                 N DARK  PDO          PSNGR CAR           01 DRVR NONE   60 F OR-Y        026           000               07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                                            OR<25
                                                                                                                                   02 UNKN     0 STOP
                                                                                                                                      UNKN       N  S                                                  011               00
                                                                                                                                      UNKNOWN            01 DRVR NONE   00 F UNK         000           000               00
                                                                                                                                                                             UNK
01276  N N N      04/16/2010 CLACKAMAS           1    16   3                     INTER      CROSS  N            N CLR   S-1STOP    01 NONE     0 STRGHT                                                                  07
NONE              Fri    7A  GLADSTONE           CN    0   82ND DR               N                 TRF SIGNAL   N DRY   REAR          UNKN       N  S                                                  000               00
                             PORTLAND UA          11.45    SB EXTO 82ND DR       06           2                 N DAY   PDO          PSNGR CAR           01 DRVR NONE   00 U UNK         026           000               07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                                            UNK
                                                                                                                                   02 NONE     0 STOP
                                                                                                                                      PRVTE      N  S                                                  011               00
                                                                                                                                     PSNGR CAR           01 DRVR NONE   57 F OR-Y        000           000               00
                                                                                                                                                                             OR<25
03079  N N N      08/31/2010 CLACKAMAS           1    16   3                     INTER      CROSS  N            N RAIN  S-1STOP    01 NONE     0 STRGHT                                                                  07
NONE              Tue    3P  GLADSTONE           CN    0   82ND DR               N                 TRF SIGNAL   N WET   REAR          PRVTE      N  S                                                  000               00
                             PORTLAND UA          11.45    SB EXTO 82ND DR       06           2                 N DAY   INJ          PSNGR CAR           01 DRVR NONE   30 M OR-Y        026           000               07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                                            OR<25
                                                                                                                                   02 NONE     0 STOP
                                                                                                                                      PRVTE      N  S                                                  011               00
                                                                                                                                     PSNGR CAR           01 DRVR INJC   31 M OR-Y        000           000               00
                                                                                                                                                                             OR<25
03102  N N N      09/01/2010 CLACKAMAS           1    16   3                     INTER      CROSS  N            N CLR   S-1STOP    01 NONE     0 STRGHT                                                                  07
NONE              Wed    1P  GLADSTONE           CN    0   82ND DR               N                 TRF SIGNAL   N DRY   REAR          PRVTE      N  S                                                  000               00
                             PORTLAND UA          11.45    SB EXTO 82ND DR       06           2                 N DAY   INJ          PSNGR CAR           01 DRVR NONE   46 F OR-Y        026           000               07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                                            OR<25
                                                                                                                                   02 NONE     0 STOP
                                                                                                                                      PRVTE      N  S                                                  011               00
                                                                                                                                     PSNGR CAR           01 DRVR INJC   44 M OR-Y        000           000               00
                                                                                                                                                                             OR<25
                                                                                                                                                         02 PSNG INJC   51 F             000           000               00
                                                                                                                                                         03 PSNG NO<5   02 M             000           000               00
03420  N N N      09/22/2010 CLACKAMAS           1    16   3                     INTER      CROSS  N            N CLR   S-1STOP    01 NONE     0 STRGHT                                                                  07
NONE              Wed    6P  GLADSTONE           CN    0   82ND DR               N                 TRF SIGNAL   N DRY   REAR          PRVTE      N  S                                                  000               00
                             PORTLAND UA          11.45    SB EXTO 82ND DR       06           2                 N DAY   PDO          PSNGR CAR           01 DRVR NONE   00 M UNK         026           000               07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                                            OR<25
```

```
CDS380     10/6/2016                                                      OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                                       PAGE: 5
                                                                                 TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                               CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                                I-205 SB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                                          January 1, 2010 through December 31, 2014

       S   D
       P   R S W                              RD#  FC  CONN #                          INT-TYP                                  SPCL USE
SER#   E A U C O DATE       COUNTY            CMPT/MLG FIRST  STREET      RD CHAR (MEDIAN) INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                  A  S
INVEST E L G H R DAY/TIME   CITY              MILEPNT  SECOND STREET      DIRECT    LEGS   TRAF-   RNDBT SURF  COLL TYP     OWNER     FROM       PRTC INJ    G  E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA        LRS      INTERSECTION SEQ#  LOCTN   (#LANES) CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE  TO      P# TYPE SVRTY  E  X RES   LOC ERROR         ACTN EVENT       CAUSE

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     N  S                                               011              00
                                                                                                                             PSNGR CAR         01 DRVR NONE  31 M OR-Y      000           000              00
                                                                                                                                                                   OR<25

01754  N N N     05/20/2011 CLACKAMAS         1    16  3                    INTER     CROSS  N           N CLR   S-1STOP   01 UNKN    0 STRGHT                                                              07
NONE             Fri     3P GLADSTONE         CN    0  82ND DR              N                TRF SIGNAL  N DRY   REAR         UNKN      N  S                                               000              00
                            PORTLAND UA        11.45   SB EXTO 82ND DR      06           2               N DAY   PDO          UNKNOWN          01 DRVR NONE  00 U UNK       026           000              07
No     45 23  4.18  -122 34 50.28             0064AZ100S00              1                                                                                          UNK

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     N  S                                               011              00
                                                                                                                             PSNGR CAR         01 DRVR NONE  60 F OR-Y      000           000              00
                                                                                                                                                                   OR<25

01818  N N N     05/25/2011 CLACKAMAS         1    19  3                    INTER     CROSS  N           N RAIN  S-1STOP   01 NONE    0 STRGHT                                                   013         07
NONE             Wed     4P GLADSTONE         CN    0  82ND DR              N                TRF SIGNAL  N WET   REAR         PRVTE     N  S                                               000              00
                            PORTLAND UA        11.45   SB EXTO 82ND DR      06           2               N DAY   PDO         PSNGR CAR         01 DRVR NONE  55 F OR-Y      026           000              07
No     45 23  4.18  -122 34 50.28             0064AZ100S00              1                                                                                          OR<25

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     N  S                                               011  013         00
                                                                                                                             PSNGR CAR         01 DRVR NONE  42 M OR-Y      000           000              00
                                                                                                                                                                   OR<25

                                                                                                                           03 NONE    0 STOP
                                                                                                                              PRVTE     N  S                                               022              00
                                                                                                                             PSNGR CAR         01 DRVR NONE  30 F OR-Y      000           000              00
                                                                                                                                                                   OR<25
                                                                                                                                               02 PSNG NO<5  01 M           000           000              00

01979  Y N N     06/06/2011 CLACKAMAS         1    19  3                    INTER     CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                              01
NONE             Mon     1P GLADSTONE         CN    0  82ND DR              N                TRF SIGNAL  N DRY   REAR         PRVTE     N  S                                               000              00
                            PORTLAND UA        11.45   SB EXTO 82ND DR      06           1               N DAY   INJ         PSNGR CAR         01 DRVR NONE  00 F UNK       047,026       000              01
No     45 23  4.18  -122 34 50.28             0064AZ100S00              1                                                                                          OR<25

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     N  S                                               011              00
                                                                                                                             PSNGR CAR         01 DRVR INJC  38 F UNK       000           000              00
                                                                                                                                                                   OR>25
                                                                                                                                               02 PSNG INJC  06 M           000           000              00

02056  N N N N N 06/11/2011 CLACKAMAS         1    16  3                    INTER     CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                              07
STATE            Sat     8A GLADSTONE         CN    0  82ND DR              N                TRF SIGNAL  N DRY   REAR         PRVTE     N  S                                               000              00
                            PORTLAND UA        11.45   SB EXTO 82ND DR      06           2               N DAY   INJ         PSNGR CAR         01 DRVR NONE  62 F OR-Y      026,043       000              07
No     45 23  4.18  -122 34 50.28             0064AZ100S00              1                                                                                          OR<25

                                                                                                                           02 NONE    0 STOP
                                                                                                                              PRVTE     N  S                                               011              00
                                                                                                                             PSNGR CAR         01 DRVR INJC  73 M OR-Y      000           000              00
                                                                                                                                                                   OR<25
```

```
                                                                  TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                  CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                   I-205 SB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                              January 1, 2010 through December 31, 2014

      S  D
      P  R S W                                                            INT-TYP                                  SPCL USE
SER#  E A U C O  DATE       COUNTY          RD#  FC   CONN #            RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP  TRLR QTY  MOVE                  A  S
INVEST E L G H R DAY/TIME   CITY            CMPT/MLG  FIRST  STREET     DIRECT    LEGS    TRAF-    RNDBT SURF  COLL TYP   OWNER     FROM      PRTC INJ    G  E  LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA      MILEPNT   SECOND STREET     LOCTN   (#LANES)  CNTL     DRVWY LIGHT SVRTY   V# VEH TYPE  TO     P# TYPE SVRTY E  X  RES   LOC ERROR        ACTN EVENT      CAUSE
                                            LRS       INTERSECTION SEQ#

02217  N N N    06/22/2011 CLACKAMAS        1    16   3                 INTER     3-LEG  N           N CLR  S-1STOP  01 NONE   0 STRGHT                                                         07
NONE            Wed    8P  GLADSTONE        CN    0   82ND DR           N                TRF SIGNAL  N DRY  REAR        PRVTE    N  S                                           000             00
                           PORTLAND UA       11.45    SB EXTO 82ND DR   06          2                N DAY  INJ        PSNGR CAR        01 DRVR NONE  50 M OR-Y       026       000             07
No     45 23  4.18  -122 34 50.28           0064AZ100S00              1                                                                                 OR<25

                                                                                                                     02 NONE   0 STOP
                                                                                                                        PRVTE    N  S                                           011             00
                                                                                                                       PSNGR CAR        01 DRVR INJC  36 M OR-Y       000       000             00
                                                                                                                                                        OR<25

00890  N N N N N 03/09/2012 CLACKAMAS       1    11   3                 INTER     3-LEG  N           N CLR  S-1STOP  01 NONE   0 STRGHT                                                         07
STATE           Fri    7A  GLADSTONE        CN    0   82ND DR           N                TRF SIGNAL  N DRY  REAR        PRVTE    N  S                                           000             00
                           PORTLAND UA       11.45    SB EXTO 82ND DR   06          0                N DAY  INJ        PSNGR CAR        01 DRVR NONE  52 F OR-Y       043,026   000             07
No     45 23  4.18  -122 34 50.28           0064AZ100S00              1                                                                                 OR<25

                                                                                                                     02 NONE   0 STOP
                                                                                                                        PRVTE    N  S                                           011             00
                                                                                                                       PSNGR CAR        01 DRVR INJC  26 F OR-Y       000       000             00
                                                                                                                                                        OR<25

01463  N N N    04/20/2012 CLACKAMAS        1    11   3                 INTER     CROSS  N           N CLR  S-1STOP  01 NONE   0 STRGHT                                                         27,07
NO RPT          Fri    4P  GLADSTONE        CN    0   82ND DR           N                TRF SIGNAL  N DRY  REAR        PRVTE    N  S                                           000             00
                           PORTLAND UA       11.45    SB EXTO 82ND DR   06          2                N DAY  INJ        PSNGR CAR        01 DRVR NONE  34 M OR-Y       026       000             07
No     45 23  4.18  -122 34 50.28           0064AZ100S00              1                                                                                 OR<25

                                                                                                                     02 NONE   0 STOP
                                                                                                                        PRVTE    N  S                                           011             00
                                                                                                                       PSNGR CAR        01 DRVR INJC  22 M OR-Y       000       000             00
                                                                                                                                                        OR<25

01655  Y N N    04/26/2012 CLACKAMAS        1    11   3                 INTER     CROSS  N           N CLR  S-1STOP  01 NONE   0 STRGHT                                                         01,07
NONE            Thu   UNK  GLADSTONE        CN    0   82ND DR           N                TRF SIGNAL  N DRY  REAR        PRVTE    N  S                                           000             00
                           PORTLAND UA       11.45    SB EXTO 82ND DR   06          2                N DAY  PDO        PSNGR CAR        01 DRVR NONE  22 M OR-Y       047,026   000             01,07
No     45 23  4.18  -122 34 50.28           0064AZ100S00              1                                                                                 OR<25

                                                                                                                     02 NONE   0 STOP
                                                                                                                        PRVTE    N  S                                           011             00
                                                                                                                       PSNGR CAR        01 DRVR NONE  66 F OR-Y       000       000             00
                                                                                                                                                        OR<25

00555  N N N    02/06/2013 CLACKAMAS        1    11   3                 INTER     CROSS  N           N CLR  S-1STOP  01 NONE   1 STRGHT                                                         27,07
NONE            Wed    4P  GLADSTONE        CN    0   SB EXTO 82ND DR   N                TRF SIGNAL  N DRY  REAR        PRVTE    N  S                                           000             00
                           PORTLAND UA       11.45    82ND DR           06          2                N DAY  INJ        PSNGR CAR        01 DRVR NONE  22 F OR-Y       026       038             27,07
No     45 23  4.18  -122 34 50.28           0064AZ100S00              1                                                                                 OR<25

                                                                                                                     02 NONE   0 STOP
                                                                                                                        PRVTE    N  S                                           011             00
                                                                                                                       PSNGR CAR        01 DRVR INJC  34 F OR-Y       000       000             00
                                                                                                                                                        OR<25
                                                                                                                                        02 PSNG INJC  38 M            000       000             00
```

```
                                                    OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
                                                           TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                         CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                     I-205 SB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                               January 1, 2010 through December 31, 2014

       S   D
       P   R S W                                 RD#  FC   CONN #                      INT-TYP                              SPCL USE
SER#   E A U C O  DATE        COUNTY             CMPT/MLG  FIRST  STREET       RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP   TRLR QTY   MOVE                     A  S
INVEST E L G H R  DAY/TIME    CITY               MILEPNT   SECOND STREET       DIRECT    LEGS    TRAF-    RNDBT SURF  COLL TYP    OWNER      FROM       PRTC  INJ    G  E  LICNS PED
UNLOC? D C S L K  LAT/LONG    URBAN AREA         LRS       INTERSECTION SEQ#   LOCTN   (#LANES)  CNTL     DRVWY LIGHT SVRTY    V# VEH TYPE   TO     P# TYPE  SVRTY  E  X  RES   LOC ERROR          ACTN EVENT        CAUSE

01153  N N N     04/05/2013 CLACKAMAS            1    11   3                   INTER      CROSS  N           N RAIN  S-1STOP   01 NONE    0 STRGHT                                                                   07
NONE             Fri     5P GLADSTONE            CN    0   82ND DR             N                 TRF SIGNAL  N WET   REAR         PRVTE      N  S                                                      000             00
                            PORTLAND UA           11.45    SB EXTO 82ND DR     06           2                N DAY   INJ          PSNGR CAR           01 DRVR NONE  61 M OR-Y        026         000             07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                    OR<25

                                                                                                                               02 NONE    0 STOP
                                                                                                                                  PRVTE      N  S                                                      011             00
                                                                                                                                  PSNGR CAR           01 DRVR INJC  37 F OR-Y        000         000             00
                                                                                                                                                                     OR<25

03199  N N N     08/28/2013 CLACKAMAS            1    11   3                   INTER      CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                                   07
NONE             Wed     5P GLADSTONE            CN    0   82ND DR             N                 TRF SIGNAL  N DRY   REAR         PRVTE      N  S                                                      000             00
                            PORTLAND UA           11.45    SB EXTO 82ND DR     06           2                N DAY   INJ          PSNGR CAR           01 DRVR NONE  39 M OR-Y        026         000             07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                    OR<25

                                                                                                                               02 NONE    0 STOP
                                                                                                                                  PRVTE      N  S                                                      011             00
                                                                                                                                  PSNGR CAR           01 DRVR INJC  26 M OR-Y        000         000             00
                                                                                                                                                                     OR<25

04346  N N N     11/10/2013 CLACKAMAS            1    11   3                   INTER      CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                                   07
NO RPT           Sun     3P GLADSTONE            CN    0   82ND DR             N                 TRF SIGNAL  N DRY   REAR         PRVTE      N  S                                                      000             00
                            PORTLAND UA           11.45    SB EXTO 82ND DR     06           2                N DAY   INJ          PSNGR CAR           01 DRVR NONE  27 M OR-Y        026         000             07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                    OR<25

                                                                                                                               02 NONE    0 STOP
                                                                                                                                  PRVTE      N  S                                                      011             00
                                                                                                                                  PSNGR CAR           01 DRVR NONE  44 M OR-Y        000         000             00
                                                                                                                                                                     OR<25
                                                                                                                                                      02 PSNG INJC  37 F             000         000             00
00056  N N N     01/05/2014 CLACKAMAS            1    11   3                   INTER      CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                                   07
NONE             Sun     2P GLADSTONE            CN    0   82ND DR             N                 TRF SIGNAL  N DRY   REAR         PRVTE      N  S                                                      000             00
                            PORTLAND UA           11.45    SB EXTO 82ND DR     06           2                N DAY   PDO          PSNGR CAR           01 DRVR NONE  62 M OR-Y        026         000             07
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                    OR<25

                                                                                                                               02 NONE    0 STOP
                                                                                                                                  PRVTE      N  S                                                      011             00
                                                                                                                                  PSNGR CAR           01 DRVR NONE  86 F OR-Y        000         000             00
                                                                                                                                                                     OR<25

02422  N N N     06/24/2014 CLACKAMAS            1    11   3                   INTER      CROSS  N           N CLR   S-1STOP   01 NONE    0 STRGHT                                                                   29
NONE             Tue     6P GLADSTONE            CN    0   82ND DR             N                 TRF SIGNAL  N DRY   REAR         PRVTE      N  S                                                      000             00
                            PORTLAND UA           11.45    SB EXTO 82ND DR     06           2                N DAY   PDO          PSNGR CAR           01 DRVR NONE  20 M OR-Y        026         000             29
No      45 23  4.18  -122 34 50.28               0064AZ100S00               1                                                                                    OR<25

                                                                                                                               02 NONE    0 STOP
                                                                                                                                  PRVTE      N  S                                                      011             00
                                                                                                                                  PSNGR CAR           01 DRVR NONE  47 F OTH-Y       000         000             00
                                                                                                                                                                     N-RES
```

```
064 EAST PORTLAND FREEWAY                                                         I-205 SB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                                   January 1, 2010 through December 31, 2014

       S   D
       P   R S W                                     RD#  FC   CONN #                        INT-TYP                                         SPCL USE
SER#   E A U C O  DATE        COUNTY                 CMPT/MLG  FIRST  STREET        RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP     TRLR QTY  MOVE                     A  S
INVEST E L G H R  DAY/TIME    CITY                   MILEPNT   SECOND STREET        DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP      OWNER     FROM      PRTC INJ     G  E  LICNS PED
UNLOC? D C S L K  LAT/LONG    URBAN AREA             LRS       INTERSECTION SEQ#    LOCTN    (#LANES) CNTL     DRVWY LIGHT SVRTY     V# VEH TYPE  TO     P# TYPE SVRTY  E  X  RES   LOC ERROR          ACTN EVENT        CAUSE

03218  N N N N N 09/02/2014  CLACKAMAS              1    11   3                    INTER      CROSS  N              N CLR  PED        01 NONE    0 TURN-R                                                                     04,02
CITY             Tue    2P   GLADSTONE              CN    0   82ND DR              N                 TRF SIGNAL  N DRY  PED           PRVTE     N  W                                                          016               00
                             PORTLAND UA             11.45    SB EXTO 82ND DR      06            2                N DAY  FAT          PSNGR CAR          01 DRVR NONE  36 M OR-Y       029                000               02
No     45 23  4.18  -122  34 50.28                  0064AZ100S00               1                                                                                OR<25
                                                                                                                                                   STRGHT 01 PED  KILL  81 M        01  020                035               04
                                                                                                                                                   W  E

01079  N N N     03/17/2014  CLACKAMAS              1    11   3                    INTER      CROSS  N              N CLR  S-1STOP    01 NONE    0 STRGHT                                                                     07
NONE             Mon    5P   GLADSTONE              CN    0   82ND DR              NE                TRF SIGNAL  N DRY  REAR          PRVTE     NE SW                                                         000               00
                             PORTLAND UA             11.45    SB EXTO 82ND DR      06            4                N DAY  INJ          PSNGR CAR          01 DRVR NONE  28 F OR-Y       026                000               07
No     45 23  4.18  -122  34 50.28                  0064AZ100S00               1                                                                                OR<25

                                                                                                                               02 NONE    0 STOP
                                                                                                                                  PRVTE     NE SW                                                         011               00
                                                                                                                                 PSNGR CAR          01 DRVR INJC  52 M OR-Y       000                000               00
                                                                                                                                                                    OR<25

00855  N N N     03/15/2010  CLACKAMAS              1    11   3                    INTER      3-LEG  N              N CLR  S-1STOP    01 NONE    0 STRGHT                                                                     07
NONE             Mon   11A   GLADSTONE              CN    0   82ND DR              S                 TRF SIGNAL  N DRY  REAR          PRVTE     S  N                                                          000               00
                             PORTLAND UA             11.45    SB EXTO 82ND DR      06            2                N DAY  INJ          PSNGR CAR          01 DRVR NONE  47 F OR-Y       026                000               07
No     45 23  4.18  -122  34 50.28                  0064AZ100S00               1                                                                                OR<25

                                                                                                                               02 NONE    0 STOP
                                                                                                                                  PRVTE     S  N                                                          023               00
                                                                                                                                 PSNGR CAR          01 DRVR INJC  43 M OR-Y       000                000               00
                                                                                                                                                                    OR<25

02341  N N N     07/07/2010  CLACKAMAS              1    16   5                    INTER      CROSS  N              N CLR  S-1STOP    01 NONE    0 STRGHT                                                                     07
NONE             Wed   11A   GLADSTONE              CN    0   82ND DR              W                 TRF SIGNAL  N DRY  REAR          PRVTE     W  E                                                          000               00
                             PORTLAND UA             11.45    SB EXTO 82ND DR      06            2                N DAY  PDO          PSNGR CAR          01 DRVR NONE  56 F OR-Y       026                000               07
No     45 22 56.87  -122  34 59.51                  0064BB100S00               1                                                                                OR<25

                                                                                                                               02 NONE    0 STOP
                                                                                                                                  PRVTE     W  E                                                          011               00
                                                                                                                                 PSNGR CAR          01 DRVR NONE  49 F OR-Y       000                000               00
                                                                                                                                                                    OR<25
```

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

I-205 NB ramps (Hwy 064) & 82nd Dr (Hwy 064)
January 1, 2010 through December 31, 2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2014														
MISCELLANEOUS	0	1	0	1	0	1	0	1	0	1	0	1	0	0
NON-COLLISION	0	0	1	1	0	0	1	1	0	1	0	1	0	0
REAR-END	0	1	0	1	0	1	0	1	0	0	1	1	0	0
2014 TOTAL	0	2	1	3	0	2	1	3	0	2	1	3	0	0
YEAR: 2013														
REAR-END	0	1	0	1	0	1	0	0	1	1	0	1	0	0
TURNING MOVEMENTS	0	0	2	2	0	0	1	0	2	1	1	2	0	0
2013 TOTAL	0	1	2	3	0	1	1	0	3	2	1	3	0	0
YEAR: 2012														
REAR-END	0	2	2	4	0	2	0	2	2	3	1	4	0	0
2012 TOTAL	0	2	2	4	0	2	0	2	2	3	1	4	0	0
YEAR: 2011														
REAR-END	0	1	0	1	0	1	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	0	1	1	0	0
2011 TOTAL	0	2	0	2	0	2	0	2	0	1	1	2	0	0
YEAR: 2010														
REAR-END	0	2	1	3	0	5	0	3	0	2	1	3	0	0
2010 TOTAL	0	2	1	3	0	5	0	3	0	2	1	3	0	0
FINAL TOTAL	0	9	6	15	0	12	2	10	5	10	5	15	0	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

```
CDS380     10/6/2016                                                                  OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION                                              PAGE: 1
                                                                                              TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                                            CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                                            I-205 NB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                                                      January 1, 2010 through December 31, 2014

       S  D
       P  R S W                                                                       INT-TYP                                        SPCL USE
SER#   E A U C O DATE        COUNTY         RD#  FC   CONN #                RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                   A S
INVEST E L G H R DAY/TIME    CITY           CMPT/MLG  FIRST  STREET          DIRECT     LEGS   TRAF-    RNDBT SURF  COLL TYP     OWNER     FROM      PRTC INJ     G E LICNS PED
UNLOC? D C S L K LAT/LONG    URBAN AREA     MILEPNT   SECOND STREET          LOCTN    (#LANES) CNTL     DRVWY LIGHT SVRTY    V# VEH TYPE  TO     P# TYPE SVRTY E X RES   LOC ERROR          ACTN EVENT        CAUSE
                                            LRS       INTERSECTION SEQ#

03614  N N N    09/30/2011  CLACKAMAS      1    19   2                     INTER     3-LEG  N          N CLR  ANGL-OTH   01 NONE    0 TURN-R                                                    001           02
NONE            Fri   11P  GLADSTONE      CN    0   82ND DR               S                 YIELD      N DRY  TURN          PRVTE     W  S                                                 000                 00
                           PORTLAND UA     10.93    NB ENFR 82ND DR       03          1                N DLIT INJ          PSNGR CAR         01 DRVR NONE  58 F OR-Y      028            000                 02
No     45 23  4.36  -122 34 39.34         0064AY100S00             1                                                                                    OR>25

                                                                                                                         02 NONE    0 TURN-L
                                                                                                                            PRVTE     E  S                                                 000                 00
                                                                                                                           MTRCYCLE          01 DRVR INJB  46 M OR-Y      000            000  001            00
                                                                                                                                                                 OR<25

01641  N N N N N 05/12/2011 CLACKAMAS      1    16   1                     INTER     3-LEG  N          N CLR  S-1STOP    01 NONE    0 STRGHT                                                                 07
NONE            Thu    4P  GLADSTONE      CN    0   82ND DR               E                 YIELD      N DRY  REAR          PRVTE     S  N                                                 000                 00
                           PORTLAND UA     11.10    NB EXTO 82ND DR       09          1                N DAY  INJ          PSNGR CAR         01 DRVR NONE  65 F OR-Y      026            000                 07
No     45 23  5.72  -122 34 39.35         0064AX100S00             1                                                                                    OR<25

                                                                                                                         02 NONE    0 STOP
                                                                                                                            PRVTE     S  N                                                 011                 00
                                                                                                                           PSNGR CAR         01 DRVR INJC  25 F OR-Y      000            000                 00
                                                                                                                                                                 OR<25

01173  N N N    03/28/2012  CLACKAMAS      1    11   1                     INTER     3-LEG  N          N CLD  S-1STOP    01 NONE    0 STRGHT                                                                 07
NONE            Wed    4P  GLADSTONE      CN    0   82ND DR               E                 YIELD      N WET  REAR          PRVTE     S  N                                                 000                 00
                           PORTLAND UA     11.10    NB EXTO 82ND DR       09          1                N DAY  INJ          PSNGR CAR         01 DRVR NONE  00 U UNK       026            000                 07
No     45 23  5.72  -122 34 39.35         0064AX100S00             1                                                                                    UNK

                                                                                                                         02 NONE    0 STOP
                                                                                                                            PRVTE     S  N                                                 011                 00
                                                                                                                           PSNGR CAR         01 DRVR INJC  51 M OR-Y      000            000                 00
                                                                                                                                                                 OR<25

02476  N N N N N 07/16/2010 CLACKAMAS      1    16   1                     INTER     3-LEG  N          N CLR  S-1STOP    01 NONE    0 STRGHT                                                                 07
CITY            Fri   11A  GLADSTONE      CN    0   82ND DR               S                 TRF SIGNAL N DRY  REAR          PRVTE     S  N                                                 000                 00
                           PORTLAND UA     11.10    NB EXTO 82ND DR       06          0                N DAY  PDO          PSNGR CAR         01 DRVR NONE  77 M OR-Y      043,026        000                 07
No     45 23  5.72  -122 34 39.35         0064AX100S00             1                                                                                    OR<25

                                                                                                                         02 NONE    0 STOP
                                                                                                                            PRVTE     S  N                                                 011                 00
                                                                                                                           PSNGR CAR         01 DRVR NONE  37 F OR-Y      000            000                 00
                                                                                                                                                                 OR<25

04863  N N N    12/17/2010  CLACKAMAS      1    19   1                     INTER     3-LEG  N          N CLR  S-1STOP    01 NONE    0 STRGHT                                                                 07
NONE            Fri    5P  GLADSTONE      CN    0   82ND DR               S                 TRF SIGNAL N DRY  REAR          PRVTE     S  N                                                 000                 00
                           PORTLAND UA     11.10    NB EXTO 82ND DR       06          2                N DUSK INJ          PSNGR CAR         01 DRVR NONE  00 M UNK       026            000                 07
No     45 23  5.72  -122 34 39.35         0064AX100S00             1                                                                                    UNK

                                                                                                                         02 NONE    0 STOP
                                                                                                                            PRVTE     S  N                                                 012                 00
                                                                                                                           PSNGR CAR         01 DRVR INJC  39 F OR-Y      000            000                 00
                                                                                                                                                                 OR<25
```

```
                                                                          TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
                                                                                        CONTINUOUS SYSTEM CRASH LISTING

064 EAST PORTLAND FREEWAY                                                        I-205 NB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                                  January 1, 2010 through December 31, 2014

       S  D
       P  R S W                                                                         INT-TYP                                   SPCL USE
SER#   E A U C O DATE       COUNTY               RD#  FC   CONN #              RD CHAR (MEDIAN)  INT-REL  OFFRD WTHR  CRASH TYP    TRLR QTY  MOVE                       A  S
INVEST E L G H R DAY/TIME   CITY                 CMPT/MLG  FIRST  STREET       DIRECT    LEGS    TRAF-    RNDBT SURF  COLL TYP     OWNER     FROM        PRTC  INJ    G  E  LICNS  PED
UNLOC? D C S L K LAT/LONG   URBAN AREA           MILEPNT   SECOND STREET       LOCTN   (#LANES)  CNTL     DRVWY LIGHT SVRTY     V# VEH TYPE  TO       P# TYPE  SVRTY  E  X  RES    LOC  ERROR        ACTN EVENT       CAUSE
                                                 LRS       INTERSECTION SEQ#

03676  N N N     09/30/2013 CLACKAMAS            1    11   1                   INTER      3-LEG  N            N UNK  S-1STOP   01 NONE   0 STRGHT                                                                  07
NONE             Mon    3P  GLADSTONE            CN    0   82ND DR             S                 TRF SIGNAL   N WET  REAR         PRVTE      S  N                                                         000             00
                            PORTLAND UA           11.10    NB EXTO 82ND DR     06           0                 N DAY  INJ         PSNGR CAR           01 DRVR NONE  00 M UNK          026          000             07
No      45 23  5.72  -122  34 39.35            0064AX100S00               1                                                                                          OR<25

                                                                                                                           02 NONE   0 STOP
                                                                                                                              PRVTE      S  N                                                         011             00
                                                                                                                             PSNGR CAR           01 DRVR INJB  33 M OTH-Y        000          000             00
                                                                                                                                                                    OR<25

04502  N Y N N N 11/21/2012 CLACKAMAS            1    11   1                   INTER      3-LEG  N            N CLD  S-1STOP   01 NONE   0 STRGHT                                                                  07
CITY             Wed    6P  GLADSTONE            CN    0   82ND DR             SW                TRF SIGNAL   N WET  REAR         PRVTE      S  N                                                         000             00
                            PORTLAND UA           11.10    NB EXTO 82ND DR     06           0                 N DUSK INJ         PSNGR CAR           01 DRVR NONE  43 F OR-Y         026          000             07
No      45 23  5.72  -122  34 39.35            0064AX100S00               1                                                                                          OR<25

                                                                                                                           02 NONE   0 STOP
                                                                                                                              PRVTE      S  N                                                         012             00
                                                                                                                             PSNGR CAR           01 DRVR INJC  35 F OR-Y         000          000             00
                                                                                                                                                                    OR<25

00732  N N N     03/06/2010 CLACKAMAS            1    11   1                   INTER      3-LEG  N            N CLR  S-1STOP   01 NONE   0 TURN-L                                                                  07
NONE             Sat   11A  GLADSTONE            CN    0   82ND DR             CN                STOP SIGN    N DRY  REAR         PRVTE      S  W                                                         000             00
                            PORTLAND UA           11.10    NB EXTO 82ND DR     03           0                 N DAY  INJ         PSNGR CAR           01 DRVR NONE  20 F OR-Y         026          000             07
No      45 23  5.72  -122  34 39.35            0064AX100S00               1                                                                                          OR<25

                                                                                                                           02 NONE   0 STOP
                                                                                                                              PRVTE      S  N                                                         012             00
                                                                                                                             PSNGR CAR           01 DRVR INJC  39 M OR-Y         000          000             00
                                                                                                                                                                    OR<25
                                                                                                                                                 02 PSNG INJC  29 F              000          000             00
                                                                                                                                                 03 PSNG INJC  06 M              000          000             00
                                                                                                                                                 04 PSNG INJC  01 M              000          000             00

03498  N N N     09/20/2012 CLACKAMAS            1    16   5                   INTER      3-LEG  N            N CLR  S-1STOP   01 NONE   0 STRGHT                                                                  07
NONE             Thu    3P  GLADSTONE            CN    0   82ND DR             NE                TRF SIGNAL   N DRY  REAR         UNKN       NE SW                                                        000             00
                            PORTLAND UA           11.10    NB EXTO 82ND DR     06           2                 N DAY  PDO          UNKNOWN            01 DRVR NONE  00 F UNK          026          000             07
No      45 23  5.99  -122  34 38.65            0064BB100S00               1                                                                                          UNK

                                                                                                                           02 NONE   0 STOP
                                                                                                                              PRVTE      NE SW                                                        011             00
                                                                                                                             PSNGR CAR           01 DRVR NONE  26 F OR-Y         000          000             00
                                                                                                                                                                    OR<25

03169  Y N N N N 08/16/2014 CLACKAMAS            1    16   5                   INTER      3-LEG  N            N CLR  OVERTURN  01 NONE   1 TURN-R                                                           021,028      01,08,24
CITY             Sat    5P  GLADSTONE            CN    0   82ND DR             E                 TRF SIGNAL   N DRY  NCOL         PRVTE      S  E                                                         000  021,028     24
                            PORTLAND UA           11.10    NB EXTO 82ND DR     05           0                 N DAY  PDO          SEMI TOW           01 DRVR NONE  51 M OTH-Y        047,002      000             01,08
No      45 23  5.72  -122  34 39.35            0064BB100S00               1                                                                                          N-RES

01578  N N N     04/30/2012 CLACKAMAS            1    16   5                   INTER      CROSS  N            N CLR  S-1STOP   01 NONE   0 STRGHT                                                                  07
NONE             Mon    2P  GLADSTONE            CN    0   82ND DR             E                 TRF SIGNAL   N DRY  REAR         PRVTE      E  W                                                         000             00
                            PORTLAND UA           11.10    NB EXTO 82ND DR     06           0                 N DAY  PDO         PSNGR CAR           01 DRVR NONE  53 M OR-Y         026          000             07
No      45 23  5.72  -122  34 39.35            0064BB100S00               1                                                                                          OR<25
```

```
064 EAST PORTLAND FREEWAY                                                                    I-205 NB ramps (Hwy 064) & 82nd Dr (Hwy 064)
                                                                                              January 1, 2010 through December 31, 2014

       S   D
       P   R S W                               RD#  FC  CONN #                        INT-TYP                                    SPCL USE
SER#   E A U C O DATE       COUNTY             CMPT/MLG FIRST  STREET        RD CHAR (MEDIAN)  INT-REL OFFRD WTHR  CRASH TYP    TRLR QTY   MOVE                 A  S
INVEST E L G H R DAY/TIME   CITY               MILEPNT  SECOND STREET        DIRECT     LEGS   TRAF-   RNDBT SURF  COLL TYP     OWNER      FROM      PRTC INJ   G  E LICNS PED
UNLOC? D C S L K LAT/LONG   URBAN AREA         LRS      INTERSECTION SEQ#    LOCTN   (#LANES)  CNTL    DRVWY LIGHT SVRTY     V# VEH TYPE   TO     P# TYPE SVRTY E  X RES   LOC ERROR          ACTN EVENT        CAUSE

                                                                                                                             02 NONE   0 STOP
                                                                                                                                PRVTE     E  W                                                011               00
                                                                                                                               PSNGR CAR          01 DRVR NONE  50 M OR-Y      000            000               00
                                                                                                                                                                     OR<25

00597  Y N N     02/21/2013 CLACKAMAS          1   16   5                    INTER     3-LEG   N          N RAIN  ANGL-STP   01 NONE   1 TURN-R                                                    021,010      08,01
NO RPT           Thu    8A  GLADSTONE          CN   0   82ND DR              E                 TRF SIGNAL N WET   TURN          PRVTE     S  E                                                000  021,010      00
                            PORTLAND UA         11.10   NB EXTO 82ND DR      06           1               N DAY   PDO           SEMI TOW          01 DRVR NONE  21 M OR-Y      001,047        000               08,01
No     45 23  5.72  -122 34 39.35              0064BB100S00              1                                                                                           OR<25

                                                                                                                             02 NONE   0 STOP
                                                                                                                                PRVTE     E  W                                                011               00
                                                                                                                               PSNGR CAR          01 DRVR NONE  57 M OR-Y      000            000               00
                                                                                                                                                                     OR>25

                                                                                                                             03 NONE   0 STOP
                                                                                                                                PRVTE     E  W                                                011               00
                                                                                                                               PSNGR CAR          01 DRVR NONE  37 F OR-Y      000            000               00
                                                                                                                                                                     OR<25

04812  N N N N N 11/26/2014 CLACKAMAS          1   16   5                    INTER     3-LEG   N          N CLD   S-1STOP    01 NONE   0 STRGHT                                                                 07
CITY             Wed    4P  GLADSTONE          CN   0   82ND DR              E                 TRF SIGNAL N DRY   REAR          PRVTE     E  W                                                000               00
                            PORTLAND UA         11.10   NB EXTO 82ND DR      06           0               N DUSK  INJ          PSNGR CAR          01 DRVR INJC  78 F OR-Y      043,026        000               07
No     45 23  5.72  -122 34 39.35              0064BB100S00              1                                                                                           OR<25

                                                                                                                             02 NONE   0 STOP
                                                                                                                                PRVTE     E  W                                                011               00
                                                                                                                               PSNGR CAR          01 DRVR NONE  54 M OR-Y      000            000               00
                                                                                                                                                                     OR<25

03562  N N N     09/23/2013 CLACKAMAS          1   16   5                    INTER     3-LEG   N          N CLD   S-OTHER    01 NONE   0 TURN-L                                                                 06
CITY             Mon   10P  GLADSTONE          CN   0   82ND DR              CN                TRF SIGNAL N WET   TURN          UNKN      S  W                                                031               00
                            PORTLAND UA         11.10   NB EXTO 82ND DR      01           0               N DLIT  PDO          PSNGR CAR          01 DRVR NONE  00 U UNK       034            000               06
No     45 23  5.72  -122 34 39.35              0064BB100S00              1                                                                                           UNK

                                                                                                                             02 NONE   0 TURN-L
                                                                                                                                PRVTE     S  W                                                000               00
                                                                                                                               PSNGR CAR          01 DRVR NONE  29 M OR-Y      000            000               00
                                                                                                                                                                     OR<25

01604  N N N     04/27/2014 CLACKAMAS          1   16   5                    INTER     3-LEG   N          N CLR   NON-COLL   01 NONE   0 TURN-L                                                                 10
NONE             Sun   12P  GLADSTONE          CN   0   82ND DR              CN                TRF SIGNAL N DRY   OTH           PRVTE     S  W                                                000               00
                            PORTLAND UA         11.10   NB EXTO 82ND DR      01           1               N DAY   INJ           MTRCYCLE          01 DRVR INJB  63 F OR-Y      000            017               10
No     45 23  5.72  -122 34 39.35              0064BB100S00              1                                                                                           OR<25
```

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
000	NONE	NO ACTION OR NON-WARRANTED
001	SKIDDED	SKIDDED
002	ON/OFF V	GETTING ON OR OFF STOPPED OR PARKED VEHICLE
003	LOAD OVR	OVERHANGING LOAD STRUCK ANOTHER VEHICLE, ETC.
006	SLOW DN	SLOWED DOWN
007	AVOIDING	AVOIDING MANEUVER
008	PAR PARK	PARALLEL PARKING
009	ANG PARK	ANGLE PARKING
010	INTERFERE	PASSENGER INTERFERING WITH DRIVER
011	STOPPED	STOPPED IN TRAFFIC NOT WAITING TO MAKE A LEFT TURN
012	STP/L TRN	STOPPED BECAUSE OF LEFT TURN SIGNAL OR WAITING, ETC.
013	STP TURN	STOPPED WHILE EXECUTING A TURN
015	GO A/STOP	PROCEED AFTER STOPPING FOR A STOP SIGN/FLASHING RED.
016	TRN A/RED	TURNED ON RED AFTER STOPPING
017	LOSTCTRL	LOST CONTROL OF VEHICLE
018	EXIT DWY	ENTERING STREET OR HIGHWAY FROM ALLEY OR DRIVEWAY
019	ENTR DWY	ENTERING ALLEY OR DRIVEWAY FROM STREET OR HIGHWAY
020	STR ENTR	BEFORE ENTERING ROADWAY, STRUCK PEDESTRIAN, ETC. ON SIDEWALK OR SHOULDER
021	NO DRVR	CAR RAN AWAY - NO DRIVER
022	PREV COL	STRUCK, OR WAS STRUCK BY, VEHICLE OR PEDESTRIAN IN PRIOR COLLISION BEFORE ACC. STABILIZED
023	STALLED	VEHICLE STALLED OR DISABLED
024	DRVR DEAD	DEAD BY UNASSOCIATED CAUSE
025	FATIGUE	FATIGUED, SLEEPY, ASLEEP
026	SUN	DRIVER BLINDED BY SUN
027	HDLGHTS	DRIVER BLINDED BY HEADLIGHTS
028	ILLNESS	PHYSICALLY ILL
029	THRU MED	VEHICLE CROSSED, PLUNGED OVER, OR THROUGH MEDIAN BARRIER
030	PURSUIT	PURSUING OR ATTEMPTING TO STOP A VEHICLE
031	PASSING	PASSING SITUATION
032	PRKOFFRD	VEHICLE PARKED BEYOND CURB OR SHOULDER
033	CROS MED	VEHICLE CROSSED EARTH OR GRASS MEDIAN
034	X N/SGNL	CROSSING AT INTERSECTION - NO TRAFFIC SIGNAL PRESENT
035	X W/ SGNL	CROSSING AT INTERSECTION - TRAFFIC SIGNAL PRESENT
036	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
037	BTWN INT	CROSSING BETWEEN INTERSECTIONS
038	DISTRACT	DRIVER'S ATTENTION DISTRACTED
039	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
040	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
041	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
042	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
043	PLAYINRD	PLAYING IN STREET OR ROAD
044	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
045	WORK ON	WORKING IN ROADWAY OR ALONG SHOULDER
046	W/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. WITH TRAFFIC
047	A/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. FACING TRAFFIC
050	LAY ON RD	STANDING OR LYING IN ROADWAY
051	ENT OFFRD	ENTERING / STARTING IN TRAFFIC LANE FROM OFF ROAD
052	MERGING	MERGING
055	SPRAY	BLINDED BY WATER SPRAY
088	OTHER	OTHER ACTION

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
099	UNK	UNKNOWN ACTION

CAUSE CODE TRANSLATION LIST

CAUSE CODE	SHORT DESCRIPTION	LONG DESCRIPTION
00	NO CODE	NO CAUSE ASSOCIATED AT THIS LEVEL
01	TOO-FAST	TOO FAST FOR CONDITIONS (NOT EXCEED POSTED SPEED
02	NO-YIELD	DID NOT YIELD RIGHT-OF-WAY
03	PAS-STOP	PASSED STOP SIGN OR RED FLASHER
04	DIS SIG	DISREGARDED TRAFFIC SIGNAL
05	LEFT-CTR	DROVE LEFT OF CENTER ON TWO-WAY ROAD; STRADDLING
06	IMP-OVER	IMPROPER OVERTAKING
07	TOO-CLOS	FOLLOWED TOO CLOSELY
08	IMP-TURN	MADE IMPROPER TURN
09	DRINKING	ALCOHOL OR DRUG INVOLVED
10	OTHR-IMP	OTHER IMPROPER DRIVING
11	MECH-DEF	MECHANICAL DEFECT
12	OTHER	OTHER (NOT IMPROPER DRIVING)
13	IMP LN C	IMPROPER CHANGE OF TRAFFIC LANES
14	DIS TCD	DISREGARDED OTHER TRAFFIC CONTROL DEVICE
15	WRNG WAY	WRONG WAY ON ONE-WAY ROAD; WRONG SIDE DIVIDED RO
16	FATIGUE	DRIVER DROWSY/FATIGUED/SLEEPY
17	ILLNESS	PHYSICAL ILLNESS
18	IN RDWY	NON-MOTORIST ILLEGALLY IN ROADWAY
19	NT VISBL	NOT MOTORIST NOT VISIBLE; NON-REFLECTIVE CLOTHIN
20	IMP PKNG	VEHICLE IMPROPERLY PARKED
21	DEF STER	DEFECTIVE STEERING MECHANISM
22	DEF BRKE	INADEQUATE OR NO BRAKES
24	LOADSHFT	VEHICLE LOST LOAD OR LOAD SHIFTED
25	TIREFAIL	TIRE FAILURE
26	PHANTOM	PHANTOM / NON-CONTACT VEHICLE
27	INATTENT	INATTENTION
28	NM INATT	NON-MOTORIST INATTENTION
29	F AVOID	FAILED TO AVOID VEHICLE AHEAD
30	SPEED	DRIVING IN EXCESS OF POSTED SPEED
31	RACING	SPEED RACING (PER PAR)
32	CARELESS	CARELESS DRIVING (PER PAR)
33	RECKLESS	RECKLESS DRIVING (PER PAR)
34	AGGRESV	AGGRESSIVE DRIVING (PER PAR)
35	RD RAGE	ROAD RAGE (PER PAR)
40	VIEW OBS	VIEW OBSCURED
50	USED MDN	IMPROPER USE OF MEDIAN OR SHOULDER

COLLISION TYPE CODE TRANSLATION LIST

COLL CODE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OTH	MISCELLANEOUS
-	BACK	BACKING
0	PED	PEDESTRIAN
1	ANGL	ANGLE
2	HEAD	HEAD-ON
3	REAR	REAR-END
4	SS-M	SIDESWIPE - MEETING
5	SS-O	SIDESWIPE - OVERTAKING
6	TURN	TURNING MOVEMENT
7	PARK	PARKING MANEUVER
8	NCOL	NON-COLLISION
9	FIX	FIXED OBJECT OR OTHER OBJECT

CRASH TYPE CODE TRANSLATION LIST

CRASH TYPE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OVERTURN	OVERTURNED
0	NON-COLL	OTHER NON-COLLISION
1	OTH RDWY	MOTOR VEHICLE ON OTHER ROADWAY
2	PRKD MV	PARKED MOTOR VEHICLE
3	PED	PEDESTRIAN
4	TRAIN	RAILWAY TRAIN
6	BIKE	PEDALCYCLIST
7	ANIMAL	ANIMAL
8	FIX OBJ	FIXED OBJECT
9	OTH OBJ	OTHER OBJECT
A	ANGL-STP	ENTERING AT ANGLE - ONE VEHICLE STOPPED
B	ANGL-OTH	ENTERING AT ANGLE - ALL OTHERS
C	S-STRGHT	FROM SAME DIRECTION - BOTH GOING STRAIGHT
D	S-1TURN	FROM SAME DIRECTION - ONE TURN, ONE STRAIGHT
E	S-1STOP	FROM SAME DIRECTION - ONE STOPPED
F	S-OTHER	FROM SAME DIRECTION-ALL OTHERS, INCLUDING PARKING
G	O-STRGHT	FROM OPPOSITE DIRECTION - BOTH GOING STRAIGHT
H	O-1 L-TURN	FROM OPPOSITE DIRECTION-ONE LEFT TURN,ONE STRAIGHT
I	O-1STOP	FROM OPPOSITE DIRECTION - ONE STOPPED
J	O-OTHER	FROM OPPOSITE DIRECTION-ALL OTHERS INCL. PARKING

DRIVER LICENSE CODE TRANSLATION LIST

LIC CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NOT LICENSED (HAD NEVER BEEN LICENSED)
1	OR-Y	VALID OREGON LICENSE
2	OTH-Y	VALID LICENSE, OTHER STATE OR COUNTRY
3	SUSP	SUSPENDED/REVOKED

DRIVER RESIDENCE CODE TRANSLATION LIST

RES CODE	SHORT DESC	LONG DESCRIPTION
1	OR<25	OREGON RESIDENT WITHIN 25 MILE OF HOME
2	OR>25	OREGON RESIDENT 25 OR MORE MILES FROM HOME
3	OR-?	OREGON RESIDENT - UNKNOWN DISTANCE FROM HOME
4	N-RES	NON-RESIDENT
9	UNK	UNKNOWN IF OREGON RESIDENT

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
000	NONE	NO ERROR
001	WIDE TRN	WIDE TURN
002	CUT CORN	CUT CORNER ON TURN
003	FAIL TRN	FAILED TO OBEY MANDATORY TRAFFIC TURN SIGNAL, SIGN OR LANE MARKINGS
004	L IN TRF	LEFT TURN IN FRONT OF ONCOMING TRAFFIC
005	L PROHIB	LEFT TURN WHERE PROHIBITED
006	FRM WRNG	TURNED FROM WRONG LANE
007	TO WRONG	TURNED INTO WRONG LANE
008	ILLEG U	U-TURNED ILLEGALLY
009	IMP STOP	IMPROPERLY STOPPED IN TRAFFIC LANE
010	IMP SIG	IMPROPER SIGNAL OR FAILURE TO SIGNAL
011	IMP BACK	BACKING IMPROPERLY (NOT PARKING)
012	IMP PARK	IMPROPERLY PARKED
013	UNPARK	IMPROPER START LEAVING PARKED POSITION
014	IMP STRT	IMPROPER START FROM STOPPED POSITION
015	IMP LGHT	IMPROPER OR NO LIGHTS (VEHICLE IN TRAFFIC)
016	INATTENT	INATTENTION (FAILURE TO DIM LIGHTS PRIOR TO 4/1/97)
017	UNSF VEH	DRIVING UNSAFE VEHICLE (NO OTHER ERROR APPARENT)
018	OTH PARK	ENTERING/EXITING PARKED POSITION W/ INSUFFICIENT CLEARANCE; OTHER IMPROPER PARKING MANEUVER
019	DIS DRIV	DISREGARDED OTHER DRIVER'S SIGNAL
020	DIS SGNL	DISREGARDED TRAFFIC SIGNAL
021	RAN STOP	DISREGARDED STOP SIGN OR FLASHING RED
022	DIS SIGN	DISREGARDED WARNING SIGN, FLARES OR FLASHING AMBER
023	DIS OFCR	DISREGARDED POLICE OFFICER OR FLAGMAN
024	DIS EMER	DISREGARDED SIREN OR WARNING OF EMERGENCY VEHICLE
025	DIS RR	DISREGARDED RR SIGNAL, RR SIGN, OR RR FLAGMAN
026	REAR-END	FAILED TO AVOID STOPPED OR PARKED VEHICLE AHEAD OTHER THAN SCHOOL BUS
027	BIKE ROW	DID NOT HAVE RIGHT-OF-WAY OVER PEDALCYCLIST
028	NO ROW	DID NOT HAVE RIGHT-OF-WAY
029	PED ROW	FAILED TO YIELD RIGHT-OF-WAY TO PEDESTRIAN
030	PAS CURV	PASSING ON A CURVE
031	PAS WRNG	PASSING ON THE WRONG SIDE
032	PAS TANG	PASSING ON STRAIGHT ROAD UNDER UNSAFE CONDITIONS
033	PAS X-WK	PASSED VEHICLE STOPPED AT CROSSWALK FOR PEDESTRIAN
034	PAS INTR	PASSING AT INTERSECTION
035	PAS HILL	PASSING ON CREST OF HILL
036	N/PAS ZN	PASSING IN "NO PASSING" ZONE
037	PAS TRAF	PASSING IN FRONT OF ONCOMING TRAFFIC
038	CUT-IN	CUTTING IN (TWO LANES - TWO WAY ONLY)
039	WRNGSIDE	DRIVING ON WRONG SIDE OF THE ROAD (2-WAY UNDIVIDED ROADWAYS)
040	THRU MED	DRIVING THROUGH SAFETY ZONE OR OVER ISLAND
041	F/ST BUS	FAILED TO STOP FOR SCHOOL BUS

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
042	F/SLO MV	FAILED TO DECREASE SPEED FOR SLOWER MOVING VEHICLE
043	TOO CLOSE	FOLLOWING TOO CLOSELY (MUST BE ON OFFICER'S REPORT)
044	STRDL LN	STRADDLING OR DRIVING ON WRONG LANES
045	IMP CHG	IMPROPER CHANGE OF TRAFFIC LANES
046	WRNG WAY	WRONG WAY ON ONE-WAY ROADWAY; WRONG SIDE DIVIDED ROAD
047	BASCRULE	DRIVING TOO FAST FOR CONDITIONS (NOT EXCEEDING POSTED SPEED)
048	OPN DOOR	OPENED DOOR INTO ADJACENT TRAFFIC LANE
049	IMPEDING	IMPEDING TRAFFIC
050	SPEED	DRIVING IN EXCESS OF POSTED SPEED
051	RECKLESS	RECKLESS DRIVING (PER PAR)
052	CARELESS	CARELESS DRIVING (PER PAR)
053	RACING	SPEED RACING (PER PAR)
054	X N/SGNL	CROSSING AT INTERSECTION, NO TRAFFIC SIGNAL PRESENT
055	X W/SGNL	CROSSING AT INTERSECTION, TRAFFIC SIGNAL PRESENT
056	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
057	BTWN INT	CROSSING BETWEEN INTERSECTIONS
059	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
060	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
061	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
062	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
063	PLAYINRD	PLAYING IN STREET OR ROAD
064	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
065	WORK IN RD	WORKING IN ROADWAY OR ALONG SHOULDER
070	LAY ON RD	STANDING OR LYING IN ROADWAY
071	NM IMP USE	IMPROPER USE OF TRAFFIC LANE BY NON-MOTORIST
073	ELUDING	ELUDING / ATTEMPT TO ELUDE
079	F NEG CURV	FAILED TO NEGOTIATE A CURVE
080	FAIL LN	FAILED TO MAINTAIN LANE
081	OFF RD	RAN OFF ROAD
082	NO CLEAR	DRIVER MISJUDGED CLEARANCE
083	OVRSTEER	OVER-CORRECTING
084	NOT USED	CODE NOT IN USE
085	OVRLOAD	OVERLOADING OR IMPROPER LOADING OF VEHICLE WITH CARGO OR PASSENGERS
097	UNA DIS TC	UNABLE TO DETERMINE WHICH DRIVER DISREGARDED TRAFFIC CONTROL DEVICE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
001	FEL/JUMP	OCCUPANT FELL, JUMPED OR WAS EJECTED FROM MOVING VEHICLE
002	INTERFER	PASSENGER INTERFERED WITH DRIVER
003	BUG INTF	ANIMAL OR INSECT IN VEHICLE INTERFERED WITH DRIVER
004	INDRCT PED	PEDESTRIAN INDIRECTLY INVOLVED (NOT STRUCK)
005	SUB-PED	"SUB-PED": PEDESTRIAN INJURED SUBSEQUENT TO COLLISION, ETC.
006	INDRCT BIK	PEDALCYCLIST INDIRECTLY INVOLVED (NOT STRUCK)
007	HITCHIKR	HITCHHIKER (SOLICITING A RIDE)
008	PSNGR TOW	PASSENGER OR NON-MOTORIST BEING TOWED OR PUSHED ON CONVEYANCE
009	ON/OFF V	GETTING ON/OFF STOPPED/PARKED VEHICLE (OCCUPANTS ONLY; MUST HAVE PHYSICAL CONTACT W/ VEHI
010	SUB OTRN	OVERTURNED AFTER FIRST HARMFUL EVENT
011	MV PUSHD	VEHICLE BEING PUSHED
012	MV TOWED	VEHICLE TOWED OR HAD BEEN TOWING ANOTHER VEHICLE
013	FORCED	VEHICLE FORCED BY IMPACT INTO ANOTHER VEHICLE, PEDALCYCLIST OR PEDESTRIAN
014	SET MOTN	VEHICLE SET IN MOTION BY NON-DRIVER (CHILD RELEASED BRAKES, ETC.)
015	RR ROW	AT OR ON RAILROAD RIGHT-OF-WAY (NOT LIGHT RAIL)
016	LT RL ROW	AT OR ON LIGHT-RAIL RIGHT-OF-WAY
017	RR HIT V	TRAIN STRUCK VEHICLE
018	V HIT RR	VEHICLE STRUCK TRAIN
019	HIT RR CAR	VEHICLE STRUCK RAILROAD CAR ON ROADWAY
020	JACKNIFE	JACKKNIFE; TRAILER OR TOWED VEHICLE STRUCK TOWING VEHICLE
021	TRL OTRN	TRAILER OR TOWED VEHICLE OVERTURNED
022	CN BROKE	TRAILER CONNECTION BROKE
023	DETACH TRL	DETACHED TRAILING OBJECT STRUCK OTHER VEHICLE, NON-MOTORIST, OR OBJECT
024	V DOOR OPN	VEHICLE DOOR OPENED INTO ADJACENT TRAFFIC LANE
025	WHEELOFF	WHEEL CAME OFF
026	HOOD UP	HOOD FLEW UP
028	LOAD SHIFT	LOST LOAD, LOAD MOVED OR SHIFTED
029	TIREFAIL	TIRE FAILURE
030	PET	PET: CAT, DOG AND SIMILAR
031	LVSTOCK	STOCK: COW, CALF, BULL, STEER, SHEEP, ETC.
032	HORSE	HORSE, MULE, OR DONKEY
033	HRSE&RID	HORSE AND RIDER
034	GAME	WILD ANIMAL, GAME (INCLUDES BIRDS; NOT DEER OR ELK)
035	DEER ELK	DEER OR ELK, WAPITI
036	ANML VEH	ANIMAL-DRAWN VEHICLE
037	CULVERT	CULVERT, OPEN LOW OR HIGH MANHOLE
038	ATENUATN	IMPACT ATTENUATOR
039	PK METER	PARKING METER
040	CURB	CURB (ALSO NARROW SIDEWALKS ON BRIDGES)
041	JIGGLE	JIGGLE BAR OR TRAFFIC SNAKE FOR CHANNELIZATION
042	GDRL END	LEADING EDGE OF GUARDRAIL
043	GARDRAIL	GUARD RAIL (NOT METAL MEDIAN BARRIER)
044	BARRIER	MEDIAN BARRIER (RAISED OR METAL)
045	WALL	RETAINING WALL OR TUNNEL WALL
046	BR RAIL	BRIDGE RAILING OR PARAPET (ON BRIDGE OR APPROACH)
047	BR ABUTMNT	BRIDGE ABUTMENT (INCLUDED "APPROACH END" THRU 2013)
048	BR COLMN	BRIDGE PILLAR OR COLUMN
049	BR GIRDR	BRIDGE GIRDER (HORIZONTAL BRIDGE STRUCTURE OVERHEAD)
050	ISLAND	TRAFFIC RAISED ISLAND
051	GORE	GORE
052	POLE UNK	POLE - TYPE UNKNOWN
053	POLE UTL	POLE - POWER OR TELEPHONE
054	ST LIGHT	POLE - STREET LIGHT ONLY
055	TRF SGNL	POLE - TRAFFIC SIGNAL AND PED SIGNAL ONLY
056	SGN BRDG	POLE - SIGN BRIDGE
057	STOPSIGN	STOP OR YIELD SIGN
058	OTH SIGN	OTHER SIGN, INCLUDING STREET SIGNS
059	HYDRANT	HYDRANT

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
060	MARKER	DELINEATOR OR MARKER (REFLECTOR POSTS)
061	MAILBOX	MAILBOX
062	TREE	TREE, STUMP OR SHRUBS
063	VEG OHED	TREE BRANCH OR OTHER VEGETATION OVERHEAD, ETC.
064	WIRE/CBL	WIRE OR CABLE ACROSS OR OVER THE ROAD
065	TEMP SGN	TEMPORARY SIGN OR BARRICADE IN ROAD, ETC.
066	PERM SGN	PERMANENT SIGN OR BARRICADE IN/OFF ROAD
067	SLIDE	SLIDES, FALLEN OR FALLING ROCKS
068	FRGN OBJ	FOREIGN OBSTRUCTION/DEBRIS IN ROAD (NOT GRAVEL)
069	EQP WORK	EQUIPMENT WORKING IN/OFF ROAD
070	OTH EQP	OTHER EQUIPMENT IN OR OFF ROAD (INCLUDES PARKED TRAILER, BOAT)
071	MAIN EQP	WRECKER, STREET SWEEPER, SNOW PLOW OR SANDING EQUIPMENT
072	OTHER WALL	ROCK, BRICK OR OTHER SOLID WALL
073	IRRGL PVMT	OTHER BUMP (NOT SPEED BUMP), POTHOLE OR PAVEMENT IRREGULARITY (PER PAR)
074	OVERHD OBJ	OTHER OVERHEAD OBJECT (HIGHWAY SIGN, SIGNAL HEAD, ETC.); NOT BRIDGE
075	CAVE IN	BRIDGE OR ROAD CAVE IN
076	HI WATER	HIGH WATER
077	SNO BANK	SNOW BANK
078	LO-HI EDGE	LOW OR HIGH SHOULDER AT PAVEMENT EDGE
079	DITCH	CUT SLOPE OR DITCH EMBANKMENT
080	OBJ FRM MV	STRUCK BY ROCK OR OTHER OBJECT SET IN MOTION BY OTHER VEHICLE (INCL. LOST LOADS)
081	FLY-OBJ	STRUCK BY ROCK OR OTHER MOVING OR FLYING OBJECT (NOT SET IN MOTION BY VEHICLE)
082	VEH HID	VEHICLE OBSCURED VIEW
083	VEG HID	VEGETATION OBSCURED VIEW
084	BLDG HID	VIEW OBSCURED BY FENCE, SIGN, PHONE BOOTH, ETC.
085	WIND GUST	WIND GUST
086	IMMERSED	VEHICLE IMMERSED IN BODY OF WATER
087	FIRE/EXP	FIRE OR EXPLOSION
088	FENC/BLD	FENCE OR BUILDING, ETC.
089	OTHR CRASH	CRASH RELATED TO ANOTHER SEPARATE CRASH
090	TO 1 SIDE	TWO-WAY TRAFFIC ON DIVIDED ROADWAY ALL ROUTED TO ONE SIDE
091	BUILDING	BUILDING OR OTHER STRUCTURE
092	PHANTOM	OTHER (PHANTOM) NON-CONTACT VEHICLE
093	CELL PHONE	CELL PHONE (ON PAR OR DRIVER IN USE)
094	VIOL GDL	TEENAGE DRIVER IN VIOLATION OF GRADUATED LICENSE PGM
095	GUY WIRE	GUY WIRE
096	BERM	BERM (EARTHEN OR GRAVEL MOUND)
097	GRAVEL	GRAVEL IN ROADWAY
098	ABR EDGE	ABRUPT EDGE
099	CELL WTNSD	CELL PHONE USE WITNESSED BY OTHER PARTICIPANT
100	UNK FIXD	FIXED OBJECT, UNKNOWN TYPE.
101	OTHER OBJ	NON-FIXED OBJECT, OTHER OR UNKNOWN TYPE
102	TEXTING	TEXTING
103	WZ WORKER	WORK ZONE WORKER
104	ON VEHICLE	PASSENGER RIDING ON VEHICLE EXTERIOR
105	PEDAL PSGR	PASSENGER RIDING ON PEDALCYCLE
106	MAN WHLCHR	PEDESTRIAN IN NON-MOTORIZED WHEELCHAIR
107	MTR WHLCHR	PEDESTRIAN IN MOTORIZED WHEELCHAIR
108	OFFICER	LAW ENFORCEMENT / POLICE OFFICER
109	SUB-BIKE	"SUB-BIKE": PEDALCYCLIST INJURED SUBSEQUENT TO COLLISION, ETC.
110	N-MTR	NON-MOTORIST STRUCK VEHICLE
111	S CAR VS V	STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM) STRUCK VEHICLE
112	V VS S CAR	VEHICLE STRUCK STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM)
113	S CAR ROW	AT OR ON STREET CAR OR TROLLEY RIGHT-OF-WAY
114	RR EQUIP	VEHICLE STRUCK RAILROAD EQUIPMENT (NOT TRAIN) ON TRACKS
115	DSTRCT GPS	DISTRACTED BY NAVIGATION SYSTEM OR GPS DEVICE
116	DSTRCT OTH	DISTRACTED BY OTHER ELECTRONIC DEVICE
117	RR GATE	RAIL CROSSING DROP-ARM GATE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
118	EXPNSN JNT	EXPANSION JOINT
119	JERSEY BAR	JERSEY BARRIER
120	WIRE BAR	WIRE OR CABLE MEDIAN BARRIER
121	FENCE	FENCE
123	OBJ IN VEH	LOOSE OBJECT IN VEHICLE STRUCK OCCUPANT
124	SLIPPERY	SLIDING OR SWERVING DUE TO WET, ICY, SLIPPERY OR LOOSE SURFACE (NOT GRAVEL)
125	SHLDR	SHOULDER GAVE WAY
126	BOULDER	ROCK(S), BOULDER (NOT GRAVEL; NOT ROCK SLIDE)
127	LAND SLIDE	ROCK SLIDE OR LAND SLIDE
128	CURVE INV	CURVE PRESENT AT CRASH LOCATION
129	HILL INV	VERTICAL GRADE / HILL PRESENT AT CRASH LOCATION
130	CURVE HID	VIEW OBSCURED BY CURVE
131	HILL HID	VIEW OBSCURED BY VERTICAL GRADE / HILL
132	WINDOW HID	VIEW OBSCURED BY VEHICLE WINDOW CONDITIONS
133	SPRAY HID	VIEW OBSCURED BY WATER SPRAY

FUNCTIONAL CLASSIFICATION TRANSLATION LIST

FUNC CLASS	DESCRIPTION
01	RURAL PRINCIPAL ARTERIAL - INTERSTATE
02	RURAL PRINCIPAL ARTERIAL - OTHER
06	RURAL MINOR ARTERIAL
07	RURAL MAJOR COLLECTOR
08	RURAL MINOR COLLECTOR
09	RURAL LOCAL
11	URBAN PRINCIPAL ARTERIAL - INTERSTATE
12	URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXP
14	URBAN PRINCIPAL ARTERIAL - OTHER
16	URBAN MINOR ARTERIAL
17	URBAN MAJOR COLLECTOR
18	URBAN MINOR COLLECTOR
19	URBAN LOCAL
78	UNKNOWN RURAL SYSTEM
79	UNKNOWN RURAL NON-SYSTEM
98	UNKNOWN URBAN SYSTEM
99	UNKNOWN URBAN NON-SYSTEM

INJURY SEVERITY CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
1	KILL	FATAL INJURY
2	INJA	INCAPACITATING INJURY - BLEEDING, BROKEN BONES
3	INJB	NON-INCAPACITATING INJURY
4	INJC	POSSIBLE INJURY - COMPLAINT OF PAIN
5	PRI	DIED PRIOR TO CRASH
7	NO<5	NO INJURY - 0 TO 4 YEARS OF AGE

MEDIAN TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NO MEDIAN
1	RSDMD	SOLID MEDIAN BARRIER
2	DIVMD	EARTH, GRASS OR PAVED MEDIAN

HIGHWAY COMPONENT TRANSLATION LIST

CODE	DESCRIPTION
0	MAINLINE STATE HIGHWAY
1	COUPLET
3	FRONTAGE ROAD
6	CONNECTION
8	HIGHWAY - OTHER

LIGHT CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	DAY	DAYLIGHT
2	DLIT	DARKNESS - WITH STREET LIGHTS
3	DARK	DARKNESS - NO STREET LIGHTS
4	DAWN	DAWN (TWILIGHT)
5	DUSK	DUSK (TWILIGHT)

MILEAGE TYPE CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
0	REGULAR MILEAGE
T	TEMPORARY
Y	SPUR
Z	OVERLAPPING

MOVEMENT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	STRGHT	STRAIGHT AHEAD
2	TURN-R	TURNING RIGHT
3	TURN-L	TURNING LEFT
4	U-TURN	MAKING A U-TURN
5	BACK	BACKING
6	STOP	STOPPED IN TRAFFIC
7	PRKD-P	PARKED - PROPERLY
8	PRKD-I	PARKED - IMPROPERLY

PEDESTRIAN LOCATION CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
00	AT INTERSECTION - NOT IN ROADWAY
01	AT INTERSECTION - INSIDE CROSSWALK
02	AT INTERSECTION - IN ROADWAY, OUTSIDE CROSSWALK
03	AT INTERSECTION - IN ROADWAY, XWALK AVAIL UNKNWN
04	NOT AT INTERSECTION - IN ROADWAY
05	NOT AT INTERSECTION - ON SHOULDER
06	NOT AT INTERSECTION - ON MEDIAN
07	NOT AT INTERSECTION - WITHIN TRAFFIC RIGHT-OF-WAY
08	NOT AT INTERSECTION - IN BIKE PATH OR PARKING LANE
09	NOT-AT INTERSECTION - ON SIDEWALK
10	OUTSIDE TRAFFICWAY BOUNDARIES
13	AT INTERSECTION - IN BIKE LANE
14	NOT AT INTERSECTION - IN BIKE LANE
15	NOT AT INTERSECTION - INSIDE MID-BLOCK CROSSWALK
16	NOT AT INTERSECTION - IN PARKING LANE

ROAD CHARACTER CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	INTER	INTERSECTION
2	ALLEY	DRIVEWAY OR ALLEY
3	STRGHT	STRAIGHT ROADWAY
4	TRANS	TRANSITION
5	CURVE	CURVE (HORIZONTAL CURVE)
6	OPENAC	OPEN ACCESS OR TURNOUT
7	GRADE	GRADE (VERTICAL CURVE)
8	BRIDGE	BRIDGE STRUCTURE
9	TUNNEL	TUNNEL

PARTICIPANT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	OCC	UNKNOWN OCCUPANT TYPE
1	DRVR	DRIVER
2	PSNG	PASSENGER
3	PED	PEDESTRIAN
4	CONV	PEDESTRIAN USING A PEDESTRIAN CONVEYA
5	PTOW	PEDESTRIAN TOWING OR TRAILERING AN OB
6	BIKE	PEDALCYCLIST
7	BTOW	PEDALCYCLIST TOWING OR TRAILERING AN
8	PRKD	OCCUPANT OF A PARKED MOTOR VEHICLE
9	UNK	UNKNOWN TYPE OF NON-MOTORIST

TRAFFIC CONTROL DEVICE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
000	NONE	NO CONTROL
001	TRF SIGNAL	TRAFFIC SIGNALS
002	FLASHBCN-R	FLASHING BEACON - RED (STOP)
003	FLASHBCN-A	FLASHING BEACON - AMBER (SLOW)
004	STOP SIGN	STOP SIGN
005	SLOW SIGN	SLOW SIGN
006	REG-SIGN	REGULATORY SIGN
007	YIELD	YIELD SIGN
008	WARNING	WARNING SIGN
009	CURVE	CURVE SIGN
010	SCHL X-ING	SCHOOL CROSSING SIGN OR SPECIAL SIGNAL
011	OFCR/FLAG	POLICE OFFICER, FLAGMAN - SCHOOL PATROL
012	BRDG-GATE	BRIDGE GATE - BARRIER
013	TEMP-BARR	TEMPORARY BARRIER
014	NO-PASS-ZN	NO PASSING ZONE
015	ONE-WAY	ONE-WAY STREET
016	CHANNEL	CHANNELIZATION
017	MEDIAN BAR	MEDIAN BARRIER
018	PILOT CAR	PILOT CAR
019	SP PED SIG	SPECIAL PEDESTRIAN SIGNAL
020	X-BUCK	CROSSBUCK
021	THR-GN-SIG	THROUGH GREEN ARROW OR SIGNAL
022	L-GRN-SIG	LEFT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
023	R-GRN-SIG	RIGHT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
024	WIGWAG	WIGWAG OR FLASHING LIGHTS W/O DROP-ARM GATE
025	X-BUCK WRN	CROSSBUCK AND ADVANCE WARNING
026	WW W/ GATE	FLASHING LIGHTS WITH DROP-ARM GATES
027	OVRHD SGNL	SUPPLEMENTAL OVERHEAD SIGNAL (RR XING ONLY)
028	SP RR STOP	SPECIAL RR STOP SIGN
029	ILUM GRD X	ILLUMINATED GRADE CROSSING
037	RAMP METER	METERED RAMPS
038	RUMBLE STR	RUMBLE STRIP
090	L-TURN REF	LEFT TURN REFUGE (WHEN REFUGE IS INVOLVED)
091	R-TURN ALL	RIGHT TURN AT ALL TIMES SIGN, ETC.
092	EMR SGN/FL	EMERGENCY SIGNS OR FLARES
093	ACCEL LANE	ACCELERATION OR DECELERATION LANES
094	R-TURN PRO	RIGHT TURN PROHIBITED ON RED AFTER STOPPING

VEHICLE TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
01	PSNGR CAR	PASSENGER CAR, PICKUP, LIGHT DELIVERY, ETC.
02	BOBTAIL	TRUCK TRACTOR WITH NO TRAILERS (BOBTAIL)
03	FARM TRCTR	FARM TRACTOR OR SELF-PROPELLED FARM EQUIPMENT
04	SEMI TOW	TRUCK TRACTOR WITH TRAILER/MOBILE HOME IN TOW
05	TRUCK	TRUCK WITH NON-DETACHABLE BED, PANEL, ETC.
06	MOPED	MOPED, MINIBIKE, SEATED MOTOR SCOOTER, MOTOR BIKE
07	SCHL BUS	SCHOOL BUS (INCLUDES VAN)
08	OTH BUS	OTHER BUS
09	MTRCYCLE	MOTORCYCLE, DIRT BIKE
10	OTHER	OTHER: FORKLIFT, BACKHOE, ETC.
11	MOTRHOME	MOTORHOME
12	TROLLEY	MOTORIZED STREET CAR/TROLLEY (NO RAILS/WIRES)
13	ATV	ATV
14	MTRSCTR	MOTORIZED SCOOTER (STANDING)
15	SNOWMOBILE	SNOWMOBILE
99	UNKNOWN	UNKNOWN VEHICLE TYPE

095	BUS STPSGN	BUS STOP SIGN AND RED LIGHTS
099	UNKNOWN	UNKNOWN OR NOT DEFINITE

WEATHER CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	CLR	CLEAR
2	CLD	CLOUDY
3	RAIN	RAIN
4	SLT	SLEET
5	FOG	FOG
6	SNOW	SNOW
7	DUST	DUST
8	SMOK	SMOKE
9	ASH	ASH

APPENDIX F TECH MEMO #6: NEEDS ANALYSIS

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

Date:	May 5, 2017	Project #: 19890.3
To:	Jim Whynot and Jacque Betz, City of Gladstone Gail Curtis, Oregon Department of Transportation, Region 1	
From:	Matt Bell and Molly McCormick, Kittelson and Associates, Inc.	
Project:	Gladstone Transportation System Plan (TSP) Update	
Subject:	Final Tech Memo 6: Needs Analysis (Subtask 3.2)	

This memorandum documents the existing and future transportation system needs within the city of Gladstone. The information presented in this memorandum builds upon the gaps and deficiencies identified in *Tech Memo 5: Existing Gaps and Deficiencies* and provides the technical analysis needed to support the development of potential solutions that will be identified in *Tech Memo 8: TSP Solutions* This information is intended to inform the development of the city's 2017 Transportation System Plan (TSP) update which will address existing transportation system needs and additional facilities that are required to serve future growth. *Attachment "A" contains a menu of potential solutions that can be used to address many of these needs identified in this memo.*

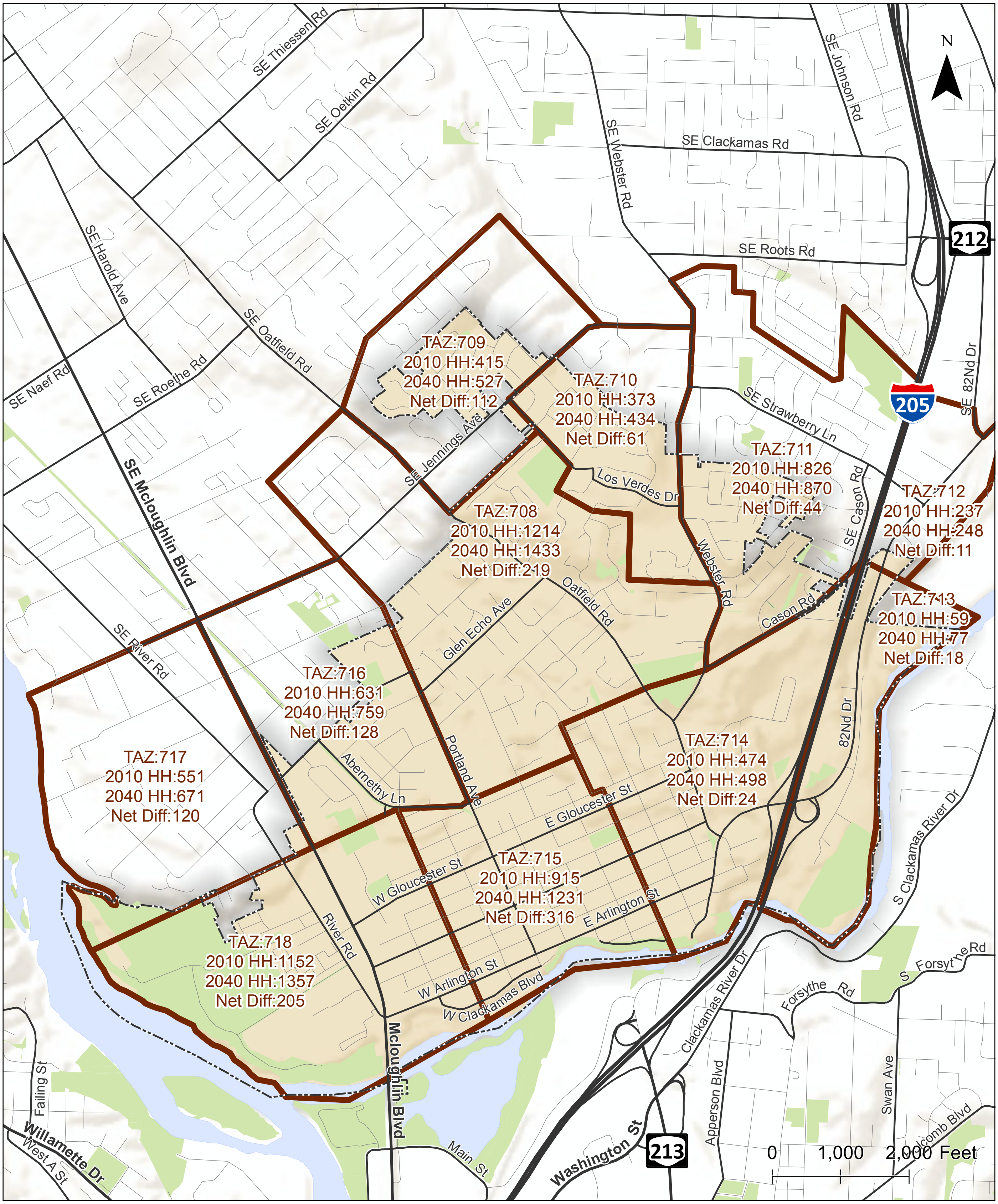
PROJECTED LAND USES

Land use plays an important role in developing a comprehensive transportation system. The amount of land that is planned to be developed, the type of land uses, and how the land uses are mixed together have a direct impact on how the transportation system will be used in the future. Understanding land use is critical to taking actions to maintain or enhance the transportation system.

Land use data for Gladstone was provided by Metro. The data includes base year 2010 and forecast year 2040 population, household, and employment estimates for the city by Transportation Analysis Zone (TAZ). There are 11 TAZs that cover the city limits of Gladstone. Figures 1 and 2 illustrate the TAZs and the household and employment changes expected between base year 2010 and forecast year 2040. Table 1 summarizes the TAZ data for base year 2010 and forecast year 2040 conditions. As shown in Table 1, the growth in population and households over the 30 year period is expected to be less than 1% per year while the growth in employment is expected to be more than 2% per year.

Table 1: Gladstone Land Use Summary

Land Use	2010	2040	Change	Percent Change
Population	16,006	18,691	+2,685	+16.8%
Households	6,847	8,105	+1,258	+18.4%
Employment	3,062	4,912	+1,850	+60.4%



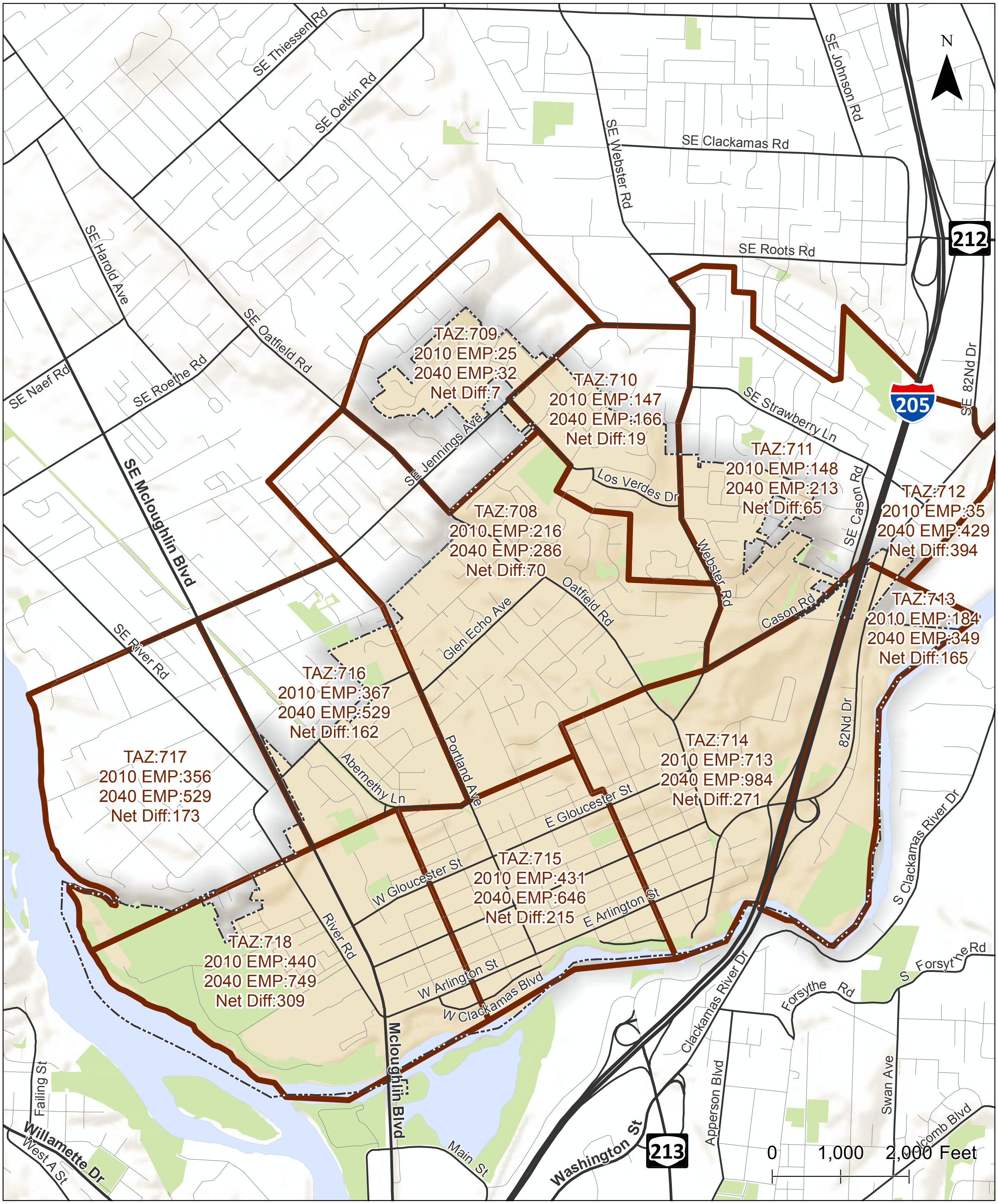
Net Difference in Households by TAZ (2010 to 2040)
Gladstone, Oregon

Figure
1

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\01 TAZ Households.mxd - mbell - 3:58 PM 5/5/2017

KITTELSON & ASSOCIATES

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



Net Difference in Employment by TAZ (2010 to 2040)
Gladstone, Oregon

Figure
2

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\02 TAZ Employment.mxd - mbell - 3:59 PM 5/5/2017

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

As land uses change in proportion to each other (i.e. there is a significant increase in employment relative to household growth), there will be a shift in the overall operation of the transportation system. Retail land uses generate a higher number of trips per acre of land than residential and other land uses. The location and design of retail land uses in a community can greatly affect transportation system operation. Additionally, if a community is homogeneous in land use character (i.e. all employment or all residential), the transportation system must support significant trips coming to or from the community rather than within the community. Typically, there should be a mix of residential, commercial, and employment type land uses so that some residents may work and shop locally, reducing the need for residents to travel long distances. The data shown in Table 1 indicates that significant growth is expected in Gladstone in the coming years, particularly employment opportunities. The transportation system should be monitored to make sure that land uses in the plan are balanced with transportation system capacity.

PUBLIC TRANSIT SYSTEM NEEDS

Transit Level-of-Service Analysis

A transit level-of-service analysis was conducted in accordance with the methodology described in *TCRP Report 100: Transit Capacity and Quality of Service Manual* (TCQSM). Chapter 3 of the TCQSM provides an extended discussion on quality of service, which is the evaluation of transit service from the passenger's point-of-view. The TCQSM uses six measures to quantify service quality. Each of these measures is assigned a letter value, where LOS A represents the best service from the passenger perspective and LOS F represents the worst service. *(Note that high LOS values, such as LOS A or B, may not reflect optimal service from the transit agency's perspective, because the market may not support those service levels. The development of agency service standards helps to bridge the gap between the kind of service passengers would ideally want and the kind of service that is reasonable to provide, given available resources.)* The transit LOS approach mirrors the system commonly used for streets and highways, and allows a speedy comparison of service performance to transit passenger desires.

Of the six available measures, three were selected for this analysis as being most relevant to a long-range planning effort. Table 2 summarizes the TCQSM measures used and the ranges of values used to determine the LOS result for each measure.

Table 2: Transit Capacity and Quality of Service Manual - Level of Service (LOS) Measures

Level of Service	Transit Capacity and Quality of Service Measures		
	Service Frequency (minutes)	Hours of Service	Service Coverage
LOS A	<10	19-24	90.0-100.0%
LOS B	10-14	17-18	80.0-89.9%
LOS C	15-20	14-16	70.0-79.9%
LOS D	21-30	12-13	60.0-69.9%
LOS E	31-60	4-11	50.0-59.9%
LOS F	>60	0-3	<50.0%

Service Frequency

From the user's perspective, *service frequency* determines how many times an hour a user has access to transit service, assuming that service is provided within acceptable walking distance (measured by *service coverage*) and at the times the user wishes to travel (measured by *hours of service*). Service frequency also measures the convenience of transit service to riders and is one component of overall transit trip time (helping to determine the wait time at a stop). Table 3 summarizes the transit level-of-service analysis results for service frequency.

Table 3: Service Frequency Level-of-Service Analysis

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

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

As shown in Table 3, Lines 33 and 99 operate at LOS C during the morning and evening peak periods and at LOS D during off-peak periods while Lines 32 and 79 operate at LOS D during the morning and evening peak periods and at LOS E during off peak periods. At LOS C, service frequencies provide a reasonable choice of travel times, but the wait involved if a bus is missed becomes long. At LOS D, service is only available about twice per hour and requires passengers to adjust their routines to fit the transit service provided. At LOS E, service is provided approximately once per hour and puts passengers in the position of potentially spending long periods of time waiting for service and/or rearranging schedules to be able to take transit.

This type of service (frequent peak hour service with less frequent off-peak service) is typical of smaller communities, particularly those with relatively low household densities. Per the TCQSM, areas with densities of 3-6 households per acre (hh/acre) typically have 1-hour service while areas with 6-8 hh/acre have 30-minute service, areas with 8-12 hh/acre have 15-minute service, and areas with 12+ hh/acre have 10-minute service. As indicated below, most areas within Gladstone have less than 6 hh/acre with the exception of the area in the southern part of the city. Household density in this area is currently 8-10 hh/acre and is projected to be more than 10 hh/acre in the future.

Hours of Service

Hours of service, also known as "service span," is the number of hours during the day when transit service is provided along a route, a segment of a route, or between two locations. It plays as important a role as *frequency* and *service coverage* in determining the availability of transit service to potential users: if transit service is not provided at the time of day a potential passenger needs to take a trip, it does not matter where or how often transit service is provided the rest of the day. Table 4 summarizes the transit level-of-service analysis results for hours of service.

Table 4: Hours of Service Level-of-Service Analysis

Provider	Routes	Hours of Service	LOS
TriMet	Line 32	17 hours[1]	B
	Line 33	21 hours[1]	A
	Line 34	14 hours[2]	C
	Line 79	17 hours[1]	B
	Line 99	7 hours[2]	E

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

As shown in Table 4, Line 32 operates at LOS A and Lines 31 and 79 operate at LOS B, while Line 34 operates at LOS C. At LOS A, service is available for most or all of the day. Workers who do not work traditional 8-to-5 jobs receive service and all riders are assured that they will not be stranded until the next morning if a late-evening bus is missed. At LOS B, service is available late into the evening, which allows a range of trip purposes other than commute trips to be served. At LOS C, service runs only into the early evening, but still provides some flexibility in one's choice of time for the trip home. Also shown in Table 4, Line 99 operates at LOS E. At LOS E, midday service is limited or non-existent and/or commuters have a limited choice of travel times.

Service Coverage

Service Coverage is a measure of the area within walking distance of transit service. Areas must be within 1/4-mile of a bus stop (or service route if there are no designated stops) or 1/2 mile of a transit station to be considered an area served by transit. As with the other availability measures, service coverage does not provide a complete picture of transit availability by itself, but when combined with frequency and hours of service, it helps identify the number of opportunities people have to access transit from different locations. Service coverage LOS evaluates the percentage of transit-supportive areas—areas that would typically produce the majority of a system's ridership—that are served by transit.

To qualify as a transit-supportive area (TSA) one of the following thresholds must be met:

- Minimum population density of 3 households/gross acre; or
- Minimum job density of 4 employees/gross acre.

Service coverage is an all-or-nothing issue for transit riders—either service is available for a particular trip or it is not. As a result, there is no direct correlation between service coverage LOS and what a passenger would experience for a given trip. Rather, service coverage LOS reflects the number of potential trip origins and destinations available to potential passengers. As noted in Table 2, at LOS A, 90 percent or more of the TSA's have transit service; at LOS F, less than half of the TSA's have service.

Figure 3 displays the existing transit level-of-service analysis results for service coverage in Gladstone. Areas defined as transit supportive that have service are shown in green. Areas defined as transit supportive but lacking service are shown in red. Areas that have transit service, but do not qualify as a TSA, are shown in orange. A majority of the areas shown in red would require additional transit routes or the development of new pathway connections (increasing the area that is within ¼ mile walking distance) to existing transit routes to be served.

The percentage of TSAs served and the corresponding level of service has been identified using the Transit Level of Service (TLOS) methodology. As shown in Table 5, the percent of transit supportive population areas served is 82 percent and the percent of transit supportive employment areas served is also 82 percent. The corresponding LOS is B.

Table 5: Existing Transit Service Coverage Analysis

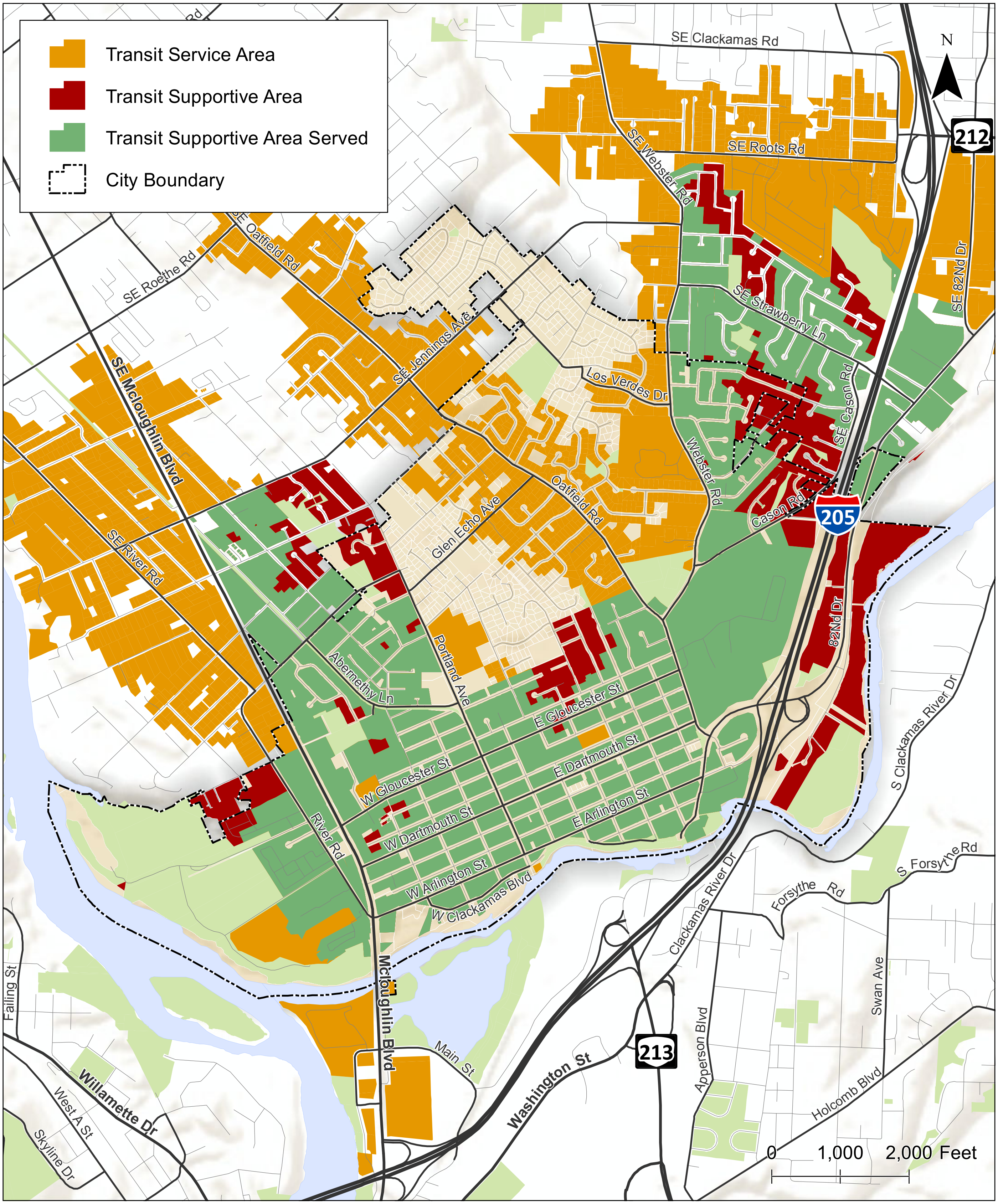
Area Type	Households	Employment
Transit Supportive Areas (TSA)[1]	2,533	1,372
Transit Supportive Areas Served[2]	2,072	1,123
Percent TSA Served by Transit	82%	82%
Level of Service	LOS B	LOS B
Transit Supportive Areas without service	461	249
Total Transit Area Served[3]	3,083	1,441
Additional Areas Served by Transit	1,011	318

1. Area shown in Green and red in Figure 3.
2. Area shown in Green in Figure 3.
3. Area shown in Green and orange in Figure 3.

As shown above, 461 households and 249 jobs are located within TSAs that do not have transit service. These areas currently have a population and/or employment density that can support transit service and therefore should be included in future efforts to improve service routes and stop locations. Also shown above, 3,083 households and 1,441 jobs are currently served by transit. Of the total area served, 1,011 households and 318 jobs are located within areas that have transit service, but currently do not have the population and/or job density necessary to economically support transit service. A few of these areas, however, are shown in Figure 3 as containing a large portion of the transportation disadvantaged population in Gladstone and therefore the service provided in these areas is an important consideration.

Future Transit Service Coverage

The future transit level-of-service analysis assumes that existing service frequencies, service hours, and service coverage is the same in the future. The only difference is the population and employment growth assumptions included in the regional traffic model and the resulting transit supportive areas. Figure 4 displays the TLOS analysis results for future transit service coverage. As shown, the number of transit supportive areas is expected to increase. While many of these areas are expected to be served by existing transit services, the remaining areas will require additional service routes or connections to existing routes in order to be served.



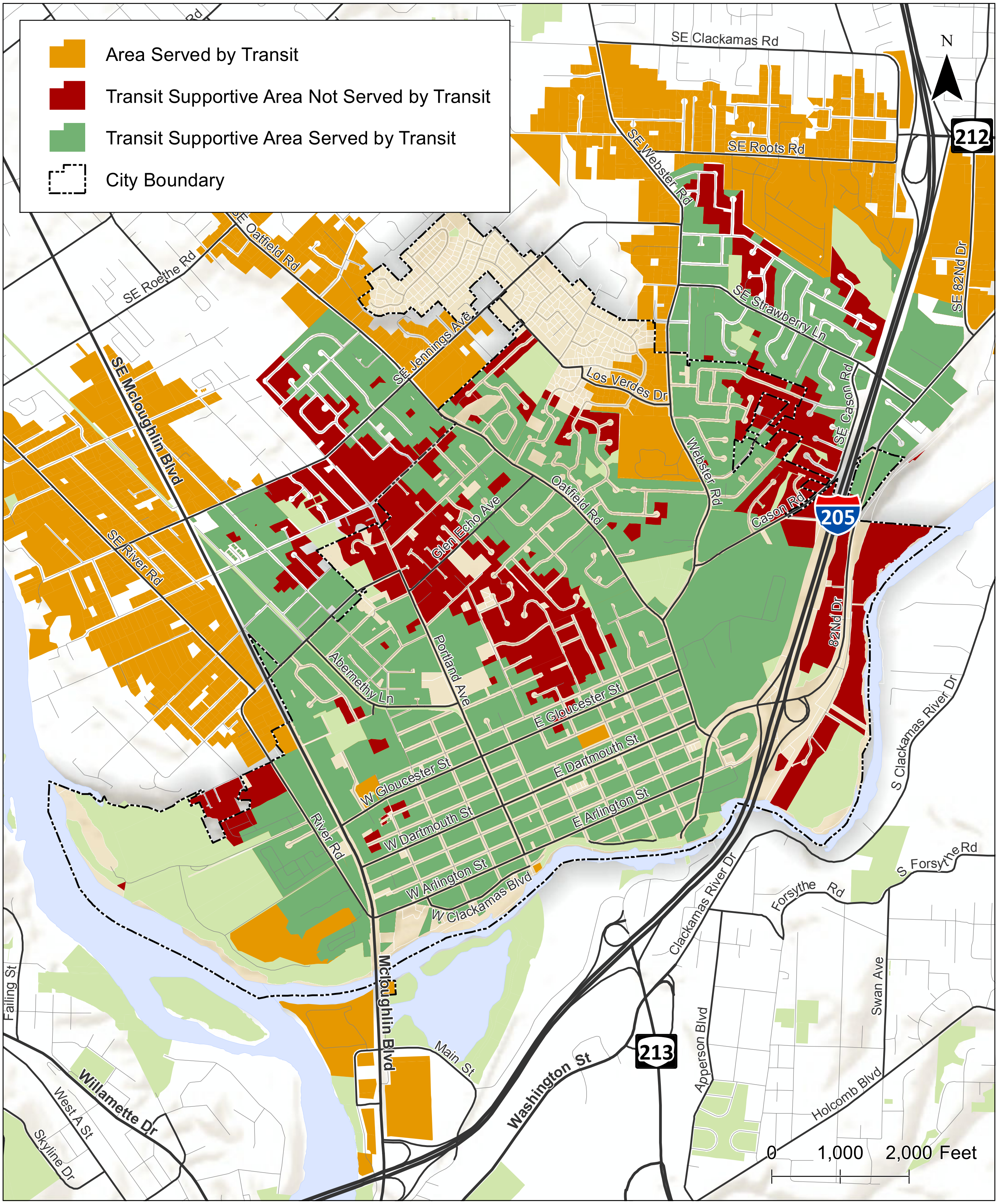
Existing Transit Supportive Areas
Gladstone, Oregon

Figure
3

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\03 Existing TSA.mxd - mbell - 3:59 PM 5/5/2017

KITTELSON & ASSOCIATES

*Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl\
Portland Metro Data Resource Center*



Transit Supportive Areas have population and employment densities sufficient to support a basic level of public transit service

Future Transit Supportive Areas
Gladstone, Oregon

Figure
4

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\04 Future TSA.mxd - mbell - 3:59 PM 5/5/2017

KITTELSON & ASSOCIATES

*Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl\
Portland Metro Data Resource Center*

System Connectivity

The TLOS analysis described above indicates that transit service coverage is relatively high within the city, meaning that most people have access to public transit. However, there are a few areas where additional fixed-route service could be provided to improve access to transit as well as areas where existing service frequencies and hours of service could be increased to make public transit a more viable option for commuting.

Fixed-Routes

The areas shown in red in Figures 3 and 4 represent areas that support transit service under existing and/or future conditions but lack existing service. These areas could be served by providing new service or re-routing existing service along streets that currently do not provide transit service. The following provides a summary of the streets where transit service could be provided to address the need in these areas:

- Portland Avenue from Abernathy Lane to Jennings Avenue – Portland Avenue currently does not connect to Jennings Avenue
- Jennings Avenue from OR 99E to Oatfield Road
- Carson Road from Webster Road to Strawberry Lane
- 82nd Drive from Oatfield Road to the north city limits

Service along these streets would increase service coverage within the areas that currently support transit service, as well as the areas that are projected to support transit service in the future. Other fixed-route service needs identified by committee members and the general public include:

- Express service north on 82nd Drive
- Extended hours of service for Line 79
- Convert Line 79 to an express service “Freeway Flyer” to the Clackamas Town Center Transit Center and the MAX Green Line
- Direct service to the Portland City Center (no transfers)
- Fixed-route service along Portland Avenue (formerly served by Line 33)

Transit Stops

Amenities at transit stops, such as bus benches and bus shelters enhance a transit system and make it more user-friendly. Steps that can make this mode as comfortable and accommodating as possible may help encourage ridership. TriMet generally limits placement of bus shelters to locations with 35 or more weekday boardings. Ridership data was obtained from TriMet that reflects the average number of boardings and alightings (ons and offs) that occurred at each stop in Spring 2016. Based on a review of the data, Gladstone has six stops that meet this threshold, of which four currently do not have shelters. These stops include:

- Bus stop ID: 10323, SE McLoughlin Boulevard/Glen Echo Avenue,
- Bus stop ID: 10324, SE McLoughlin Boulevard/Gloucester Street,
- Bus stop ID: 10325, SE McLoughlin Boulevard/River Road, and
- Bus stop ID: 10327, SE McLoughlin Boulevard/Gloucester Street.

Due to low ridership levels at other stops, the City may need to directly fund the installation of bus benches, bus shelters and other amenities. Other potential amenities identified by committee members and the general public include:

- Improved signage and other amenities at transit stops

Park-and-Rides

Park-and-ride facilities provide parking for people who wish to transfer from their personal vehicle to public transportation or carpools/vanpools. Park-and-rides are frequently located near major intersections, at commercial centers, or on express and commuter bus routes. It is Oregon state policy to encourage the development and use of park-and-ride facilities at appropriate urban and rural locations adjacent to or within the highway right-of-way. Park-and-ride facilities can provide an efficient method to enhance access to transit service to and from low density areas, connecting people to jobs, and provide an alternate mode to complete long-distance commutes.

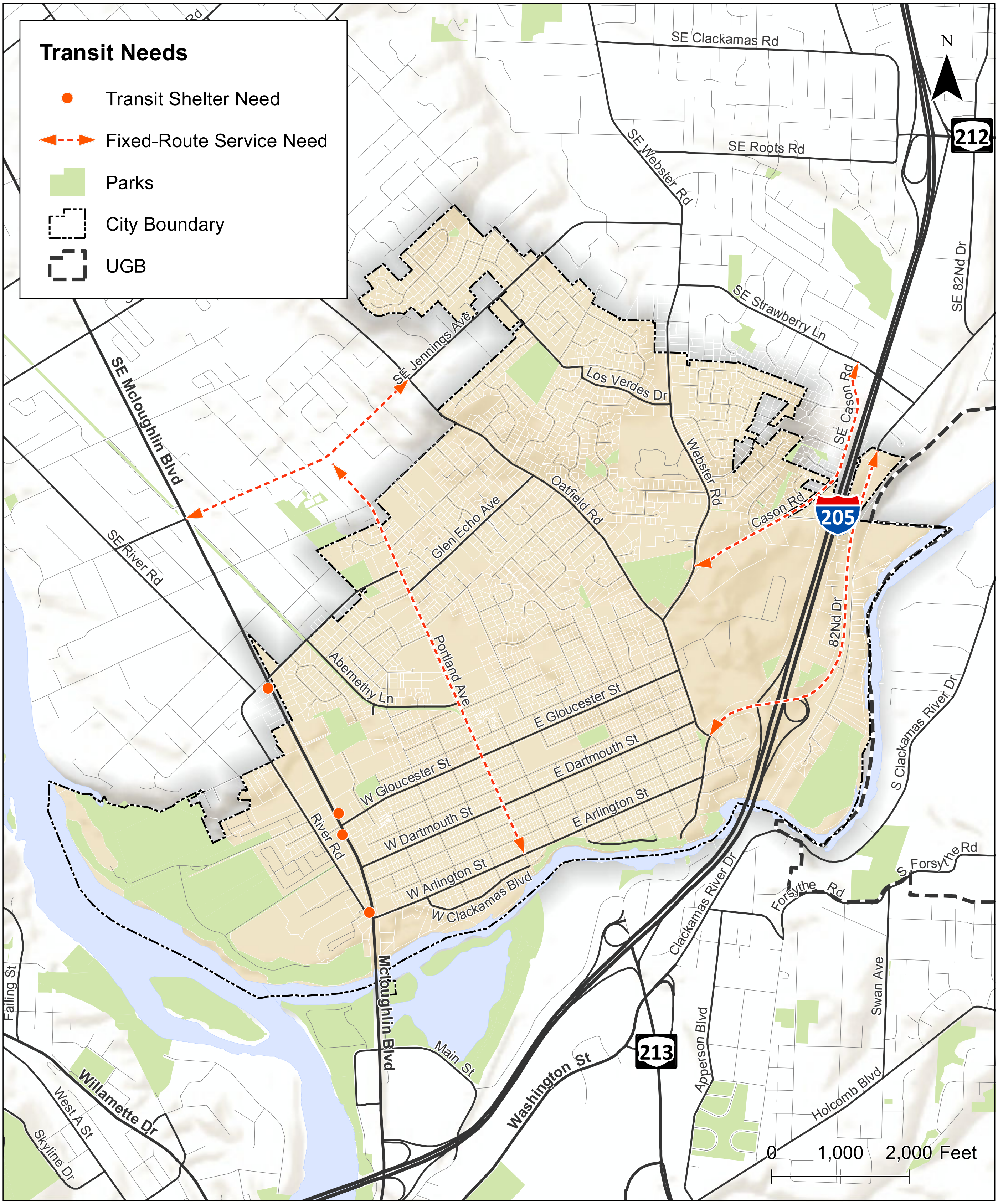
As indicated in *Tech Memo #5: Existing Gaps and Deficiencies*, there are currently no park and ride facilities located within Gladstone. While the TLOS analysis indicates that most people can access transit from their homes, a park and ride could encourage more people routinely choose transit for their daily commute. Potential park-and-ride lot locations identified by committee members and the general public include:

- OR 99E and Arlington Street (park-and-ride and bus shelter)
- First Christian Church on Dartmouth
- Baptist Church at intersection of Cason and Webster
- Mormon Church at intersection of Cason and Webster

Figure 5 illustrates the public transit system needs for Gladstone

Regional High Capacity Transit

High capacity transit is characterized by exclusive right-of-way and routes with fewer transit stops. In July 2009, Metro adopted the Regional High Capacity Transit (HCT) System Plan. The HCT Plan identifies corridors where new HCT is desired over the next 30 years and prioritizes corridors for implementation, based on a set of evaluation criteria consistent with the goals of the RTP and 2040 Concept. The location of any final HCT corridor is decided through a corridor refinement plan and/or alternatives analysis, and through a series of local and regional actions described in the plan.



Transit System Needs
Gladstone, Oregon

Figure
5

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\05 Transit Needs.mxd - mbell - 4:04 PM 5/5/2017

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

The HCT plan identifies one Next Phase Regional Priority Corridor along the segment of I-205 that travels through Gladstone. HCT Corridor 28 will provide service between the Clackamas Town Center, the Oregon City Transit Center, and Washington Square via I-205 and Highway 217. Other HCT Corridors within the area include two Next Phase Regional Priority Corridors in Oregon City. HCT Corridor 8 will provide service between the Clackamas Town Center and the Oregon City Transit Center via I-205 and HCT Corridor 9 will provide service between Park Avenue and the Oregon City Transit Center via McLoughlin Boulevard (OR 99E). Next Phase Regional Priority Corridors are corridors where future HCT investment may be viable if recommended planning and policy actions are implemented. The City of Gladstone should work with TriMet to ensure that local transit service continues to provide access to the Oregon City Transit Center and other transit centers where HCT routes are planned.

Transportation Disadvantaged

The primary transportation disadvantaged populations in Gladstone include minorities, elderly people, people with low income, and people with disabilities (See *Tech Memo 5: Existing Gaps and Deficiencies* for additional information). Therefore, access to schools, parks, and other essential destinations should be prioritized to serve these populations. The City of Gladstone should continue to support the Clackamas County Transportation Consortium services to the elderly and ADA-eligible residents, and other services currently being provided. Also, because needs are expected to increase, Gladstone should work with existing providers to assess the needs and develop ways to best meet them.

PEDESTRIAN SYSTEM NEEDS

Pedestrian facilities, such as sidewalks, shared-use paths and trails, marked and unmarked, signalized and unsignalized pedestrian crossings are essential elements of the city's pedestrian system. While these facilities are currently provided along many city streets, there are many more streets where these facilities are needed to improve pedestrian access and connectivity. The following provides a summary of the pedestrian system needs within Gladstone, which are based on the gaps and deficiencies identified in *Tech Memo 5: Existing Gaps and Deficiencies* and a system-level analysis of the pedestrian facilities located along arterial and collector streets. As described below, the most common overall need is to provide a safe and interconnected pedestrian system that encourages people to walk, especially for trips less than one-half mile in length.

Pedestrian Level of Traffic Stress Analysis

The pedestrian facilities located along the city's arterial and collector streets were evaluated in an effort to identify potential issues that could be addressed as part of the TSP update. The Oregon Department of Transportation (ODOT) Analysis Procedures Manual (APM) provides a methodology for evaluating pedestrian facilities within urban and rural environments called Pedestrian Level of Traffic Stress (PLTS). As applied by ODOT, this methodology classifies four levels of traffic stress that a pedestrian can experience on the roadway, ranging from PLTS 1 (little traffic stress) to PLTS 4 (high traffic stress). A road segment that is rated PLTS 1 generally has low traffic volumes and travel speeds and has a sidewalk that is separated from vehicular traffic. These segments are generally suitable for all users, including children. A road segment that is rated PLTS 4 generally has high traffic volumes and travel speeds and is perceived as unsafe by most adults. Road segments rated PLTS 4 also include those with no sidewalks or other pedestrian facilities. Per the APM, PLTS 2 is considered a reasonable target for most pedestrian facilities due to its acceptability with the majority of people.

The PLTS score is based on four criteria, including sidewalk condition, physical buffer type, total buffering width, and general land use. All four criteria are scored from 1 to 4 and the highest score determines the overall score for the road segment. Figure 6 illustrates the results of the PLTS analysis for Gladstone's arterial and collector streets. It is important to note that while some segments are shown as PLTS 3 or 4, they may have shorter segments with lower PLTS scores. Table 6 summarizes the detailed results of the PLTS analysis, which includes the scores for each criteria. As shown, there are 27 road segments rated PLTS 3 and 21 road segments rated PLTS 4.

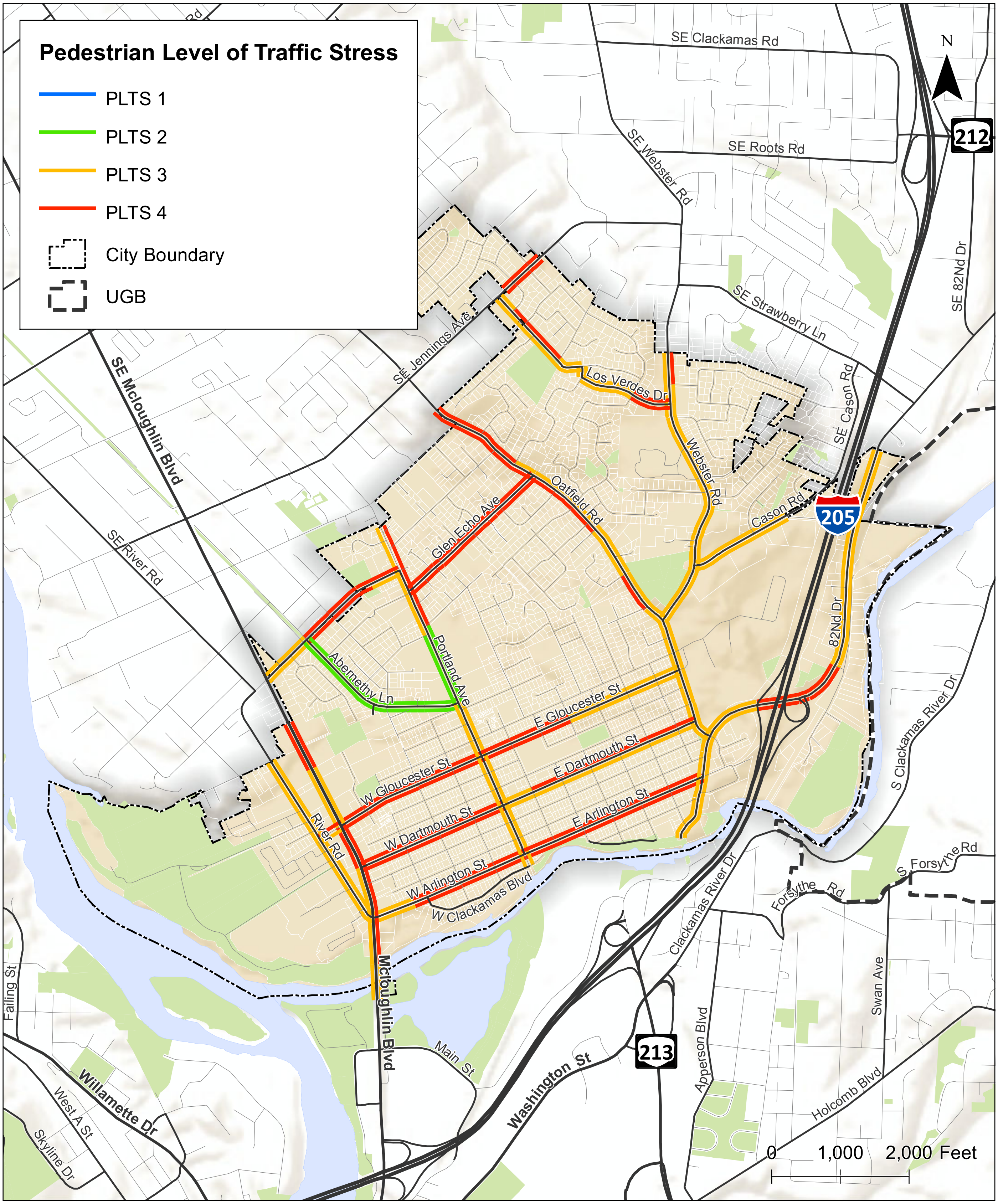
A majority of the road segments rated PLTS 3 have sidewalks in fair condition; however, they are too narrow and/or do not have illumination present. In order for these segments to be rated LTS 2, the sidewalks would need to be widened to five feet or more and illumination would need to be installed along the full length of the roadway. Several road segments are also rated LTS 3 due to having curb-tight sidewalks on roadways with speeds of 30 mph or higher. In order for these segments to be rated LTS 2, the speeds would need to be reduced to 25 mph or a buffer would need to be installed between the sidewalk and vehicle travel lane. For several other segments rated LTS 3, adjusting the LTS score will be difficult because it is controlled by the general land use next to the segment. A majority of the segments rated PLTS 4 have no sidewalks or other pedestrian facilities to accommodate pedestrians. In order for these segments to be rated PLTS 2, sidewalks with appropriate sidewalk and buffer widths would need to be installed along the full length of the roadway. *Attachment "B" contains detailed information on the PLTS analysis results.*

System Connectivity

A well-connected pedestrian system provides continuous sidewalks and other pedestrian facilities between essential destinations, such as residential neighborhoods, schools, parks, and retail/commercial centers. Strategies to improve pedestrian connectivity include identifying, prioritizing, and ultimately constructing new sidewalks, shared-use paths and trails, pedestrian crossings, and connections between neighborhoods. The following provides a summary of connectivity needs for the pedestrian system.

Sidewalks

As indicated in *Tech Memo 5: Existing Gaps and Deficiencies* and in the PLTS analysis described above, there are several arterial and collector streets that need new sidewalks or updates to existing sidewalks and other pedestrian facilities to improve connectivity. Figure 7 illustrates the pedestrian system needs within Gladstone. The following summarizes the arterial and collector streets where there is a need to fill in the gaps in the existing sidewalk network or install new sidewalks along one or two sides of the roadway:



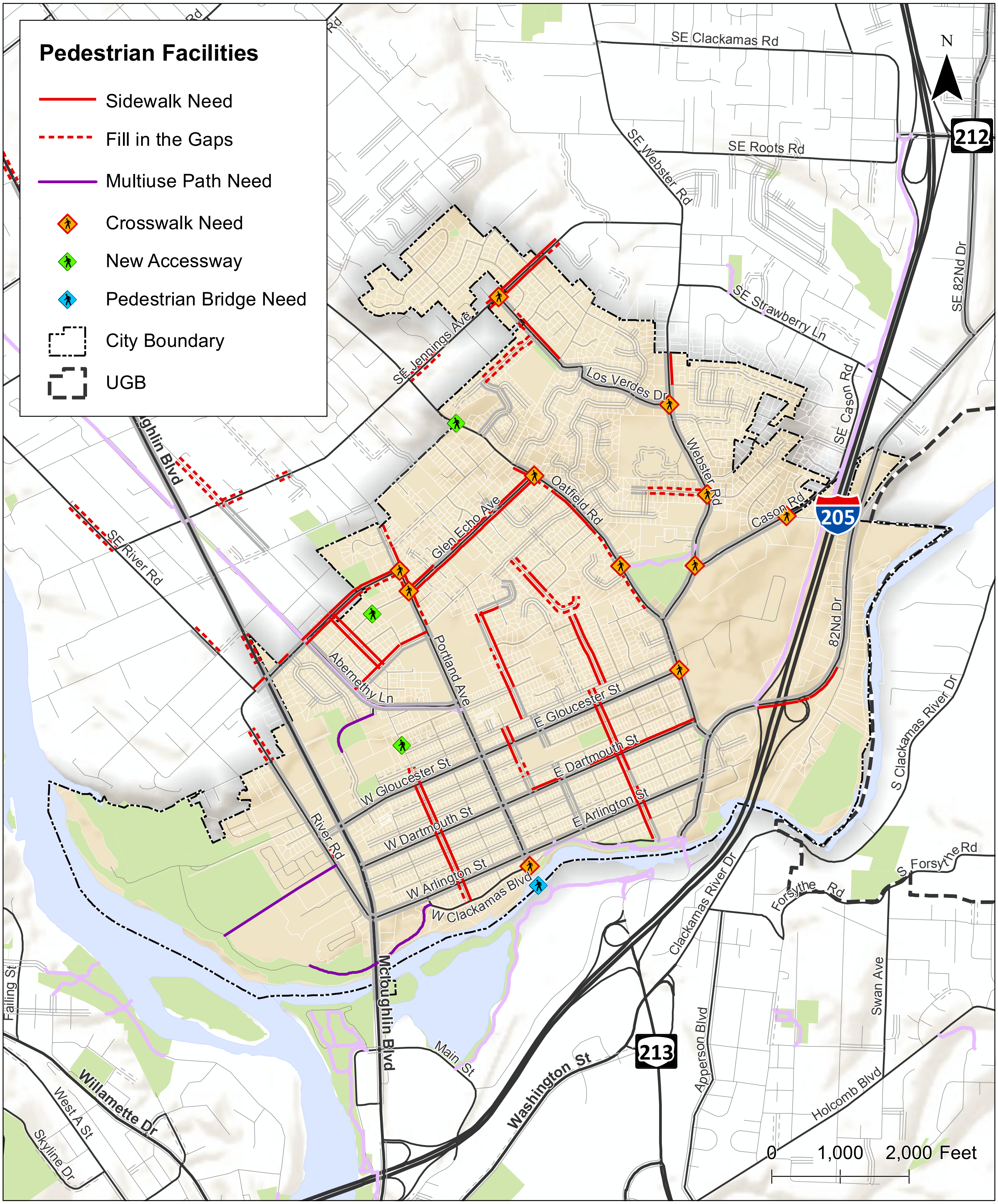
Pedestrian Level of Traffic Stress
Gladstone, Oregon

Figure
6

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\06 Pedestrian LTS.mxd - mbell - 4:05 PM 5/5/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center



Pedestrian System Needs
Gladstone, Oregon

Figure
7

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\07 Pedestrian Needs.mxd - mbell - 4:11 PM 5/5/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

Table 6: PLTS Analysis Results

Street	From	To	Side	Pedestrian LTS Criteria Scores				Pedestrian LTS
				Sidewalk Condition	**Physical Buffer Type**	**Total Buffering Width**	**General Land Use Criteria**	
Major Arterial								
OR 99E	City Limits	North of OR 99E Bridge	Both	2*[1]	2	3[2]	3	**3**
	North of OR 99E Bridge	Gloucester Street	East	2*[1]	4	2	3	**4**
	North of OR 99E Bridge	Dartmouth Street	West	2*[1]	2	1	3	**3**
	Dartmouth Street	Gloucester Street	West	2*[1]	4	2	3	**4**
	Gloucester Street	19340 OR 99E	Both	2*[1]	2	1	3	**3**
	19340 OR 99E	City Limits	East	2*[1]	4	2	3	**4**
	19340 OR 99E	19250 OR 99E	West	2*[1]	4	3	3	**4**
	19250 OR 99E	19210 OR 99E	West	4	4	3	3	**4**
	19210 OR 99E	City Limits	West	2*[1]	4	3	3	**4**
Minor Arterial								
River Road	Arlington Street	Jensen Road	East	2	3	2	3	**3**
	Jensen Road	City Limits	East	2	3	1	3	**3**
	Arlington Street	City Limits	West	2	3	2	2	**3**
Arlington Street	OR 99E	430 W Arlington Street	Both	2[1]	2	2[3]	3	**3**
	430 W Arlington Street	82nd Drive	Both	4[1]	1	2[3]	1	**4**
Portland Avenue	Clackamas Boulevard	High School Driveway	East	3	1	1	1	**3**
	Clackamas Boulevard	Abernethy Lane	West	3	1	1	1	**3**
	High School Driveway	Nelson Lane	East	1*	2	2[3]	1	**2**
	Nelson Lane	City Limits	East	4	4	2	1	**4**
	Abernathy Lane	Barclay Street	West	2	2	2[3]	1	**2**
	Barclay Street	Duniway Avenue	West	3	2	2[3]	1	**3**
	Duniway Avenue	18390 Portland Avenue	West	4	4	2[3]	1	**4**

	18390 Portland Avenue	City Limits	West	3	2	2[3]	1	**3**
82nd Drive	End of road	Columbia Avenue	West	3[1]	2	2	3	**3**
	Columbia Avenue	1st Street	West	3[1]	2	1	3	**3**
	End of road	1st Street	East	3[1]	2	1	3	**3**
	1st Street	I-205 Southbound Terminal	Both	3[1]	2	2	3	**3**
	I-205 Southbound Terminal	Edgewater Road	South	4	4	2	4	**4**
	I-205 Southbound Terminal	Edgewater Road	North	3	3	2	4	**4**
	Edgewater Road	City Limits	Both	3	3	2	3	**3**
Oatfield Road	82nd Drive	Webster Road	East	2	3	2	1	**3**
	Webster Road	17925 SE Oatfield Road	East	2	3	2	1	**3**
	17925 SE Oatfield Road	Park Way	East	3	2	2	1	**3**
	82nd Drive	Kenmore Street	West	2	3	2	1	**3**
	Kenmore Street	18490 SE Oatfield Road	West	4	4	2	1	**4**
	18490 SE Oatfield Road	18215 SE Oatfield Road	West	3	3	2	1	**3**
	18215 SE Oatfield Road	Park Way	West	4	4	2	1	**4**
	Park Way	City Limits	Both	4	4	2	1	**4**
Webster Road	Oatfield Road	Los Verdes Drive	Both	2	3	2	2	**3**
	Los Verdes Drive	Charolais Drive	East	3	3	1	2	**3**
	Charolais Drive	City Limits	East	4	4	2	2	**4**
	Los Verdes Drive	City Limits	West	3	3	1	2	**3**
Jennings Avenue	Valley View Road	City Limits	Both	4	4	2	1	**4**
Collector								
Dartmouth Street	OR 99E	Portland Avenue	Both	4[1]	1	2[3]	1	**4**
	Portland Avenue	Chicago Avenue	North	3	2	2[3]	1	**3**
	Chicago Avenue	Harvard Avenue	North	4[1]	4	2[3]	1	**4**
	Harvard Avenue	Yale Avenue	North	4[1]	1	2[3]	1	**4**
	Yale Avenue	Oatfield Road	North	4[1]	4	2[3]	1	**4**
	Portland Avenue	Oatfield Road	South	3	1	2[3]	1	**3**

Gloucester Street	River Road	OR 99E	North	4[1]	2	2[3]	3	**4**
	River Road	OR 99E	South	3[1]	2	2[3]	3	**3**
	OR 99E	Yale Avenue	Both	4[1]	2	2[3]	1	**4**
	Yale Avenue	Oatfield Road	Both	3[1]	2	2[3]	1	**3**
Abernethy Lane	Glen Echo Avenue	Portland Avenue	North	1	2	2	1	**2**
	Glen Echo Avenue	Portland Avenue	South	1	1	2	1	**2**
Glen Echo Avenue	OR 99E	Abernethy Lane	Both	3[1]	3	2[3]	1	**3**
	Abernethy Lane	Portland Avenue	North	4[1]	4	2	1	**4**
	Abernethy Lane	5800 Glen Echo Avenue	South	4[1]	4	2	1	**4**
	5800 Glen Echo Avenue	Portland Avenue	South	3[1]	3	2	1	**3**
	Portland Avenue	6740 Glen Echo Avenue	North	4[1]	4	2	1	**4**
	6740 Glen Echo Avenue	6890 Glen Echo Avenue	North	3[1]	2	2	1	**3**
	6890 Glen Echo Avenue	Oatfield Road	North	4[1]	4	2	1	**4**
	Portland Avenue	Oatfield Road	South	4[1]	4	2	1	**4**
Cason Road	Webster Road	City Limits	Both	2	3	2	1	**3**
Via Del Verde/Los Verdes Drive	Valley View Road	Crownview Drive	Both	3	1	2[3]	1	**3**
	Crownview Drive	Webster Road	North	4[1]	1	2[3]	1	**4**
	Crownview Drive	Webster Road	South	4[1]	2	2[3]	1	**4**
Valley View Road/Valley View Drive	Los Verdes Drive	Valley View Road	Both	3	1	2[3]	1	**3**
	Valley View Road	Churchill Drive	North	4	4	2[3]	1	**4**
	Churchill Drive	Jennings Avenue	North	3	2	2[3]	1	**3**
	Valley View Road	Jennings Avenue	South	3	2	2[3]	1	**3**

Shaded cells segments that do not meet the LTS 2 target.
* The effective width of the pedestrian facility is greater than 6 feet. The LTS value is from the last line of the sidewalk condition criteria table in the APM.
[1] No illumination present. LTS degraded by one unless already at LTS 4.
[2] Segment located on a bridge. LTS improved to LTS 3.
[3] Existing non-striped parking. Assume parking area is six to eight feet wide.

- Portland Avenue, from Nelson Lane to city limits.
- 82nd Drive, from the I-205 southbound ramp terminal to Edgewater Road.
- Oatfield Road, from Webster Road to Park Way.
- Webster Road, from Charolais Drive to city limits.
- Jennings Avenue, from city limits to city limits.
- Dartmouth Street, from Chicago Avenue to Oatfield Road.
- Glen Echo Avenue, from River Road to Oatfield Road.
- Valley View Road, from Valley View Road to Churchill Drive.

In addition to the arterial and collector streets, there are several local streets that have been identified in previous planning documents as serving a critical need for local residents. The following summarizes the local streets where there is a need to “fill in the gaps” in the existing sidewalk network or “install new sidewalks” along one or two sides of the streets:

- Beatrice Avenue, from Clackamas Boulevard to Hereford Street
- Harvard Avenue, from Hereford Street to Beverly Lane
- Cornell Avenue, from Clackamas Boulevard to Collins Crest
- Beverly Lane east of Harvard Avenue
- Oakridge Drive, from Oatfield Road to Valley View Road
- Clayton Way, from Stonewood Drive to Webster Road
- Chicago Avenue, from Hereford Street to Dartmouth Street
- Fairfield Street, south side from Portland Avenue to Chicago Avenue
- Addie Street from Glen Echo Avenue to Barclay Street
- Barclay Street from Abernathy Lane to Portland Avenue

As indicated by the PLTS analysis described above, there are several additional needs associated with sidewalks in Gladstone. With the exception of Abernethy Lane, all of the city’s arterial and collector streets have sidewalk deficiencies. The following provides a summary of the general needs associated with sidewalks:

- Lighting is needed along roadways where lighting levels were found to be insufficient.
- Wider sidewalks are needed where sidewalks are less than five feet wide.
- New sidewalks or repairs to existing sidewalks are needed where sidewalk conditions were found to be poor or very poor.
- Physical buffers are needed adjacent to roadways with vehicle speeds are equal to or greater than 30 mph.

- Wider buffers are needed adjacent to roadways with three or more travel lanes.
- Travel speeds need to be reduced to 25 mph or lower adjacent to pedestrian facilities that lack physical buffers.
- Land use changes need to be considered in areas with auto-oriented commercial and light industrial uses.

The needs associated with other pedestrian facilities, such as new pedestrian crossings, shared-use paths and trails, and neighborhood connections are described below.

Pedestrian Crossings

Pedestrian crossings along the city’s arterial and collector streets are limited to major intersections and a few key mid-block crossing locations near pedestrian destinations. There are marked pedestrian crossings at each of the signalized intersections located along OR 99E, 82nd Drive, and Oatfield Road that include pedestrian push buttons and pedestrian signal heads. There are also marked pedestrian crossings at several unsignalized intersections along Portland Avenue and other streets in select areas throughout the city. However, there are several additional locations where marked pedestrian crossings are needed to provide connectivity as well as access to schools, parks, and other essential destinations within the city. The following provides a summary of the additional pedestrian crossing needs:

- Enhanced pedestrian crossing at Arlington Street and Portland Avenue
- Enhanced pedestrian crossing at Portland Avenue and Glen Echo Avenue (north and south)
- Enhanced pedestrian crossing at Oatfield Road and Gloucester Street
- Enhanced pedestrian crossing at Oatfield Road and Glen Echo Avenue
- Enhanced pedestrian crossing at Webster Road and Cason Road
- Enhanced pedestrian crossing at Jennings Avenue and Valley View Road
- Enhanced pedestrian crossing at Cason Road and Ohlson Road

Other potential pedestrian crossing needs identified by committee members and the general public during include:

- Enhanced pedestrian crossing at Oatfield Road and Stoneoaks Court
- Enhanced pedestrian crossing at Webster Road and Clayton Way-Ridgewood Drive
- Enhanced pedestrian crossing at Webster Road and Los Verdes Drive
- Evaluate the existing pedestrian crossing at Oatfield Road and Ridegate Drive and install Rectangular Rapid Flash Beacons (RRFBs) or other enhanced pedestrian crossing treatments as necessary.

Figure 7 also illustrates the locations of the crossing needs. Marked pedestrian crossing at each of these locations would improve connectivity along the roadways as well as access to essential destinations. *Note: the Downtown Revitalization Plan will recommend design treatments for crossings on Portland Avenue, including special paving, curb extensions, and raised crossings at key intersections, such as Abernathy Lane, Dartmouth Street, and Arlington Street as well as near the high school.*

Shared-Use Paths and Trails

Shared-use paths and trails are designated pathways for both cyclists and pedestrians. The Trolley Trail, the Cross Park Trail, the Charles Ames Park Way, and the I-205 Trail all serve different portions of Gladstone. Continuous shared-use paths are most comfortable for both pedestrians and cyclists and increasing the lengths of the Cross Park Trail and the Charles Ames Park Walk along with providing and improving connections between shared-use paths and trails with on-street connections would create a more robust network to augment and support the sidewalks and bike lanes on roadways. The following summarizes the multi-use and trail needs within Gladstone:

- New shared-use path/trail, from Clackamas Boulevard at Portland Avenue across the Clackamas River to Oregon City (Trolley Trail Bridge)
- New shared-use path/trail, from Dahl Park Road under OR 99E to Arlington Road
- New shared-use path/trail, from Abernathy Court to Risley Avenue
- New shared-use paths/trail in Meldrum Bar Park
- Install pedestrian scale lighting along the shared-use path adjacent to Arlington Street.

Pedestrian Accessways

Connections between cul-de-sacs and adjacent roadways can significantly reduce travel distances for pedestrians, thereby encouraging more people to walk. Appropriate improvements should provide for more direct, convenient, and safe bicycle or pedestrian travel within and between residential areas and neighborhood activity centers. Gladstone has several existing accessways that create connections between neighborhoods and pedestrian and bicycle routes. Additional accessways are not always possible due to topography and existing development patterns. However, there is a need for at least one additional accessway:

- Duniway Avenue accessway, from Duniway Avenue terminus to Duniway Avenue terminus
- Beatrice Avenue accessway, from Jersey Street terminus to Ipswich Street terminus
- Hull Avenue accessway from Hull Avenue terminus to Oatfield Road

The Gladstone School District should also consider connecting the accessways on Ridgegate Drive and Monte Verde Drive with a paved multi-use path on the Kraxberger School grounds to provide safe and convenient access to and around this major activity center.

BICYCLE SYSTEM NEEDS

Bicycle facilities, such as on-street bicycle lanes, shoulder bikeways, shared roadway pavement markings, bicycle crossings, bicycle parking, and wayfinding signage, are essential elements of a the city's bicycle system. While these facilities are currently provided along many city streets, there are many more streets where these facilities are needed to improve bicycle access and connectivity. The following provides a summary of the bicycle system needs within Gladstone, which are based on the gaps and deficiencies identified in *Tech Memo 5: Existing Gaps and Deficiencies* and a system-level analysis of the bicycle facilities located along arterial and collector streets. As described below, the most common overall need is to provide a safe and interconnected bicycle system that encourages people to ride their bikes, especially for trips less than three miles in length.

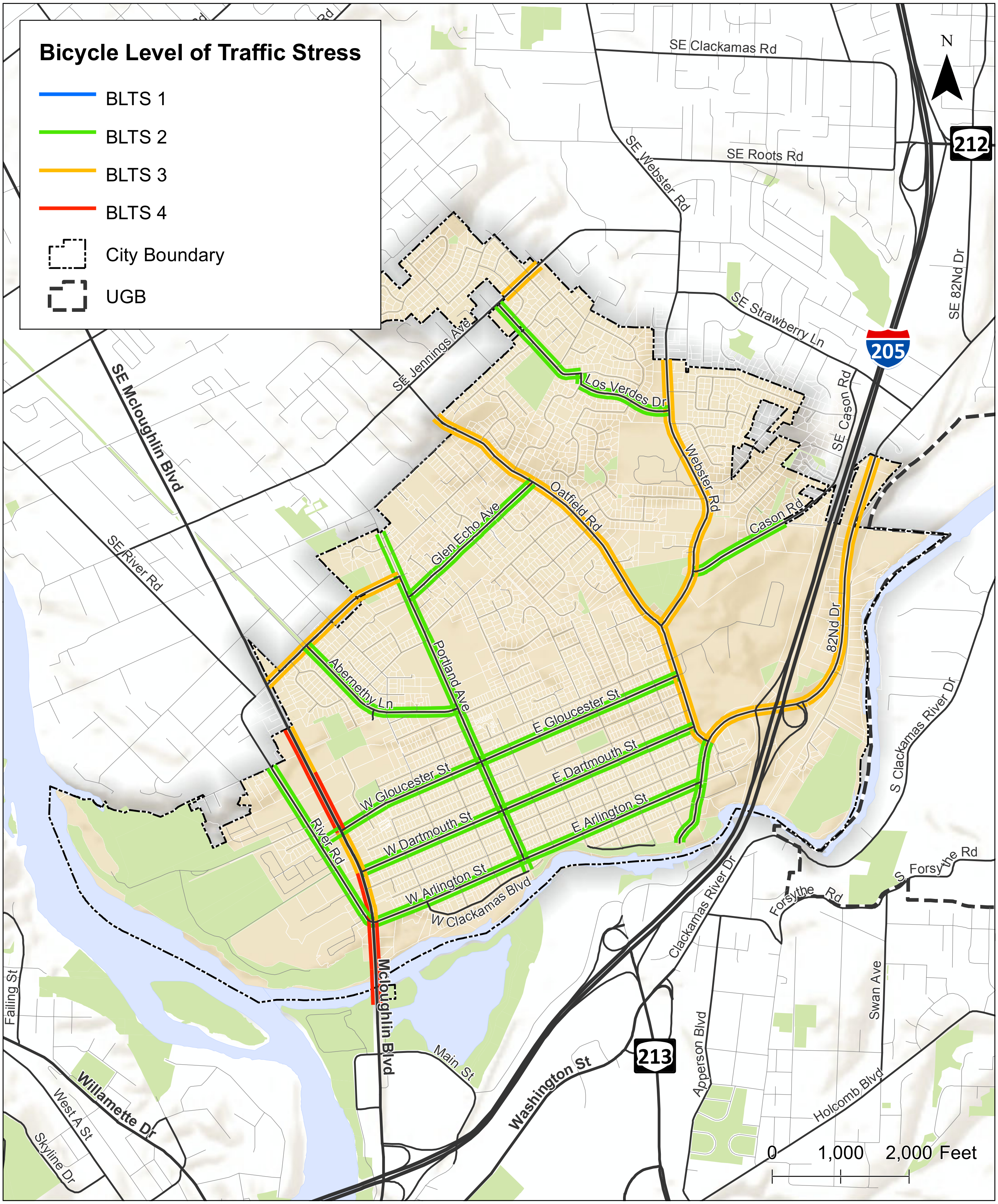
Bicycle Level of Traffic Stress Analysis

The bicycle facilities located along the city's arterial and collector streets were evaluated in an effort to identify potential issues that could be addressed as part of the TSP update. The APM provides a methodology for evaluating bicycle facilities within urban and rural environments called Bicycle Level of Traffic Stress (BLTS). As applied by ODOT, this methodology classifies four levels of traffic stress that a bicyclist can experience on the roadway, ranging from BLTS 1 (little traffic stress) to BLTS 4 (high traffic stress). A road segment that is rated B LTS 1 generally has low traffic volumes and travel speeds and is suitable for all cyclists, including children. A road segment that is rated BLTS 4 generally has high traffic volumes and travel speeds and is perceived as unsafe by most adults. Per the APM, BLTS 2 is considered a reasonable target for bicycle facilities due to its acceptability with the majority of people.

The BLTS score is determined based on the speed of the roadway, the number of travel lanes per direction, the presence and width of an on-street bicycle lane and/or adjacent parking lane, and several other factors. Figure 8 illustrates the results of the BLTS analysis for Gladstone's arterial and collector streets. It is important to note that while some segments are shown as BLTS 3 or 4, they may have shorter segments with lower BLTS scores. Table 7 summarizes the detailed results of the BLTS analysis. As shown, there eight segments rated BLTS 3 and four segments rated BLTS 4.

A majority of the segments rated BLTS 3 have striped bicycle lanes; however, they are too narrow for roadways conditions. In order for these segments to be rated BLTS 2, the striped bicycle lanes would need to be widened to 7 feet and/or the posted speed limits would need to be reduced to as low as 30 mph. Other segments rated BLTS 3 were evaluated as shared roadways. In order for these segments to be rated BLTS 2, the speed would need to be reduced to as low as 25 mph or the centerline stripe would need to be removed.

All segments rated BLTS 4 are located along OR 99E and have striped bicycle lanes that are too narrow for roadway conditions. In order for these segments to be rated BLTS 2, the striped bicycle lanes would need to be widened to 7 feet and/or the posted speed limits would need to be reduced to as low as 30 mph. Enhanced facilities, such as separated bike facilities or multi-use paths, may also be needed in some areas where traffic volumes and/or travel speeds are high.



Bicycle Level of Traffic Stress
Gladstone, Oregon

Figure
8

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\08 Bicycle LTS.mxd - mbell - 4:12 PM 5/5/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

Table 7: BLTS Analysis Results

Street	From	To	Side	Facility Type	LTS Criteria					Bicycle LTS
					Speed (MPH)	Lanes per Direction	Bike Lane Width (feet)	Parking	Frequent Blockage	
Major Arterial										
OR 99E	City Limits	Arlington Street	Both	Bike Lane	40	2	< 7	No	No	4
	Arlington Street	Dartmouth Street	East	Bike Lane	40	2	> 7	No	No	3
	Arlington Street	Dartmouth Street	West	Bike Lane	40	2	< 7	No	No	4
	Dartmouth Street	Gloucester Street	Both	Bike Lane	40	2	> 7	No	No	3
	Gloucester Street	19370 OR 99E	East	Bike Lane	40	2	< 7	No	No	4
	19370 OR 99E	City Limits	East	Bike Lane	40	2	> 7	No	No	3
	Gloucester Street	City Limits	West	Bike Lane	40	2	< 7	No	No	4
Minor Arterial										
River Road	Arlington Street	Jensen Road	Both	Bike Lane	30	1	< 5.5	No	No	2
	Jensen Road	City Limits	East	Bike Lane	30	1	< 5.5	Yes	No	2
	Jensen Road	City Limits	West	Bike Lane	30	1	< 5.5	No	No	2
Arlington Street	OR 99E	82nd Drive	Both	Mixed Traffic	25	1	N/A	Yes	No	2
Portland Avenue	Clackamas Boulevard	Nelson Lane	Both	Mixed Traffic	20	1	N/A	Yes	No	2
	Nelson Lane	Caldwell Road	East	Bike Lane	20	1	< 5.5	No	No	2
	Nelson Lane	Caldwell Road	West	Mixed Traffic	20	1	N/A	No	No	2
	Caldwell Road	City Limits	Both	Mixed Traffic	25	1	N/A	Yes	No	2
82nd Drive	City Limits	Oatfield Road	Both	Bike Lane	35	1	5.5 - 7	No	No	3
	Oatfield Road	1st Street	Both	Bike Lane	25	1	5.5 - 7	No	No	2
	1st Street	End of road	East	Bike Lane	25	1	5.5 - 7	Yes	No	2
	1st Street	Columbia Avenue	West	Bike Lane	25	1	5.5 - 7	Yes	No	2
	Columbia Avenue	End of road	West	Bike Lane	25	1	5.5 - 7	No	No	2
Oatfield Road	82nd Drive	City Limits	Both	Bike Lane	35	1	5.5 - 7	No	No	3
Webster Road	Oatfield Road	Los Verdes Drive	Both	Bike Lane	35	1	5.5 - 7	No	No	3
	Los Verdes Drive	City Limits	Both	Bike Lane	35	1	5.5 - 7	Yes	No	3
Jennings Avenue	Valley View Road	City Limits	Both	Mixed Traffic	30	1	N/A	Partial	No	3
Collector										

Dartmouth Street	OR 99E	Oatfield Road	Both	Mixed Traffic	25	1	N/A	Yes	No	2
Gloucester Street	River Road	Oatfield Road	Both	Mixed Traffic	25	1	N/A	Yes	No	2
Abernethy Lane	Glen Echo Avenue	Portland Avenue	North	Mixed Traffic	25	1	N/A	Yes	No	2
	Glen Echo Avenue	Portland Avenue	South	Multi-Use Path	25	1	N/A	No	No	2
Glen Echo Avenue	OR 99E	Portland Avenue	Both	Mixed Traffic	30	1	N/A	Partial	No	3
	Portland Avenue	Oatfield Road	Both	Mixed Traffic	25	1	N/A	No	No	2
Cason Road	Webster Road	City Limits	Both	Bike Lane	30	1	5.5-7	No	No	2
Via Del Verde/Los Verdes Drive	Valley View Road	Webster Road	Both	Mixed Traffic	25	1	N/A	Yes	No	2
Valley View Road/Valley View Drive	Los Verdes Drive	Jennings Avenue	Both	Mixed Traffic	25	1	N/A	No	No	2

Shaded cells segments that do not meet the LTS 2 target.

It should also be noted that a majority of the shared roadway segments that were rated LTS 2 could include signage and potentially striping to remind motorists to share the road. The signing and striping can also provide important wayfinding for cyclists to inform them of the preferred bicycle routes.

System Connectivity

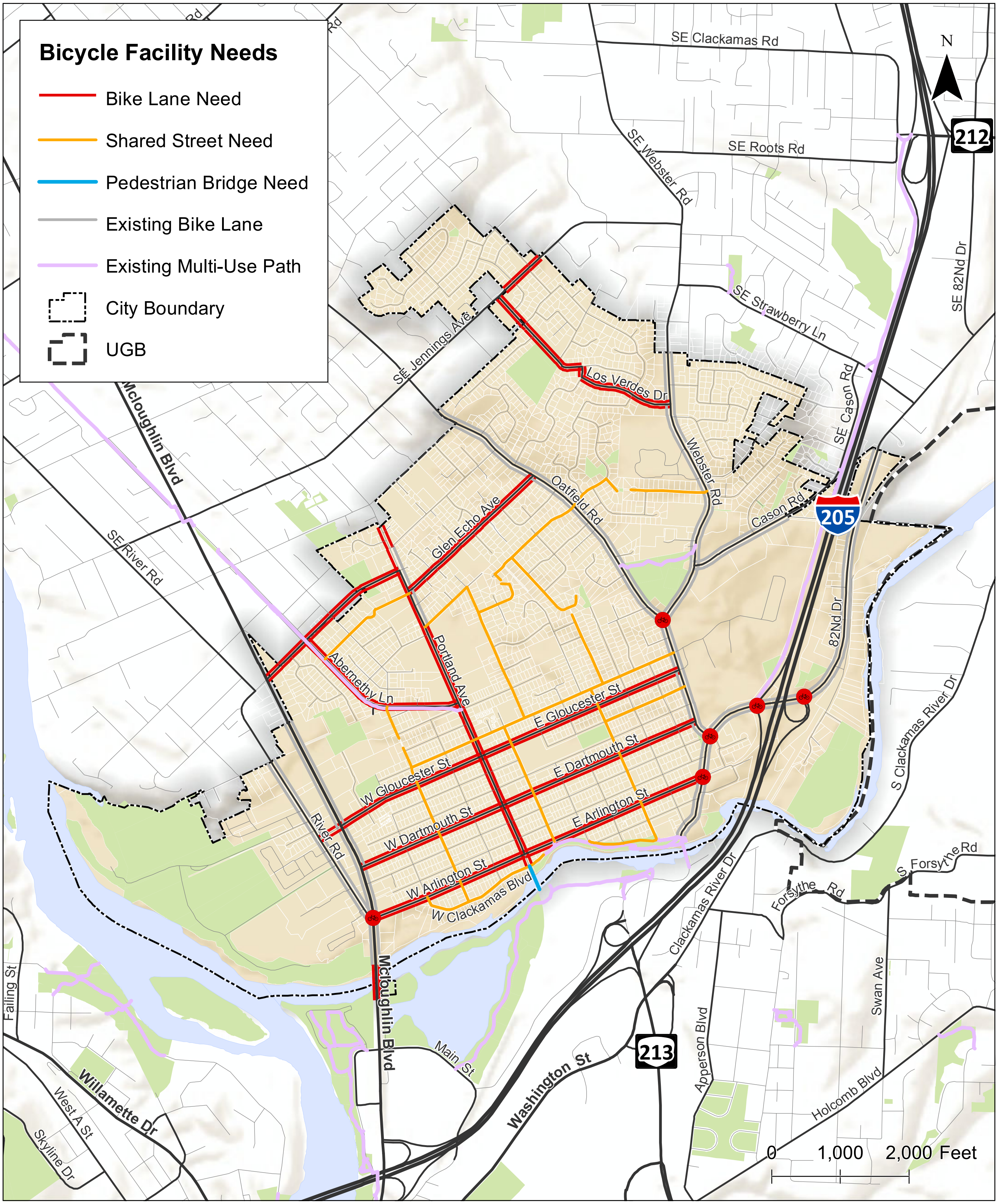
A well-connected bicycle system provides continuous bicycle lanes and other bicycle facilities between essential destinations, such as residential neighborhoods, schools, parks, and retail/commercial centers. Strategies to improve bicycle connectivity include identifying, prioritizing, and ultimately constructing new on-street bicycle lanes, shared-use pavement markings, bicycle crossings, shared-use paths, and bicycle parking.

On-street Bicycle Lanes

As indicated in *Tech Memo 5: Existing Gaps and Deficiencies* and in the BLTS analysis described above, there are several arterial and collector streets that need new on-street bicycle lanes and other bicycle facilities to improve connectivity. Figure 9 illustrates the bicycle system needs within Gladstone. The following summarizes the arterials and collector streets where there is a need for new on-street bicycle lanes on one or two sides of the roadway:

- Glen Echo Avenue, from River Road to Oatfield Road
- Abernathy Lane, from Glen Echo Road to Portland Avenue
    - There is a shared-use path along the south/west side of Abernathy Lane
- Gloucester Street, from River Road to Oatfield Road
- Dartmouth Street, from OR 99E to Oatfield Road
- Arlington Street, from OR 99E to 82nd Drive
- Portland Avenue, from Arlington Street to the north city limits
- Los Verdes Drive, from Webster Road to Valley View Road
- Valley View Road, from Los Verdes Drive to north city limits

It should be noted that while on-street bicycle lanes are typically provided along both sides of arterial and collector streets, it may not be feasible or cost effective to construct them along both sides of all streets. Along some streets it may be suitable for bicyclists to share the roadway with motorists while along others it may be suitable to have a parallel shared-use path that accommodates bicyclists in two directions. As indicated in the BLTS analysis described in the previous section, several of the arterial and collector streets listed above as needing on-street bicycle lane are rated BLTS 2, which suggests that on-street bicycle lanes may not be needed. *Note: the Downtown Revitalization Plan will recommend design treatments for bicycle facilities on Portland Avenue.*



Bicycle System Needs
Gladstone, Oregon

Figure
9

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\09 Bicycle Needs.mxd - mbell - 4:12 PM 5/5/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

It should also be noted that several of the arterial and collector streets that currently have on-street bicycle lanes were rated BLTS 3 or higher. This suggests that on-street bicycle lanes alone may not be sufficient to accommodate a majority of bicyclists on these streets. The following summarizes the needs associated with these streets:

- Wider bicycle lanes (up to 7 feet) are needed along streets with bicycle lanes of 5-feet or less.
- Buffers between the bicycle lane and adjacent travel lane are needed along street where the posted speed limits are 30 mph or above.
- Separated bicycle paths are needed along streets where appropriate and feasible.
- Designated alternative bicycle routes are need where treatments are not feasible.

Further review of potential solutions along these streets will be completed in subsequent tech memos.

Shared-Use Streets

Arterials and collectors cannot fully address bicycle travel needs in and around the city. Bicycle trips can and should be accommodated on lower classified streets with lower traffic volumes and travel speeds that offer parallel or alternative routes to essential destinations, such as schools, parks, and retail/commercial centers. These facilities could be designated as shared-use streets or could have a specific designation such as a "bike boulevard" where treatments are applied to the roadway to enhance the bicycle environment and/or make additional connections to bicycle destinations. There are several streets where shared roadway pavement markings could be used to improve access and circulation for cyclists. The streets include:

- Valley View Road/Los Verdes Drive;
- Clackamas Boulevard, Arlington Road to 82nd Drive
- Beatrice Avenue, from Abernathy Lane to Clackamas Boulevard
- Hereford Street, from Beatrice Avenue to Oatfield Road
- Nelson Lane/Harvard Avenue, from Portland Avenue to Hereford Street
- Beverly Lane/Collins Crest, from Harvard Avenue to Oatfield Road
- Ridgegate Drive/Penny Court/Clayton Way, from Oatfield Road to Webster Road
- Duniway Avenue, from Abernathy Lane Abernathy Lane to Portland Avenue
- Fairfield Street, from Cornell Avenue to Oatfield Road
- Cornell Avenue, from Clackamas Boulevard to Collins Crest
- Chicago Avenue, from Hereford Street to Arlington Street

As discussed in the current TSP, Gladstone's existing roadways are generally wide enough and carry sufficiently moderate traffic volumes at low to moderate speeds that most of the adjacent streets are suitable for shared roadway bicycle facilities and are so utilized by residents. However, the lack of specific, designated bicycle routes (designated by "Bike Route" signage, not necessarily parking-prohibited bicycle lanes) may discourage an environment of safe bicycle usage as a convenient alternative transportation mode.

Bicycle Crossings

Intersections can be potentially unsafe locations in the bicycle network, as there are more conflict points with right- and left-turning vehicles and cross street traffic. There are various configurations for addressing bicycle needs alongside right-turn lanes, although the desired configuration is to have the right-turn lane to the right of the bicycle lane, with right-turning vehicles yielding to through cyclists as they cross the bicycle lane. The following summarizes the bicycle crossing needs within Gladstone, which include both intersections with existing bicycle crossings that could be enhanced and intersections without bicycle crossings.

- Enhanced bicycle crossing at OR 99E and Arlington Street
- Enhanced bicycle crossing at Arlington Street and 82nd Drive
- Enhanced bicycle crossing at Oatfield Road and 82nd Drive
- Enhanced bicycle crossing at **Oatfield Road and Webster Road**
- Enhanced bicycle crossing at I-205 Southbound Terminal and 82nd Drive
- Enhanced bicycle crossing at I-205 Northbound Terminal and 82nd Drive

Bicycle Parking

The availability of bicycle parking is an important component of a well-designed bicycle system. Lack of proper storage facilities discourages potential riders from traveling by bicycle. Bicycle racks should be located at significant activity generators including schools, parks, and retail/commercial areas. Bicycle racks should be placed in highly-visible locations and within convenient proximity to main building entrances. Bicycle racks should be designed to provide two points of contact to the bicycle (e.g., so the user can lock both the wheel and the frame to the rack). Bicycle lockers or other storage facilities would be helpful at locations where long-term parking is expected, such as major employment centers. The attractiveness of bicycle parking may also be improved by providing covered parking and/or secured facilities where bicycles may be locked away.

The City's bicycle parking standards are found in Gladstone Municipal Code Section 17.48.050. Bicycle parking standards apply to new multi-family dwellings of four units or more and new commercial/industrial developments. See Table 5 in Tech Memo 1 for preliminary recommendations regarding potential changes to bicycle parking standards.

MOTOR VEHICLE SYSTEM NEEDS

System Connectivity

A well-connected transportation network minimizes the need for out-of-direction travel while supporting an efficient distribution of travel demand among multiple parallel roadways. The most common example of an efficient transportation network is the traditional grid system, with north-south and east-west streets spaced at generally equal distances. River Road, OR 99E, Oatfield Road, Webster Road, and 82nd Drive are all part of a larger grid system that provides connectivity on a regional level as well as connectivity within Gladstone. The southern part of Gladstone is based on a grid system while the northern part is made up of a less connected network of cul-de-sacs and stub streets that conform to the steeper topography and natural features. The following sections highlight the needs associated with street system connectively within Gladstone.

Arterial Street Connectivity

The RTP provides designations for four types of arterials, including principal arterials, major arterials, minor arterials, and rural arterials; a majority of which are located within Gladstone. According to the RTP, arterials are intended to provide general mobility for travel within the region as well as connect major commercial, residential, industrial, and institutional centers. Arterials are usually spaced about 1-mile apart and are designed to accommodate motor vehicle and truck traffic as well as pedestrians, bicyclists, and buses. Based on a review of the existing arterial street system, many of the city's arterials currently meet the RTP's arterial spacing guidelines. However, there is the potential need for a new arterial between Jennings Avenue and Arlington Street. Additional information on this potential need is provided below:

- New east-west arterial – Jennings Avenue and Arlington Street are located approximately 1.25 to 1.50 miles apart; therefore, a new arterial could be identified between the two streets to improve arterial connectivity within the city. Given that most of the area between the two streets is largely built out, the most likely approach would be to redesignate an existing street as an arterial. Based on a review of the existing street network, the most likely street is Glen Echo Avenue. However, Glen Echo Avenue has a 350-foot "jog" at Portland Avenue, which would limit connectivity. It also has several single family residential homes that have direct access to the street. Given these challenges, Glen Echo is more appropriately designated as a collector.

Further review of the arterial street system indicates that there is also the potential need for a new arterial street that connects Webster Road to 82nd Drive further north-east of Oatfield Road; however, this potential connection would be located outside the city limits and therefore is not discussed. There is also the potential need to redesignate Portland Avenue as a collector street. Additional information on this potential need is described under Collector Streets.

Collector Streets

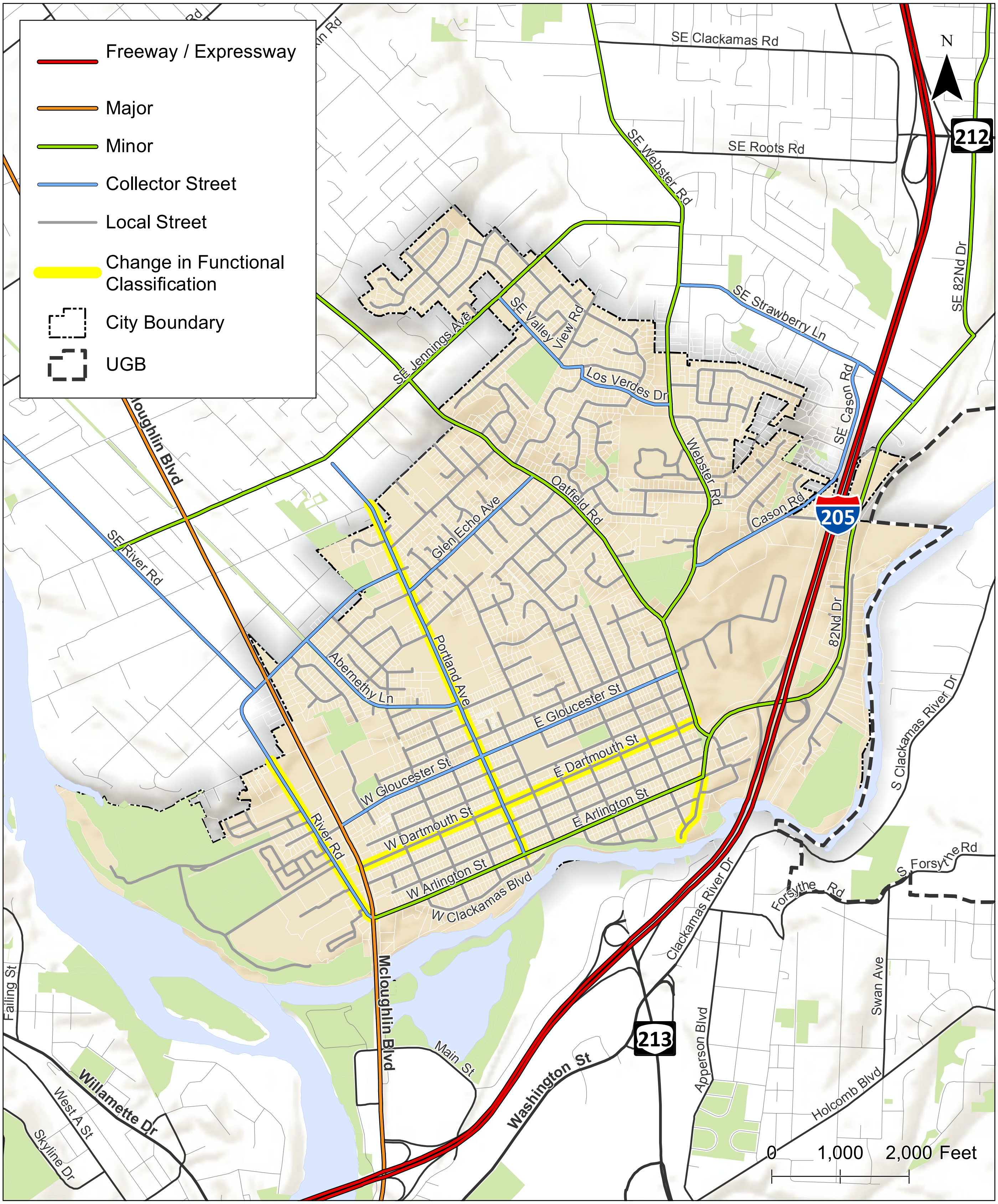
The RTP identifies collector streets as general access streets for neighborhood circulation and as support streets for the regional transportation network. Connectivity at this level is especially important for pedestrian and bicycle trips. The RTP recommends a maximum spacing of 1/2 mile for collectors in order to encourage local traffic to use them instead of higher order facilities. Based on a review of the existing collector street system, there is the potential need for a new collector between OR 99E and Oatfield Road and a new collector between Jennings Avenue and Webster Road. Additional information on these potential needs is provided below.

- New north-south collector – OR 99E and Oatfield Road are located approximately 1.0 mile apart; therefore, a new collector could be identified between the two streets to improve collector connectivity within the city. Given that most of the area between the two streets is largely built out, the most likely approach is to redesignate an existing street as a collector. Based on a review of the existing street network, the most likely street is Portland Avenue. The change in designation could be applied to the segment from Arlington Street to the north city limits; however, the City could also coordinate with Clackamas County to continue the designation (and roadway) to Jennings Avenue.
- New east-west collector – Jennings Avenue and Webster Road are located approximately 1.0 mile apart; therefore, a new collector could be identified between the two streets to improve collector connectivity within the city. Given that most of the area between the two streets is largely built out, the most likely approach would be to redesignate an existing street as a collector. Based on a review of the existing street network, the most likely street is Park Way. However, Park Way is relatively narrow and steep. It also has several single family residential homes that have direct access to the street. Given these challenges, Park Way is more appropriately designated as a local Street.

Further review of the collector street system indicates that there is also the potential need to redesignate Abernathy Lane and Dartmouth Street as local Streets, or to develop a new functional classification for the streets. Additional information on these potential needs is provided below.

- New Functional Classification – Abernathy Lane and Dartmouth Street are located less than ½ mile from other collector streets, and therefore may be more appropriately designated as local streets. As an alternative, the City could create a new functional classification that better reflects the role the two streets play in the street network. Other jurisdictions, such as West Linn and Milwaukie classify streets like these as Neighborhood Routes.

Each of these potential changes could enhance the north-south and east-west connectivity within the city and reduce reliance on the state system for making local trips. Given that significant constraints prevent further expansion or continuation of the arterial or collector network, the TSP update will focus on opportunities to improve local street connectivity as well as maximize and improve the pedestrian, bicycle, and public transportation systems along existing arterials as described below. Figure 10 illustrates the potential changes to the functional classification plan.



Functional Classification Plan Updates
Gladstone, Oregon

Figure
10

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\10 Functional Classification Plan Updates.mxd - mbell - 4:13 PM 5/5/2017

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

Local Street

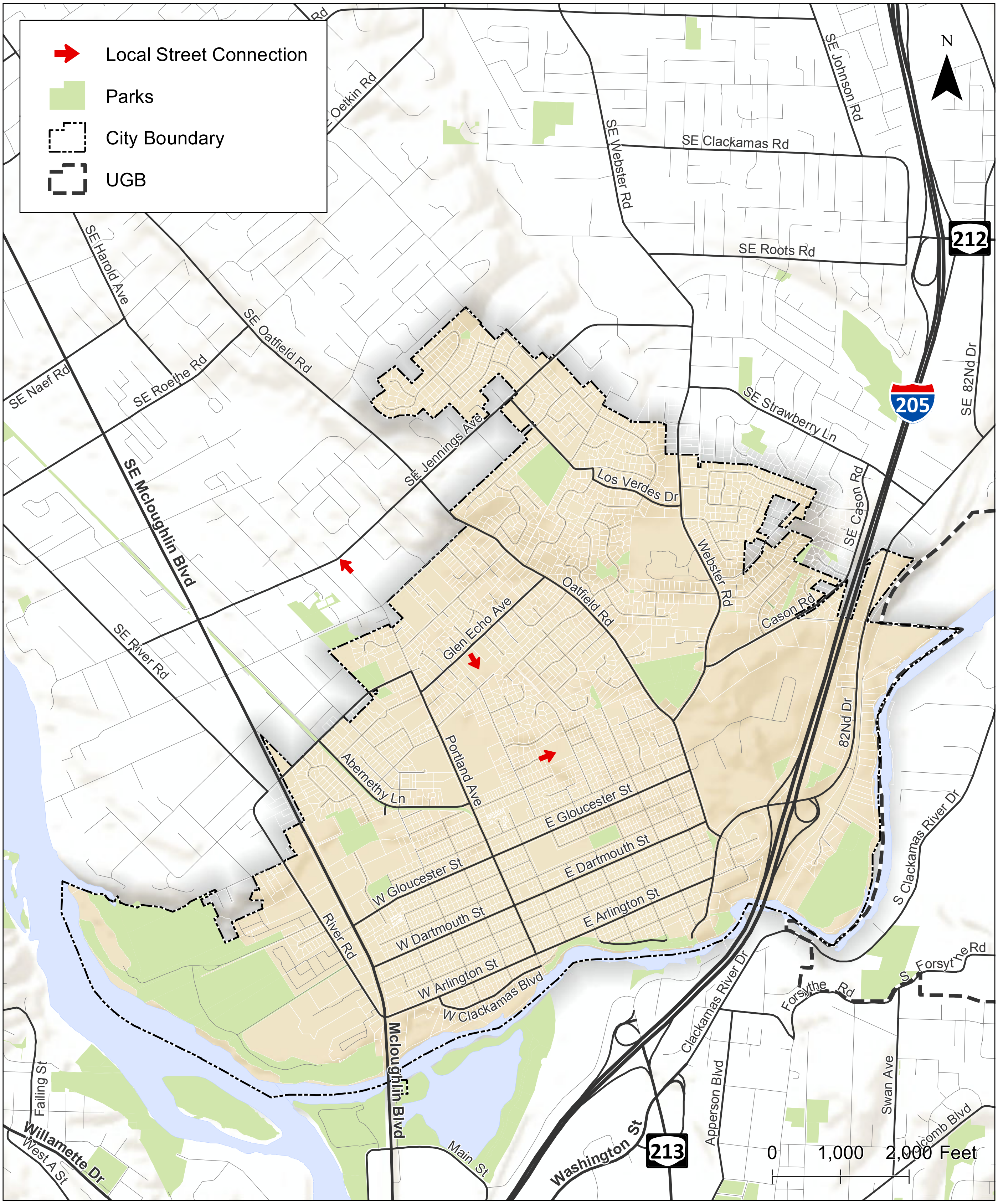
Based on the RTP, local streets primarily provide direct access to adjacent land uses and therefore serve an important role for supporting pedestrian and bicycle travel. The RTP recommends a maximum spacing of 1/10 mile for local streets and suggests limiting cul-de-sacs to 200 feet in length. Much of the local street system within southern part of Gladstone is on a grid system, which provides the highest level of connectivity However, much of the northern part of Gladstone is characterized by short, indirect streets with numerous cul-de-sacs. Although this type of system can have the effect of limiting traffic speeds and volumes on local streets, it can also result in indirect travel paths and a reliance on arterials for local trips. Based on a review of the local street system, opportunities to improve and expand local street connectivity exist in few areas throughout the city. Figure 11 illustrates the local street connectivity opportunities within Gladstone. The arrows shown in Figure 11 represent the placement and general direction of potential connections. The following summarizes the opportunities identified in Figure 11 to show the potential impact of the connections on local street connectivity.

- Portland Avenue Extension – Portland Avenue currently terminates approximately 200-feet south of Jennings Avenue. The Portland Avenue extension could improve access and circulation within the city and reduce reliance on OR 99E, Abernathy Lane, and other streets for providing access to commercial activity along Portland Avenue.
    - The Portland Avenue extension along with the segment of Portland Avenue between the current roadway terminus and Glen Echo Avenue should be designated consistent with the segment further to the south.
- Tryon Court Extension – As development occurs along the south side of Glen Echo Avenue, a new street connection the extends southeast from Tryon Court to Nelson Lane could provide access to the development area as well as improve local street connectivity within the northern part of Gladstone.
- Kenmore Street Extension – As development occurs on the west side of High Street, a new local street connection that extends northeast from Kenmore Street to High Street could provide access to the development areas as well as improve local street connectivity to the central part of Gladstone and within the vicinity of the Gladstone High School.

As new development occurs, the opportunities identified in Figure 11 should be considered to create a more efficient network consistent with the RTP guidelines. It should be noted that the primary constraint associated with each of the opportunities shown in Figure 11 is that they are located on private property and will likely only occur as part of future development or redevelopment.

Future Traffic Operations

Future traffic operations were evaluated at the eight study intersections in accordance with the assumptions and methodologies identified in *Tech Memo 4: TSP Methodology and Assumptions*.



Local Street Connectivity Needs
Gladstone, Oregon

Figure
11

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\11 Local Street Connectivity.mxd - mbell - 4:14 PM 5/5/2017

KITTELSON & ASSOCIATES

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

Forecast Traffic Volume and Peak Hour Operations

Forecast traffic volumes were developed for the study intersections based on the existing traffic counts and information provided in Metro's travel demand model for the Gladstone area. The travel demand model provides base year 2010 and forecast year 2040 traffic volume projections that reflect anticipated land use changes and planned transportation improvements within the study area. The forecast traffic volumes were developed by applying the post-processing methodology presented in the National Cooperative Highway Research Program (NCHRP) Report 255 *Highway Traffic Data for Urbanized Area Project Planning and Design*, in conjunction with engineering judgment and knowledge of the study area. *Attachment "C" contains the travel demand model data provided by Metro.*

Figure 12 illustrates the location of the study intersections. Figure 13 illustrates the year 2040 forecast traffic volumes at the study intersection during the weekday p.m. peak hour. Figure 13 and Table 8 summarize the results of the future traffic operations analysis at the study intersections under year 2040 traffic conditions. *Attachment "D" contains the year 2040 existing traffic conditions worksheets.*

Table 8: Future Year 2040 Weekday PM Peak Hour Intersection Operations

Map ID	Intersection	Level of Service (LOS)	Delay (Sec)	Volume/ Capacity (V/C)	Measure of Effectiveness (MOE)		MOE Met?
					Agency	Maximum	
	Signalized Intersections						
1	OR 99E/S Arlington Street	F	>80.0	>1.0	ODOT	v/c 1.1	***No***
2	OR 99E/W Gloucester Street	C	24.6	0.93	ODOT	v/c 1.1	Yes
3	OR 99E/Glen Echo Avenue	F	>80.0	>1.0	ODOT	v/c 1.1	***No***
4	Oatfield Road/SE 82nd Drive	C	27.8	0.61	ODOT	v/c 0.99	Yes
7	I-205 Southbound Ramp Terminal/SE 82nd Drive	E	67.7	1.00	ODOT	v/c 0.85[1]	***No***
8	I-205 Northbound Ramp Terminal/SE 82nd Drive	D	40.7	>1.0	ODOT	v/c 0.85[1]	***No***
	Unsignalized Intersections						
5	Oatfield Road/Ridgegate Drive-Collins Crest Street	E	35.1	0.26	City	LOS E	Yes
6	Oatfield Road/Glen Echo Avenue	E	36.2	0.49	City	LOS E	Yes

Notes:
LOS = Intersection Level of Service (Signal), Critical Movement Level of Service (TWSC).
Delay = Intersection Average vehicle delay (Signal), critical movement vehicle delay (TWSC).
V/C = Intersection V/C (Signal) critical movement V/C (TWSC).
MOE = Measure of Effectiveness

1. The maximum v/c ratio at ramp terminals within an urban area may be increased to 0.90 if it can be determined that the 95th percentile queue does not extend onto the mainline or into the portion of the ramp needed to safely accommodate deceleration or where an adopted Interchange Area Management Plan (IAMP) is present.

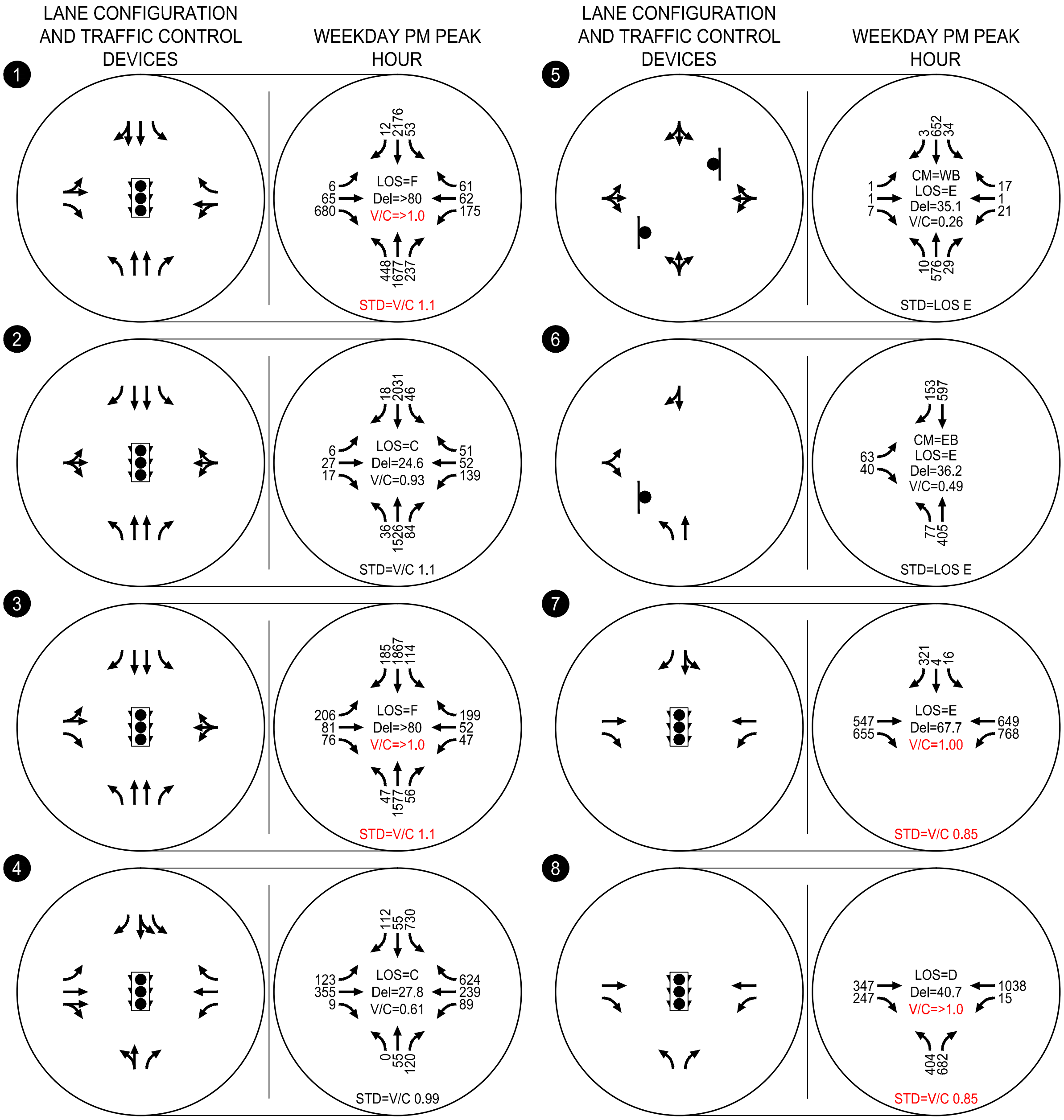
As shown in Table 8, four study intersections are forecast to exceed their acceptable mobility standards and targets under year 2040 forecast traffic conditions. Additional information about the operations issues identified at these study intersections is provided below.

Study Intersections
Gladstone, Oregon

Figure
12

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\12 Study Intersections.mxd - mbell - 4:15 PM 5/5/2017

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



Year 2040 Future Traffic Operations
Weekday PM Peak Hour
Gladstone, Oregon

Figure
13

C:\ACAD\Temp\AcPublish_2224\19890_figures.dwg May 05, 2017 - 4:55pm - fwismer Layout Tab: Fig13

KITTELSON & ASSOCIATES

OR 99E/S Arlington Street

The OR 99E/S Arlington Street intersection is projected to operate at level of service F and above capacity (v/c =1.65) during the weekday p.m. peak hour. This is primarily due to the projected increase in traffic volumes along River Road and OR 99E. The eastbound right and northbound left-turn movements are projected to increase by more than 100% over the 25-year period resulting in significant delay at each approach.

OR 99E/Glen Echo Avenue

The OR 99E/Glen Echo Avenue intersection is projected to operate at level of service F and above capacity (v/c =1.37) during the weekday p.m. peak hour. This is primarily due to the projected increase in traffic volumes along Glen Echo Road and OR 99E. The eastbound left, westbound right, southbound left, and southbound right-turn movements are all projected to increase by more than 100% over the 25-year period resulting in significant delay at each approach.

I-205 Southbound Ramp Terminal/SE 82nd Avenue

The I-205 Southbound Ramp Terminal/82nd Drive intersection is projected to operate at LOS E and at capacity (V/C = 1.0) during the weekday p.m. peak hour. This is primarily due to the moderate increase in eastbound right and westbound left-turn movements expected over the 25 year period.

I-205 Northbound Ramp Terminal/82nd Drive

The I-205 Northbound Ramp Terminal/82nd Drive intersection currently operates at LOS D and above capacity (v/c = 1.05 during the weekday p.m. peak hour. This is primarily due to the moderate increase in westbound through movements expected over the 25 year period.

Oatfield Road/Gloucester Street

The current TSP identifies the need for a traffic signal at the Oatfield Road/Gloucester Street intersection “to provide a safe and convenient point of access onto Oatfield Road, and reinforce Gloucester Street’s function as a collector and connection route to Portland Avenue and McLoughlin Boulevard.” The new traffic signal was also proposed to be coordinated with the existing Oatfield Road traffic signals at Webster Street and 82nd Drive.

Queueing

A queuing analysis was conducted at the signalized study intersections. Table 9 summarizes the 95th percentile queues during the weekday a.m. and p.m. peak hours under year 2021 background and total traffic conditions. The vehicle queue and storage lengths were rounded to the nearest 25-feet. The storage lengths reflect the striped storage for each movement at the intersections.

Table 9: Weekday PM Peak Hour Queuing

Intersection	Movement	95th Percentile Queue	Storage Length (feet)	Adequate?
OR 99E/Arlington Street	WBR	16	175	Yes
	NBL	#710	200	***No***
	NBR	40	280	Yes
	SBL	m13	250	Yes
OR 99E/Gloucester Street	NBL	m12	220	Yes
	NBR	m20	175	Yes
	SBL	m20	250	Yes
	SBR	m0	160	Yes
OR 99E/Glen Echo Avenue	EBR	64	100	Yes
	NBL	m26	185	Yes
	NBR	m12	160	Yes
	SBL	71	185	Yes
	SBR	51	160	Yes
Oatfield Road/82nd Drive	EBL	171	80	***No***
	WBL	134	170	Yes
	WBR	160	170	Yes
	NBR	62	100	Yes
	SBL	436	110	***No***
	SBR	43	101	Yes
I-205 SB Ramp Terminal/82nd Drive	WBL	m#527	310	***No***
	SBR	#80	360	Yes
I-205 NB Ramp Terminal/82nd Drive	EBR	m32	50	Yes
	WBL	25	200	Yes
	NBR	#338	575	Yes

Where WB = Westbound, SB = Southbound, EB = Eastbound, NB = Northbound, L = Left, R = Right
#: 95th percentile volume exceeds capacity, queue may be longer.
m: Volume for 95th percentile queue is metered by upstream signal.

As shown in Table 9, three study intersections are expected to have 95th percentile queues that exceed the striped storage for the movements:

- The northbound left-turn movement at the OR 99E/Arlington Road intersection is expected to exceed the striped storage for the movement by approximately 510 feet.
- The eastbound left-turn movement at the Oatfield Road/82nd Drive intersection is expected to exceed the striped storage for the movement by approximately 91 feet.
- The southbound left-turn movement at the Oatfield Road/82nd Drive intersection is expected to exceed the striped storage for the movement by approximately 326 feet.
- The westbound left-turn movement at the I-205 SB Ramp Terminal/82nd Drive intersection is expected to exceed the striped storage for the movement by approximately 217 feet.

Traffic Safety

As indicated in *Tech Memo 5: Existing Gaps and Deficiencies*, one study intersection was found to exceed the critical crash rate by intersection type and volume and one study intersection was identified as within the top five percent of statewide crash sites over the last five-year period. Several other intersections and corridors were also identified as having existing safety issues. The following provides a summary of the traffic safety needs for the city:

- I-205 Southbound Ramp Terminal/SE 82nd Drive
- OR 99E/Arlington Road
- OR 99E Corridor
- Oatfield Road Corridor
- 82nd Drive Corridor

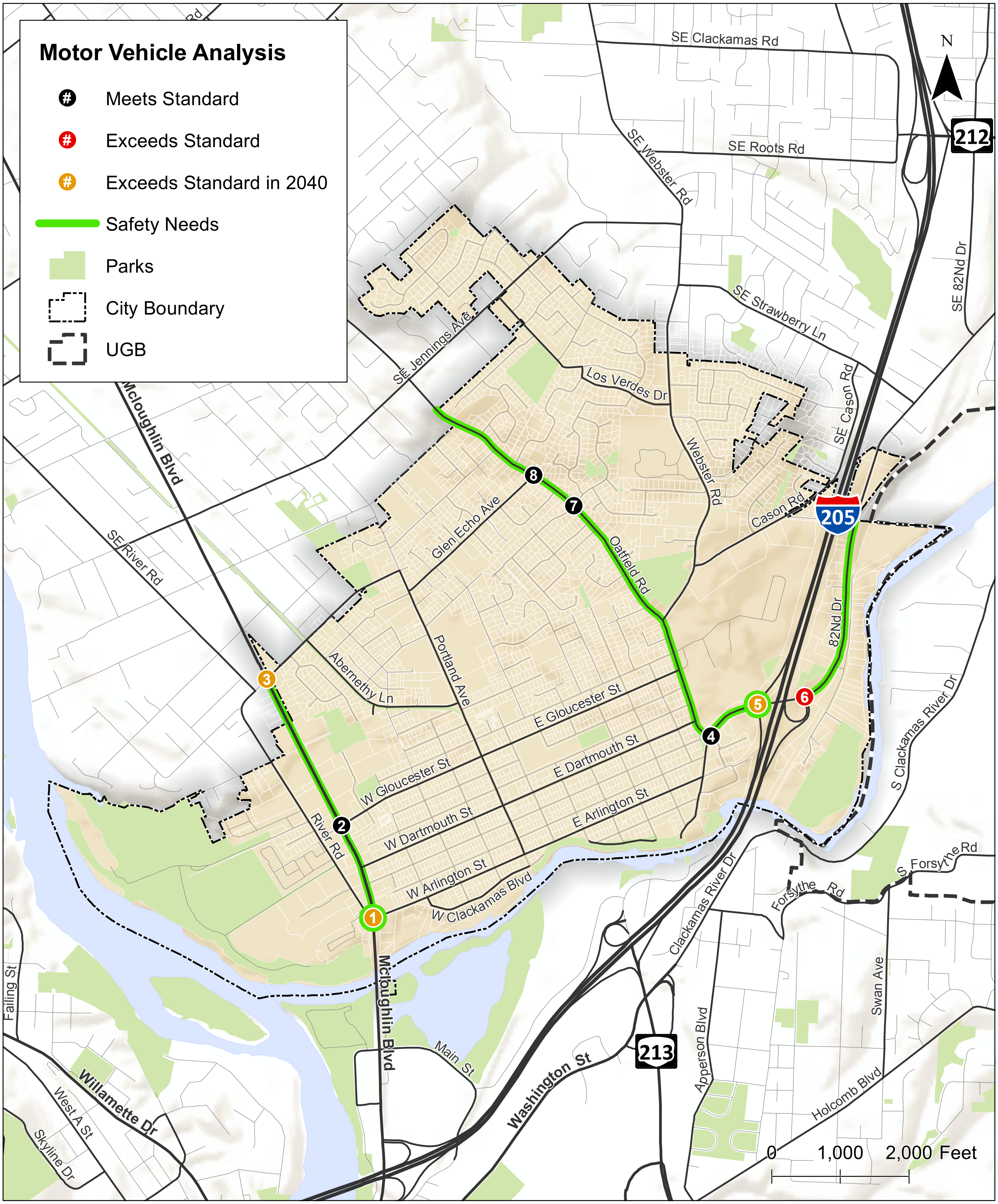
Figure 14 illustrates the motor vehicle system needs at the study intersections.

Freight Needs

As indicated in *Tech Memo 5: Existing Gaps and Deficiencies*, the only designated freight routes in Gladstone are OR 99E and I-205. The RTP identifies the segment of I-205 that travels through Gladstone as a Main Roadway Route, which is intended to connect major activity centers in the region to other areas in Oregon or the United States, Mexico, and Canada. Within Oregon, these routes include I-5, I-84, I-205, US 26, Hwy 217, 99E, and 99W. The RTP identifies the segment of OR 99E that travels through Gladstone as a road connector, which connects freight facilities or freight generation areas to the main roadway routes, such as I-205.

The RTP identifies five policies to serve as the foundation for the regional freight network, including 1) Use a system approach to plan for and manage the freight network, 2) Reduce delay and increase reliability, 3) Protect industrial lands and freight transportation investments, 4) Look beyond the roadway network to address critical marine and rail needs, and 5) Pursue clean, green and smart technologies and practices.

Freight movement within the city consists of commercial freight traffic traveling through the city on OR 99E, I-205, and 82nd Drive and the delivery of goods to the retail/commercial areas along OR 99E, Portland Avenue, and 82nd Drive. Therefore the primary freight needs are minimizing conflicts between freight vehicles and other travel modes along designated freight routes; reducing congestion on OR 99E and at the I-205/82nd Drive interchange to ensure the continuous movement of goods, and; ensuring adequate access to/from retail/commercial areas along OR 99E, Portland Avenue, and 82nd Drive as well as other parts of the city for the delivery of goods. These needs will most likely be addressed by improvements to the public transit, pedestrian, bicycle, motor vehicles systems within the city.



Motor Vehicle System Needs
Gladstone, Oregon

Figure
14

H:\projfile\19890 - Gladstone TSP Update\gis\TM6\14 Motor Vehicle System Needs.mxd - mbell - 5:16 PM 5/5/2017

KITTELSON & ASSOCIATES

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

OTHER TRAVEL MODES NEEDS

Rail

As indicated in *Tech Memo 5: Existing Gaps and Deficiencies*, there are currently no freight rail or passenger rail terminals located within Gladstone. The closest terminals are located to the south in Oregon City. Access to the terminals is provided via the local street network and either OR 99E or I-205. A typical trip from Gladstone could take up to 10 minutes by car or 20 minutes by transit, which also involves up to 15 minutes of walking. Alternatively, a trip from Gladstone could take up to 40 minutes by foot or 20 minutes by bike and involve travel along OR 99E and/or a series of local streets that may or may not have sidewalks. Therefore, the needs associated with the rail travel include ensuring adequate access to/from the freight and passenger rail terminals in Oregon City by all travel modes. This need will be addressed through the identification of improvements to the public transit, pedestrian, bicycle, motor vehicles systems within the city.

Air

As indicate in *Tech Memo 5: Existing Gaps and Deficiencies*, there are currently no airports located within Gladstone. The closest airports include Portland International Airport, the Aurora State Airport, and the Mulino Airport. Access to the Portland Airport can be a challenge for Gladstone residents due to congestion on I-205, the most direct and commonly used route to the airport. Transit service, which involves transferring in Portland, is a time-consuming and indirect way to access the Portland Airport. A typical trip from Gladstone to the Portland International Airport would take 20-30 minutes by vehicle (depending on traffic) or 100 minutes by public transit. Public transit routes to the Portland International Airport would include two transfers, either two buses and the MAX red line or one bus, the MAX Green line, and the MAX red line. Therefore, the needs associated with air travel include ensuring adequate access to/from the airports in Portland, Aurora, and Mulino by all (feasible) travel modes. This need will be addressed through the identification of improvements to the public transit, pedestrian, bicycle, motor vehicles systems within the city.

Water

As indicated in *Tech Memo 5: Existing Gaps and Deficiencies*, waterways in Gladstone are rarely used to support transportation. However, they are used for recreational purposes. Access to the rivers is provided by Meldrum Bar Park, Dahl Beach Park, and High Rock Park. The parks are used year round to access the river for recreation. Therefore, the needs associated with water travel include ensuring adequate access to/from the parks within Gladstone. This need will be addressed through the identification of improvements to the public transit, pedestrian, bicycle, motor vehicles systems within the city.

Pipeline

There are currently no needs associated with pipelines.

TRANSPORTATION SYSTEM MANAGEMENT OPERATIONS

Transportation System Management and Operations (TSMO) measures are designed to increase the efficiency and safety of the transportation system without physically increasing roadway capacity. Typical TSMO measures include Intelligent Transportation System (ITS) solutions, real-time traveler information, and services that respond quickly to traffic incidents. Several TSMO strategies are identified in Attachment A and will be further evaluated in *Tech Memo 8: TSP Solutions.*

TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) strategies measures typically include any method intended to shift travel demand from single occupant vehicles to non-auto modes or carpooling, travel at less congested times of the day, etc. Several TDM strategies are identified in Attachment A and will be further evaluated in *Tech Memo 8: TSP Solutions.*

Attachment A Menu of Potential Solutions

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

Date: May 5, 2017 Project #: 19890.3

To: Jim Whynot and Jacque Betz, City of Gladstone
Gail Curtis, Oregon Department of Transportation

From: Matt Bell and Molly McCormick, Kittelson and Associates, Inc.

Project: Gladstone Transportation System Plan (TSP) Update

Subject: Menu of Potential Solutions

This memorandum summarizes a range of potential transportation-related solutions that can be used guide the city as it grows and redevelops in the future. These “toolbox” measures fall into the following categories:

- Active transportation
- Connectivity
- Intersection control
- Neighborhood traffic management
- Transportation system management and operations
- Land use

The potential solutions included in this toolbox are intended to help the city maximize its investment in the existing infrastructure and enhance the quality and availability of pedestrian, bicycle, transit, and motor vehicle facilities, as well as plan for the long-term transportation needs of the community.

ACTIVE TRANSPORTATION

One of the city’s priorities is to reduce the reliance of single occupancy vehicles for local trips by providing residents with the option to walk, bike, or take transit to their destination. The provision of pedestrian and bicycle facilities between key destinations as well as the implementation of other active transportation strategies can enable the community to establish a well-connected system that promotes walking, bicycling, and taking transit.

Pedestrian Facilities

Pedestrian facilities are the elements of the transportation system that enable people to walk safely and efficiently between neighborhoods, retail/commercial centers, employment areas, and transit stops. These include facilities for pedestrian movement along key roadways (e.g., sidewalks, shared use paths and trails) as well as for safe roadway crossing locations (e.g., crosswalks, crossing beacons, pedestrian refuge islands). Each plays a role in developing a comprehensive pedestrian network.

A few of the city's arterial and collector streets currently lack pedestrian facilities. Others have facilities that are deficient or do not provide a comfortable environment for most pedestrians. In the future, as arterial and collector streets are improved, most of these streets will include sidewalks and/or shared-use paths alongside the roadway. Pedestrian improvements should be prioritized based on their ability to complete connections between places that generate walking trips such as residential neighborhoods and schools, parks, retail/commercial center, and transit stops. Shared-use path projects are discussed in a subsequent section because of their utility for both pedestrians and bicyclists.

Sidewalks

Sidewalks are the fundamental building blocks of the pedestrian system. They enable people to walk comfortably, conveniently and safely from place to place. They also provide an important means of mobility for people with disabilities and families with strollers, and others who may not be able to travel on an unimproved roadside surface. Sidewalks are usually constructed from concrete and they provide an area separated from the roadway by a curb, landscaping, and/or on-street parking. Sidewalks are widely used in urban and suburban settings. The images below show sidewalks in a variety of urban and suburban settings.

Types of Pedestrian Crossings

Crossing facilities enable pedestrians to safely cross streets, railroad tracks, and other transportation facilities. Planning for appropriate pedestrian crossings requires the community to balance vehicular mobility needs with providing crossing locations that are located along the desired routes of walkers.

The state of Oregon considers all roadway intersections to be legal crossing locations for pedestrians regardless of whether a painted crosswalk is provided. At these locations, drivers are required to yield the right of way to pedestrians to allow them to cross. Driver compliance to yielding is often inconsistent and pedestrians often have difficulty crossing higher volume and higher speed roadways. There are several different types of pedestrian crossing treatments; each of which is applicable under a different range of considerations.

A brief description of the various pedestrian crossing types and where they can be applied is provided below.

High Visibility Crosswalk

Clear, reflective roadway markings and accompanying devices are placed at intersections and priority pedestrian crossings where there is sufficient sight distance and reaction time for motorists to yield. Crosswalks can be used at intersections and at mid-block crossings.

Raised Crosswalk

A raised crosswalk is raised higher than the surface of the street to give motorists and pedestrians a better view of the crossing area. A raised crosswalk is similar to a speed table and are often marked and signed for pedestrian crossing. Raised crosswalks are often used in areas with low speeds where people and difficulty crossing the street.

Raised Pedestrian Refuge

A raised median island provides a protected area in the middle of a crosswalk for pedestrians to stop while crossing the street. These refuges allow pedestrians to cross one direction of traffic at a time. Pedestrian refuges are often used in areas with high traffic volumes and/or at locations with a crash history involving pedestrians.

In-Street Yield

“Yield to Pedestrian” signs can be placed in the middle of crosswalks to increase driver awareness of crossing locations and the legal responsibility to yield right-of-way to pedestrians crossing the street. These signs can be effective in areas that experience high volumes of pedestrian crossings and low levels of motorist yielding rates.

Grade-Separated Crossing

Grade-separated crossings are either underpasses or overpasses that allow pedestrians to entirely avoid conflicts with automobiles when crossing a busy roadway. When used as part of a shared-use path, grade-separated crossings also accommodate bicycles. Grade-separated crossings are necessary wherever pedestrian crossings of freeways are constructed and in other limited circumstances, such as railroad crossings. However, they are often perceived as unsafe (especially under-crossings), and may result in significant out-of-direction travel for pedestrians. Grade-separated crossings can also be very expensive to build and are typically used sparingly.

Rapid Rectangular Flashing Beacon (RRFB)

These crossing treatments include signs that have a pedestrian-activated “strobe-light” flashing pattern to attract motorists’ attention and provide awareness of pedestrians that are intending to cross the roadway. RRFBs are often used in areas with high volumes of pedestrians desiring to cross a street at a mid-block location.

Pedestrian Hybrid Beacon (HAWK)

A HAWK is a pedestrian-activated signal that is unlit when not in use. When activated the signal begins with a yellow light alerting drivers to slow and then a solid red light appears requiring drivers to stop while pedestrians have the right-of-way to cross the street. HAWKs are often used on wide roadways where mid-block crossings are difficult.

Bicycle System

Bicycle facilities enable cyclists to travel safely and efficiently on the transportation system. Both public infrastructure (bicycle lanes, shared roadways, shared-use paths and trails, signing and striping) and “on-site” facilities (secure parking, changing rooms, and showers at worksites) are important to providing a comprehensive bicycle system.

Many different bicycle facility types are needed to create a complete bicycle system that connects people to their destinations and allows cyclists to feel comfortable and safe while riding. While there are some bicycle lanes along select arterial and collector streets within the city, these lanes are not provided along the entire lengths of the corridors. The existing network could be supplemented by additional bicycle lanes or other types of bicycle facilities.

Types of Bicycle Facilities

Several types of bicycle facilities are discussed below.

Bike Lanes

Bike lanes are on-street bicycle facilities that provide a designated space for cyclists that is separated from vehicle traffic by pavement markings. Bike lanes are generally used on collector and arterial streets with adequate space to accommodate the bike lane width and with vehicular travel volumes and speeds that make it difficult for drivers and cyclists to "share the road." Bike lanes typically include white striping with a bicycle symbol or they can be buffered as shown below.

Buffered Bike Lanes

Buffered bike lanes are on-street bike lanes that include a physical separation ("buffer") between the bike lane and the vehicle traffic lane and/or the vehicle parking lane. Buffered bike lanes can be particularly helpful on streets with high vehicle speeds, high vehicle volumes, or relatively frequent parking turnover.

Cycletracks

Cycletracks are exclusive bikeways separated from vehicle travel lanes, parking lanes and sidewalks. They can be one- or two-way in direction and can be even with the street, the sidewalk, or somewhere between. On existing streets, cycletracks can be constructed where there is sufficient roadway width and/or in contexts where the number of vehicular travel lanes can be reduced.

Sharrows

A shared-lane pavement marking, or sharrow, is a pavement marking that can be used where space does not allow for a bike lane and/or where vehicular volumes and travel speeds allow cyclists to comfortably and conveniently "share the road" with motorists. Sharrows remind motorists of the presence of bicycles and indicate to cyclists where to safely ride within the roadway.

Low-Traffic Bikeway

Also known as "bicycle boulevards," streets with low vehicular volumes and speeds can be optimized for bicycle travel by including treatments for traffic calming and traffic reduction, signage and pavement markings, and intersection crossing treatments. Bike boulevards are ideal on local streets that parallel larger, high traffic routes and provide connections to similar destinations.

Mixed-Use Shoulder

A mixed-use shoulder is a roadway shoulder that is wide enough to be used by pedestrians and bicyclists as a mixed-use path. Mixed-use shoulders are ideal on low-volume streets where topography or the surrounding environment does not allow for the addition of a sidewalk or separate bicycle facility.

Wayfinding Signage

Wayfinding signs can direct bicyclists and pedestrians towards key destinations both within the city as well as to neighboring communities. These signs often include the distance to the destination and/or average travel times. Wayfinding signs are generally used on primary bicycle routes and multi-use trails.

"Share the Road" Signs

"Share the Road" signs can be used to remind drivers to watch for bicyclists on roadways without on-street bicycle lanes. However, the signs are not meant as a replacement for using the other facility types listed in this table. An alternative to the "Share the Road" sign is a "Bikes in Road" sign that suggests bicyclists take the lane rather than share the road.

Bicycle Crossings

Bicycle crossing treatments connect bike facilities at high traffic intersections, trailheads, or other bike routes. Frequently used crossing treatments are shown below.

Marked Bicycle Detectors at Traffic Signals

Many traffic signals are "actuated", meaning that a green light is provided to a particular intersection approach only when a vehicle is detected on that approach. However, actuating a signal as a cyclist is difficult if no indication is given of the location of detection equipment. Pavement markings can show cyclists where to stand to actuate a signal. Additionally, the sensitivity of all traffic signal loop detectors can be set to allow for bicycle activation. At intersections where bicyclists wait in areas separate from traffic, specific bicycle detectors can be installed.

Bicycle-only Signal

Bicycle-only signals can be used at intersections to provide a separate signal phase that is dedicated to bicyclists. They are especially useful at roadway intersections with multi-use trails, where there are high volumes of bicyclists crossing, or at intersections where large numbers of right-turning vehicles have the potential to conflict with through bicycles.

Preferential Movement for Bicycles

Some intersections may be designed such that cars cannot make particular movements, but bicyclists can. This type of treatment allows greater connectivity for bicyclists.

Striping Through Intersections

At high-vehicle and/or high-bicycle volume intersections, extending bicycle lane striping through the intersection can alert drivers to look out for bicyclists traveling through the intersection and help bicyclists know where to proceed with crossing.

On-Site Facilities

Bicyclists also benefit from facilities that are located on-site within key employment, commercial and institutional locations. These facilities can include indoor and/or outdoor secure bicycle parking, open or covered U-shaped racks, showers/changing rooms, and storage lockers for clothing and gear. The City can use incentives to encourage developers to include these types of facilities in new buildings.

Shared-use Pathways

Paved, bi-directional shared-use pathways can be designed as part of a Park and Recreational System and/or can be constructed adjacent to roadways where the topography, right-of-way, or other issues don’t allow for the construction of sidewalks and bike facilities.

Intersections of shared-use paths and roadways require crossing treatments that are well-marked and highly visible to vehicles and trail users. Shared-use paths can be used to create longer-distance links within and between communities, provide regional connections and play an integral role in recreation, commuting, and accessibility for residents due to their broad appeal to users of all ages and skill levels.

Shared-use paths provide a comfortable space for pedestrians and bicyclists of all ages.

The City may use shared-use paths in lieu of sidewalks and bike facilities, where appropriate. The Parks Master Plan, which is currently underway, will likely include shared use paths.

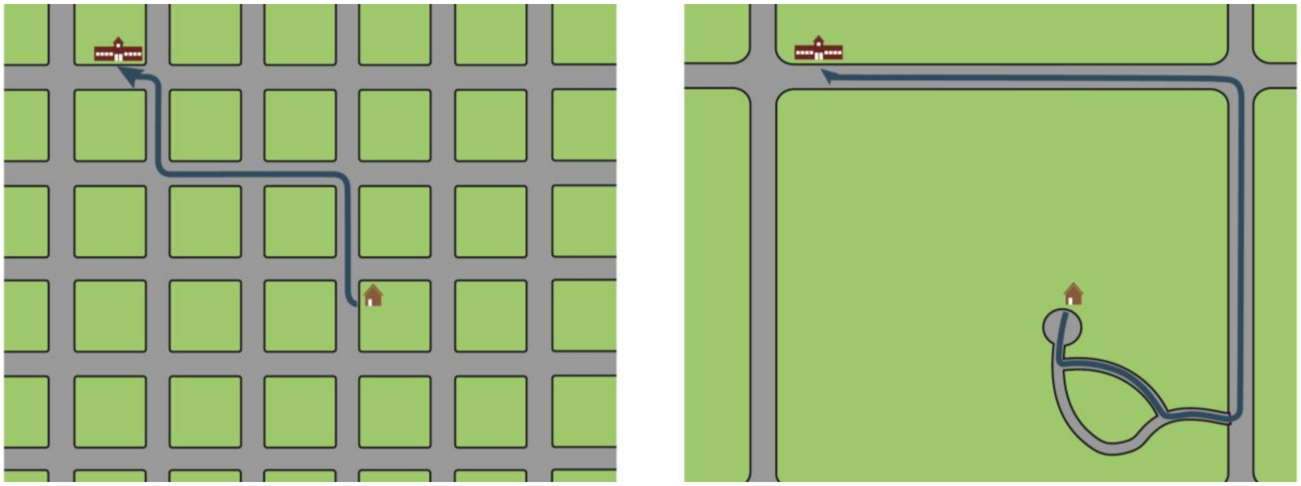
Public Transit

Public transit can provide important connections to destinations for people that do not drive or bike and can provide an additional option for all transportation system users for certain trips. Public transit can also provide links to walking, bicycling, or driving trips: users can walk to and from transit stops and their homes, shopping or work places, people can drive to park-and-ride locations to access a bus, or people can bring their bikes on transit vehicles and bicycle from a transit stop to their final destination.

Providing transit service in smaller cities is generally led by a local or regional transit agency, and is dependent on having the land use and densities that can support service. The city can plan for transit-supportive land use patterns and support future transit viability by designing and building streets that will comfortably accommodate transit stops and include the right-of-way that could allow for transit stops to be located as close as possible to important destinations in the city. At a minimum, a transit stop should be well-signed and have a comfortable space to wait. Benches that prove people with a place to sit and shelters that protect people from the weather can improve user comfort. Including bike parking near bus stops allows people the option to leave their bike at one trip-end instead of bringing it on the bus.

CONNECTIVITY

A well connected grid network of streets provides for convenient travel for vehicles, pedestrians and cyclists. Given an equivalent number of roadway lane-miles, a connected system generally has more capacity than a disconnected road network and provides the shortest, most direct routes for all users. A grid network can also lessen the effects of congestion along a single route, due to the number of alternate routes available. A connected system also can create easier and more expedient emergency response and can encourage pedestrians and bicyclists, who benefit greatly from having a direct route due to generally slower travel speeds. The images below show how someone might travel between their home and school on a well-connected grid network versus one that is a system of cul-de-sacs.



The left illustration is a connected street grid, on the right is a less connected system. Travel distance from home to school is shorter in a connected system.

The southern part of Gladstone is largely built on a grid system, while the northern part is largely built on a system of cul-de-sacs and dead ends. These streets can be desirable to residents because they can limit traffic speeds and volumes on local streets, but cul-de-sacs and dead ends result in longer trip distances, increased reliance on arterials for local trips, and limited options for people to walk and bike to the places they want to go.

The future street system needs to balance the benefits of providing a well-connected grid system with physical and topographical challenges, particularly in the northern part of the city. Incremental improvements to the street system can be planned carefully to provide route choices for motorists, cyclists and pedestrians while accounting for potential neighborhood impacts. In addition, the quality of the transportation system can be improved by making connectivity improvements to the pedestrian and bicycle system separate from street connectivity.

INTERSECTION CONTROL

The Oregon Department of Transportation (ODOT) maintains the traffic signals located along OR 99E and 82nd Drive. The City maintains the signals located along Oatfield Road. The rest of the intersections in the city are stop-controlled. The majority of these are two-way stop controlled (TWSC), with the stop sign provided on the lower volume of the two intersecting roadways. In the future, increasing traffic volumes may warrant different intersection options, such as roundabouts, traffic signals, and all-way stop control. The type of intersection control and final design for each intersection will need to consider the desired function of the roadways, travel speeds, safety, pedestrian and bicycle needs, topography, anticipated traffic volumes, sight distance, available space and other potential constraints and opportunities.

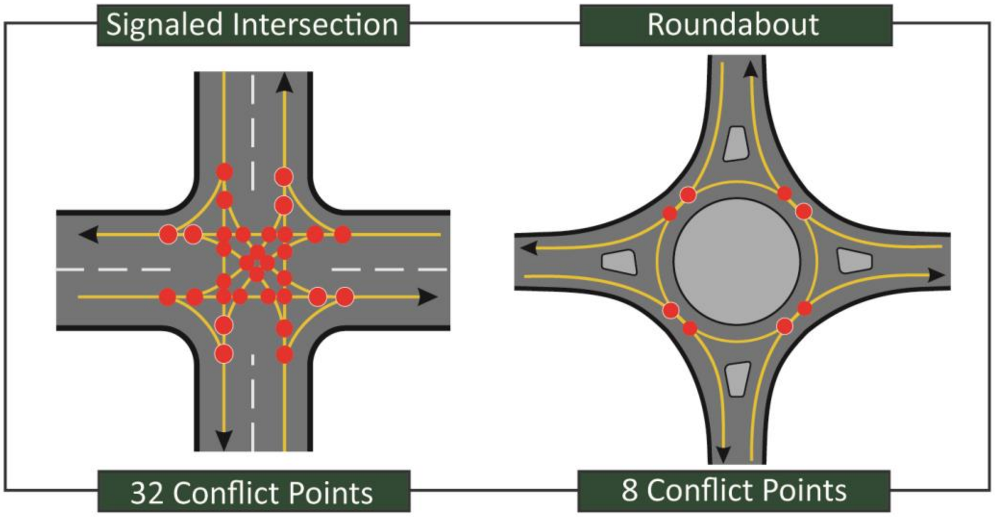
All-way Stop-control

All-way stop control is often used when the two intersecting roadways have similar vehicular volumes and where a traffic signal or roundabout is not needed. All-way stop control intersections are relatively inexpensive and can be implemented more easily than traffic signals and roundabouts.

Roundabout

Roundabouts are circular intersections where entering vehicles yield to vehicles already in the circle. They are designed to slow vehicle speeds to 20 to 30 mph or less before they enter the intersection. As shown below, roundabouts have fewer conflict-points and have been shown to reduce the severity of crashes, as compared to signalized intersections. Roundabouts can be more costly to design and install when compared to other intersection control types, but they have a lower operating and maintenance cost than traffic signals. Topography must be carefully evaluated in considering a roundabout, given that slope characteristics at an intersection may render a roundabout infeasible.

Roundabouts have fewer conflict points than signalized intersections.



Depending on the design, roundabouts can be more land-intensive than other intersection controls. To maintain the flexibility to construct roundabouts at key intersections, the City may want to ensure adequate right-of-way is provided at intersection locations whenever right-of-way dedication or acquisition activities are undertaken. Information contained in the City's development code and engineering standards can account for this need.

Key intersections of arterial/arterial, arterial/collector, and collector/collector streets may be candidates for roundabout installation in the future. Within Gladstone, a majority of these locations could likely be well served by a single lane roundabout. Based on national guidance, the right-of-way dedication at these locations could include a circle with a radius of 85 feet measured from the center of the intersection, to preserve space for a single-lane roundabout, sidewalk, and landscaping in a 170-foot diameter circle. On intersections along key freight routes within the city, a 95-foot radius (190 feet in diameter) circle could be preserved.

Traffic Signals

Traffic signals allow opposing streams of traffic to proceed in an alternating pattern. Both national and state guidance indicates when it is appropriate to install traffic signals at intersections. When used, traffic signals can effectively manage high traffic volumes, and provide for dedicated times in which pedestrians and cyclists can cross roadways. Because they continuously draw from a power source and must be periodically re-timed, signals typically have higher maintenance costs than other types of intersection control. Signals can improve safety at intersections where signal warrants are met, however, signals may result in a shift to higher levels of rear-end crashes compared to alternatives.

NEIGHBORHOOD TRAFFIC MANAGEMENT

Neighborhood Traffic Management (NTM), also known as "traffic calming," describes traffic control devices typically used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic. Below are illustrations and descriptions of neighborhood traffic management strategies that could be applied in Gladstone to address traffic issues that arise over time.

Speed Wagon	Pros	Cons
	▪ Inexpensive ▪ Low operating costs ▪ Mobile	▪ Penalties for speeding not enforced ▪ Not permanent ▪ Placement may obstruct bicycle lane or shoulder

Speed Humps	**Pros**	**Cons**
	▪ Permanent ▪ Can be used to provide raised pedestrian crossings ▪ Can be modified to accommodate emergency vehicles	▪ Placement of speed humps can be contentious ▪ Requires maintenance
Traffic Circles	**Pros**	**Cons**
	▪ Can have aesthetic value ▪ Physical barrier encourages lower speeds	▪ Can impede emergency vehicles or freight/delivery truck movement ▪ Increased maintenance costs
Medians	**Pros**	**Cons**
	▪ Eliminates potential conflict points ▪ Provides pedestrian refuge ▪ Can benefit access management	▪ Can be more expensive to construct than other NTM measures ▪ Can impede roadway connectivity ▪ Can impact business access
Landscaping	**Pros**	**Cons**
	▪ Aesthetic value ▪ Provides buffer for pedestrians ▪ Can have traffic calming effect	▪ Requires additional maintenance, including weed management ▪ Requires additional right-of-way allocation ▪ Can impede sight distance

Curb Extensions	Pros	Cons
	▪ Reduces pedestrian crossing distance ▪ Can have a traffic calming effect	▪ Can be expensive to construct ▪ Can impede freight movements

Choker	Pros	Cons
	▪ Can be used in conjunction with a midblock pedestrian crossing ▪ Can have traffic calming affect	▪ Expensive to construct

Narrow Streets	Pros	Cons
	▪ Reduces pedestrian crossing distance ▪ Can have a traffic calming effect ▪ Less asphalt to maintain	▪ Can impede emergency vehicles ▪ Can limit availability of on-street parking

Photo Radar	Pros	Cons
	▪ Permanent speed enforcement ▪ Strong deterrent for excessive speeds	▪ Expensive initial investment required ▪ Not portable

On-Street Parking	**Pros**	**Cons**
	▪ Increases available parking for commercial and/or residential uses ▪ Narrows feel of the street ▪ Potential revenue source when metered	▪ Adequate right-of-way must exist or be created ▪ Can conflict with bicycle lanes ▪ Can create additional conflict points for vehicles ▪ Can reduce sight distance

Selective Enforcement	**Pros**	**Cons**
	▪ Mobile ▪ Can target identified problem areas	▪ Requires allocation of enforcement resources ▪ May only result in temporary improvement in motorist compliance with posted speeds

Partial Street Closures	**Pros**	**Cons**
	▪ Lack of direct through routes for vehicles can reduce speeds ▪ Maintain connectivity for bicycles and pedestrians	▪ Can create connectivity issues, counter to TSP goals ▪ May increase speeds on alternative routes ▪ May increase volumes on alternative routes

Traffic calming should be considered in an area-wide manner to avoid shifting impacts between neighborhoods and adjacent streets. Typically, traffic calming receives a favorable reception by residents adjacent to streets where vehicles travel at speeds above 30 miles per hour. However, traffic calming can also be contentious because it may be perceived as just moving the problem from one neighborhood to another rather than solving it. Traffic calming may also be perceived as impacting emergency vehicle travel.

TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS (TSMO)

Transportation Demand Management (TDM) and Transportation System Management (TSM) strategies are two complementary approaches to managing transportation and maximizing the existing system. Together, these strategies are referred to as Transportation System Management and Operations (TSMO). TDM addresses the *demand* on the system: the number of vehicles traveling on the roadways each day. TDM measures include any method intended to shift travel demand from single occupant vehicles to non-auto modes or carpooling, travel at less congested times of the day, etc. TSM addresses the *supply* of the system: using strategies to improve the system efficiency without increasing roadway widths or building new roads. TSM measures are focused on improving operations by enhancing capacity during peak times, typically with advanced technologies to improve traffic operations.

Metro's Regional TSMO Plan identifies four main areas of investment to improve system performance:

- Multi-modal traffic management (TSM)
- Traffic incident management
- Traveler information
- Transportation demand management (TDM)

The TSMO Plan also identifies specific strategies for 24 mobility corridors in the region. The following strategies are identified for the mobility corridors in Gladstone:

- Freeway Management for I-205
- Arterials Corridor Management for OR 99E

In the TSMO Plan, Freeway Management refers to the expansion of freeway vehicle detection to provide comprehensive freeway traveler information including travel speed, travel times, volumes, forecasted information, incident conditions, and weather conditions. Arterial Corridor Management (ACM) refers to installing upgraded traffic signal controllers, establishing communications to the central traffic signal system, providing arterial detection (including bicycle detection where appropriate), routinely updating signal timings, upgrading traffic signage, and performing on-going maintenance and parts replacement. In addition, it may include providing real-time and forecast traveler information on arterial roadways including current roadway conditions, congestion information, travel times, incident information, construction work zones, current weather conditions and other events that may affect traffic conditions.

The following section provides an overview of a broad range of TSMO measures that are being implemented and considered in the region and identifies and explains those that are most applicable to Gladstone.

TSMO Strategies

Successful implementation of TSMO strategies relies on the participation of a variety of public and private entities. Strategies can be implemented by a region, a city, a neighborhood, or particular employer. In addition, they can be categorized as policies, programs, or physical infrastructure investments. Table 1 provides a summary of potential measures that can be implemented within the Metro region and which entities are generally in the position to implement each one. As the city continues to grow and redevelop over the next 20 to 40 years, the applicability of these strategies can be further reviewed. Additional information on potential strategy implementation within Gladstone is discussed below.

Table 1: Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies

TSMO Strategy	TDM or TSM?	Type of Investment	City/ County/ Region	Transportation Management Association[1]	Developers	Transit Provider	Employers	State
Parking management	TSM / TDM	Policy	P		S	S	S	
Limited/flexible parking requirements	TDM	Policy	P		S		S	
Access management	TSM / TDM	Policy / Infrastructure	P					P
Connectivity standards	TSM / TDM	Policy / Infrastructure	P		S			P
Congestion pricing	TSM / TDM	Policy / Infrastructure	P					P
Flexible Work Shifts	TDM	Program / Policy	S				P	
Frequent transit service	TDM	Program	S			P		
Free or subsidized transit passes	TDM	Program	S				P	
Preferential carpool parking	TDM	Program	S				P	
Carpool match services	TDM	Program	S	P			S	
Parking cash out	TDM	Program		S		S	P	
Carsharing program support	TDM	Program	P	S	P	P	P	
Bicycle facilities	TDM	Infrastructure	P		S		S	S
Pedestrian Facilities	TDM	Infrastructure	P		S			
Regional ITS	TSM	Infrastructure	P					
Regional traffic management	TSM	Infrastructure	P					
Advanced signal systems	TSM	Infrastructure	P			S		
Real time traveler data	TSM	Infrastructure	P					P
Arterial corridor management	TSM	Infrastructure	P					

[1] A Transportation Management Association does not currently exist in Gladstone
P: Primary role
S: Secondary/Support role
* Primary implementation depends on roadway jurisdiction

Strategies for Gladstone

The following section provides more detail on policy, programming and infrastructure strategies that may be effective for managing transportation demand and increasing system efficiency in Gladstone, especially within the next 10 to 20 years.

Programming

Programming solutions can provide effective and low cost options for reducing transportation demand. Some of the most effective programming strategies can be implemented by employers and are aimed at encouraging non-single occupancy vehicle (SOV) commuting. These strategies are discussed below.

Carpool Match Services

Metro coordinates a rideshare/carpool program (see the DriveLessConnect.com website) that regional commuters can use to find other commuters with similar routes to work. The program allows commuters to connect and coordinate with others on locations, departure times, and driving responsibilities. Employers can also play a role in encouraging carpooling by sharing information about the system, providing preferential carpool parking, and allowing employee flexibility in workday schedules.

Collaborative Marketing

Cities, employers, future transit service providers, and developers can collaborate on marketing to get the word out to residents about transportation options that provide alternatives to single-occupancy vehicles.

Policy

Policy solutions can be implemented by cities, counties, regions, or at the statewide level. Regional and state-level policies will affect transportation demand in Gladstone, but local policies can also have an impact.

Limited and/or Flexible Parking Requirements

Cities set policies related to parking requirements for new developments. In order to allow developments that encourage multi-modal transportation, cities can set parking maximums and low minimums and/or allow for shared parking between uses. Cities can also provide developers the option to pay in-lieu fees instead of constructing additional parking. This option provides additional flexibility to developers that can increase the likelihood of development, especially on smaller lots where surface parking would cover a high portion of the total property.

Finally, cities can set policies that require provision of parking to the rear of buildings, allowing buildings in commercial areas to directly front the street. This urban form creates a more appealing environment for walking and window-shopping. In-lieu parking fees support this type of development for parcels that do not have rear- or side-access points.

Parking Management

Parking plays a large role in transportation demand management, and effective management of parking resources can encourage use of non-single occupancy vehicle modes. Cities can tailor policies to charge for public parking in certain areas and impose time limits on street parking in retail centers. Cities can also monitor public parking supply and utilization in order to inform future parking strategy.

Access Management

Access management describes a practice of managing the number, placement, and movements of intersections and driveways that provide access to adjacent land uses. Access management policies can be an important tool to improve transportation system efficiency by limiting the number of opportunities for turning movements on to or off of certain streets.

In addition, well deployed access management strategies can help manage travel demand by improving travel conditions for pedestrian and bicycles. Eliminating the number of access points on roadways allows for continuous sidewalk and bicycle facilities and reduces the number of potential interruptions and conflict points between pedestrians, bicyclists, and cars.

Access management is typically adopted as a policy in development guidelines. It can be extremely difficult to implement an access management program once properties have been developed along a corridor. Cooperation among and involvement of relevant government agencies, business owners, land developers and the public is necessary to establish an access management plan that benefits all roadway users and businesses.

Signal Systems Improvements

Signal retiming and optimization offer a relatively low cost option to increase system efficiency. Retiming and optimization refers to updating timing plans to better match prevailing traffic conditions and coordinating signals. Timing optimization can be applied to existing systems or may include upgrading signal technology, such as signal communication infrastructure, signal controllers, or cabinets. Signal retiming can reduce travel times and be especially beneficial to improving travel time reliability. In high pedestrian or desired pedestrian areas, signal retiming can facilitate pedestrian movements through intersections by increasing minimum green times to give pedestrians time to cross during each cycle, eliminating the need to push pedestrian crossing buttons. Signals can also facilitate bicycle movements with the inclusion of bicycle detectors.

Signal upgrades often come at a higher cost and usually require further coordination between jurisdictions. However, upgrading signals provides the opportunity to incorporate advanced signal systems to further improve the efficiency of a transportation network. Strategies include coordinated signal operations across jurisdictions, centralized control of traffic signals, adaptive or active signal control, and transit or freight signal priority. These advanced signal systems can reduce delay, travel time and the number of stops for transit, freight, and other vehicles. In addition, these systems may help reduce vehicle emissions and improve travel time reliability.

Transit signal priority systems use sensors to detect approaching transit vehicles and alter signal timings to improve transit performance. This improves travel times for transit, reliability of transit travel time, and overall attractiveness of transit. The City of Portland has one of the only systems of transit signal priority in the region, which is applied on most of the major arterial corridors throughout the city.

Adaptive or active signal control systems improve the efficiency of signal operations by actively changing the allotment of green time for vehicle movements and reducing the average delay for vehicles. Adaptive or active signal control systems require several vehicle detectors at intersections in order to detect traffic flows adequately, in addition to hardware and software upgrades.

Traffic responsive control uses data collected from traffic detectors to change signal timing plans for intersections. The data collected from the detectors is used by the system to automatically select a timing plan best suited to current traffic conditions. This system is able to determine times when peak-hour timing plans begin or end; potentially reducing vehicle delays.

Truck signal priority systems use sensors to detect approaching heavy vehicles and alter signal timings to improve truck freight travel. While truck signal priority may improve travel times for trucks, its primary purpose is to improve the overall performance of intersection operations by clearing any trucks that would otherwise be stopped at the intersection and subsequently have to spend a longer time getting back up to speed. Implementing truck signal priority requires additional advanced detector loops, usually placed in pairs back from the approach to the intersection.

Real-Time Traveler Information

Traveler information consists of collecting and disseminating real-time transportation system information to the traveling public. This includes information on traffic and road conditions, general public transportation and parking information, interruptions due to roadway incidents, roadway maintenance and construction, and weather conditions. Traveler information is collected from roadway sensors, traffic cameras, vehicle probes, and more recently, media access control (MAC) devices such as cell phones or laptops. Data from these sources are sent to a central system and subsequently disseminated to the public so that drivers track conditions specific to their cars and can provide historical and real-time traffic conditions for travelers.

When roadway travelers are supplied with information on their trips, they may be able to avoid heavy congestion by altering a travel path, delaying the start of a trip, or changing which mode they can choose. This can reduce overall delay and fuel emissions. Traveler information projects can be prioritized over increasing capacity on roadway, often with high project visibility among the public.

Real-Time Transit Information

Transit agencies or third-party sources can disseminate both schedule and system performance information to travelers through a variety of applications, such as in-vehicle, wayside, or in-terminal dynamic message signs, as well as the Internet or wireless devices. Coordination with regional or multimodal traveler information efforts can increase the availability of this transit schedule and system performance information. TriMet has implemented this through its Transit Tracker system. These systems enhance passenger convenience and may increase the attractiveness of transit to the public by encouraging travelers to consider transit as opposed to driving alone. They do require cooperation and integration between agencies for disseminating the information.

LAND USE

The types and intensities of land uses are closely correlated with travel demand. Land use patterns in many areas of the city are suburban in nature and low density, with more moderate densities near OR 99E in the southern part of the city. In the future the city is envisioned to be a mixture of housing densities and areas of mixed use development (i.e., a mix of residential, retail, commercial and/or office uses).

Commercial Nodes in Residential Areas

Commercial nodes in residential areas provide residents with the opportunity to walk or ride their bike for non-work related trips. Neighborhood commercial nodes can include small restaurants, coffee shops, hair salons or other neighborhood retail or personal service uses. The city's zoning map currently shows a limited number of commercial notes within the city outside from those located along OR 99E, Portland Avenue, and 82nd Drive.

As future nodes develop, the City can encourage individual business to share parking to provide for the more efficient use of land and reduce land, development and maintenance concepts. Nodal development and shared parking allows people to drive, bike, or take transit to one location and then comfortably walk between businesses.

Mixed Use Development

Mixed use developments can reduce automobile trips by supporting higher frequency transit service and promoting pedestrian and bicycle travel. Urban areas with mixed uses and higher densities can be promoted in targeted areas, such as the four main general commercial areas and/or future town centers. Creating new employment areas near existing and future residential areas in Gladstone also can create opportunities for people to live closer to where they work.

Attachment B PLTS Analysis Results

Table B-1: Detailed PLTS Analysis Results

Street	From	To	Side	Pedestrian LTS Criteria									
				Speed (MPH)	Total Number of Lanes	Bike Lane Width (feet)	Parking	Sidewalk Condition	Sidewalk Width (feet)[1]	Buffer	Illumination	Land Use	PLTS
Major Arterial													
OR 99E	City Limits	North of OR 99E Bridge	Both	40	4	< 7	No	Fair	=> 5	Vertical	No	Auto-oriented Commercial	3
	North of OR 99E Bridge	Dartmouth Street	West	40	5	< 7	No	Fair	=> 5	Landscaped	No	Auto-oriented Commercial	4
	Dartmouth Street	Gloucester Street	West	40	5	< 7	No	Fair	=> 5	Curb-tight	No	Auto-oriented Commercial	3
	North of OR 99E Bridge	Gloucester Street	East	40	5	=> 7	No	Fair	=> 5	Curb-tight	No	Auto-oriented Commercial	4
	Gloucester Street	19340 OR 99E	Both	40	5	< 7	No	Fair	=> 5	Landscaped	No	Auto-oriented Commercial	3
	19340 OR 99E	City Limits	East	40	5	=> 7	No	Fair	=> 5	Curb-tight	No	Auto-oriented Commercial	4
	19340 OR 99E	19250 OR 99E	West	40	5	< 7	No	Good	=> 5	Curb-tight	No	Auto-oriented Commercial	4
	19250 OR 99E	19210 OR 99E	West	40	5	< 7	No	None	N/A	N/A	No	Auto-oriented Commercial	4
	19210 OR 99E	City Limits	West	40	5	< 7	No	Fair	=> 5	Curb-tight	No	Auto-oriented Commercial	4
Minor Arterial													
River Road	Arlington Street	Jensen Road	East	30	2	< 5.5	No	Fair	=> 5	Curb-tight	Yes	Auto-oriented Commercial	3
	Jensen Road	City Limits	East	30	2	< 5.5	Yes	Fair	=> 5	Curb-tight	Yes	Auto-oriented Commercial	3
	Arlington Street	City Limits	West	30	2	< 5.5	No	Fair	=> 5	Curb-tight	Yes	Low density development	3
Arlington Street	OR 99E	Barton Road	Both	25	2	N/A	Yes	Fair	=> 5	Curb-tight	No	Auto-oriented Commercial	3
	Barton Road	82nd Drive	Both	25	2	N/A	Yes	Fair	4 - 5	Landscaped	No	Residential	4
Portland Avenue	Clackamas Boulevard	High School Driveway	East	20	3	N/A	Yes	Fair	4 - 5	Landscaped	Yes	Residential; CBD	3

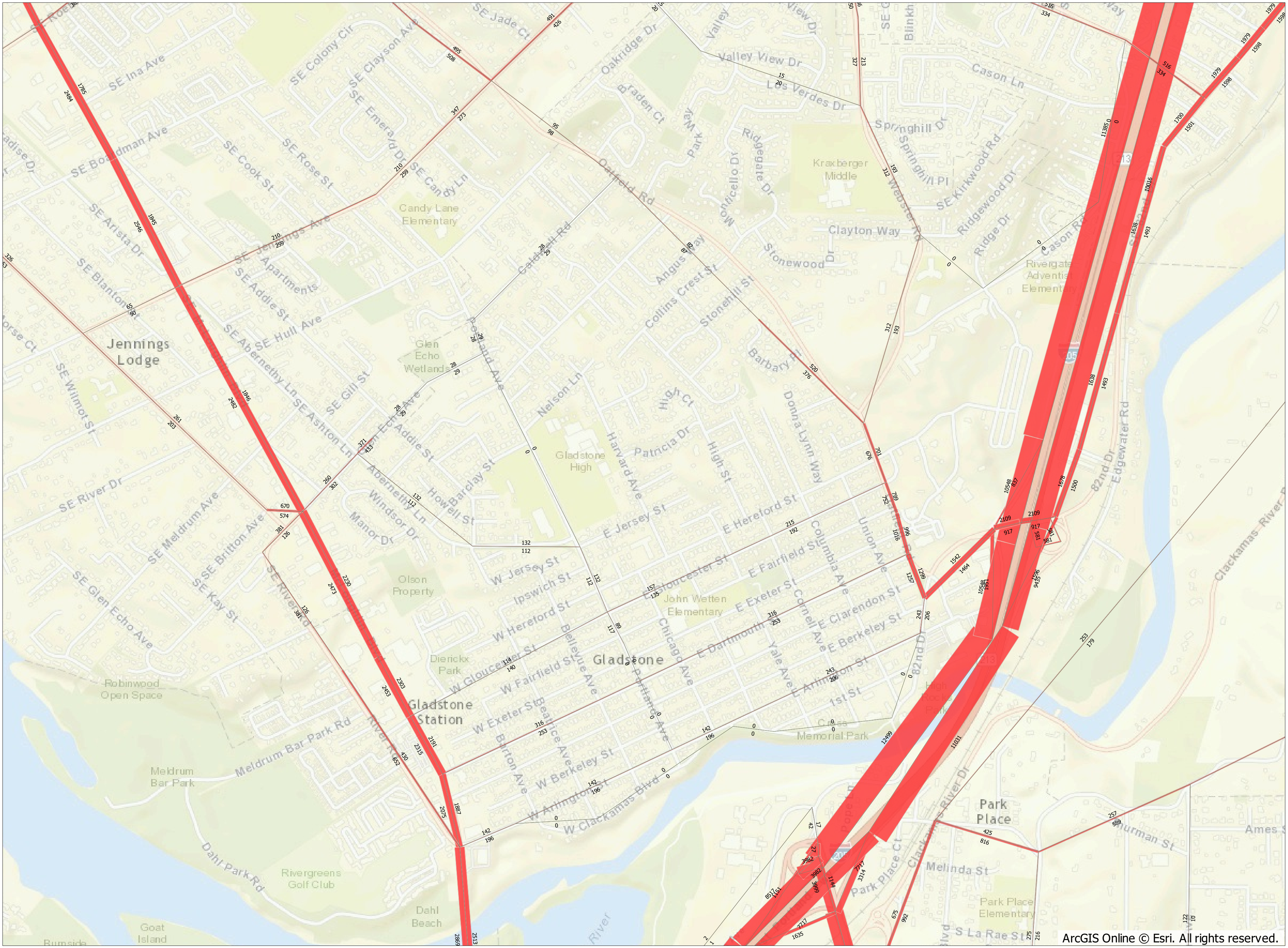
	Clackamas Boulevard	Abernethy Lane	West	20	3	N/A	Yes	Fair	4 - 5	Landscaped	Yes	Residential; CBD	3
	High School Driveway	Nelson Lane	East	20	2	N/A	Yes	Good	=> 5	Curb-tight	Yes	Public Facility	2
	Nelson Lane	City Limits	East	20-25	2	< 5.5	No	None	N/A	N/A	Yes	Residential	4
	Abernathy Lane	Barclay Street	West	20	3	N/A	Yes	Fair	=> 5	Curb-tight	Yes	Residential; Public Facility	2
	Barclay Street	Duniway Avenue	West	20	2	N/A	Yes	Fair	4 - 5	Curb-tight	Yes	Residential	3
	Duniway Avenue	18390 Portland Avenue	West	25	2	N/A	Yes	None	N/A	N/A	Yes	Residential	4
	18390 Portland Avenue	City Limits	West	25	2	N/A	Yes	Fair	4 - 5	Curb-tight	Yes	Residential	3
82nd Drive	End of road	Columbia Avenue	West	25	2	5.5 - 7	No	Fair/Poor	=> 5	Curb-tight	Yes	Light Industrial	3
	Columbia Avenue	1st Street	West	25	2	5.5 - 7	Yes	Fair	=> 5	Curb-tight	Yes	Freeway Interchange	3
	End of road	1st Street	East	25	2	5.5 - 7	Yes	Fair	=> 5	Curb-tight	Yes	Freeway Interchange	3
	1st Street	I-205 Southbound Terminal	Both	25	2	5.5 - 7	No	Fair	=> 5	Curb-tight	No	Auto-oriented commercial	3
	I-205 Southbound Terminal	Edgewater Road	South	35	3	5.5 - 7	Yes	None	N/A	N/A	No	Auto-oriented commercial	4
	I-205 Southbound Terminal	Edgewater Road	North	35	3	5.5 - 7	Yes	Fair	4 - 5	Curb-tight	No	Auto-oriented commercial	4
	Edgewater Road	City Limits	Both	35	3	5.5 - 7	No	Fair/Poor	4 - 5	Curb-tight	No	Auto-oriented commercial	3
Oatfield Road	82nd Drive	Webster Road	East	35	3	5.5 - 7	No	Fair	=> 5	Curb-tight	Yes	Residential	3
	Webster Road	17925 SE Oatfield Road	East	35	2	5.5 - 7	No	Fair	=> 5	Curb-tight	Yes	Residential	3
	17925 SE Oatfield Road	Park Way	East	35	2	5.5 - 7	No	Poor	4 - 5	Landscaped	Yes	Residential	3

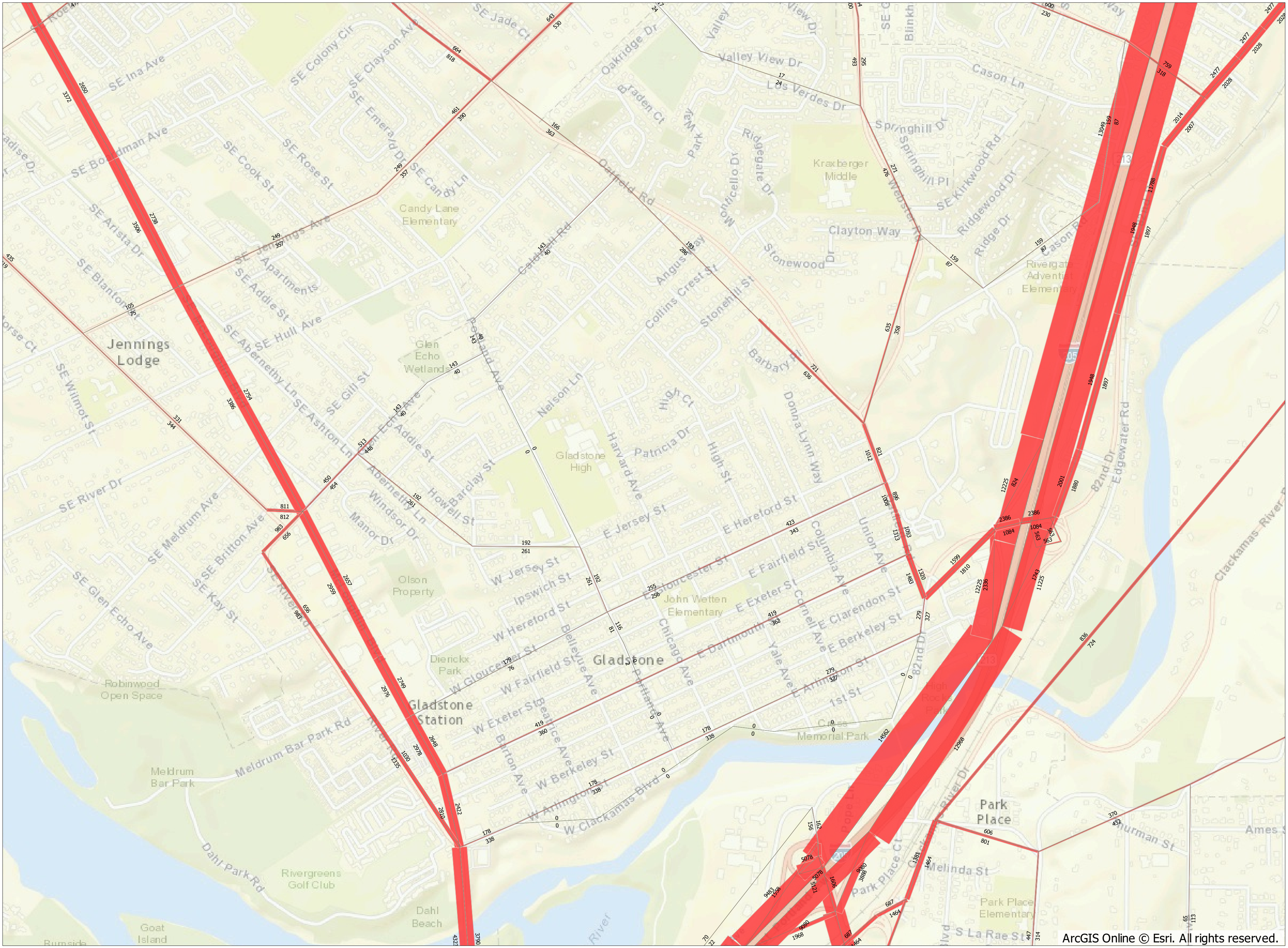
	82nd Drive	Kenmore Street	West	35	3	5.5 - 7	No	Fair	=> 5	Curb-tight	Yes	Residential	3
	Kenmore Street	18490 SE Oatfield Road	West	35	2	5.5 - 7	No	None	N/A	N/A	Yes	Residential	4
	18490 SE Oatfield Road	18215 SE Oatfield Road	West	35	2	5.5 - 7	Yes	Fair	4 - 5	Curb-tight	Yes	Residential	3
	18215 SE Oatfield Road	Park Way	West	35	2	5.5 - 7	No	None	N/A	N/A	Yes	Residential	4
	Park Way	City Limits	Both	35	2	5.5 - 7	No	None	N/A	N/A	Yes	Residential	4
Webster Road	Oatfield Road	Los Verdes Drive	Both	35	2	5.5 - 7	No	Fair	=> 5	Curb-tight	Yes	Low density development	3
	Los Verdes Drive	Charolais Drive	East	35	2	5.5 - 7	Yes	Fair	4 - 5	Curb-tight	Yes	Low density development	3
	Charolais Drive	City Limits	East	35	2	5.5 - 7	Yes	None	N/A	N/A	Yes	Low density development	4
	Los Verdes Drive	City Limits	West	35	2	5.5 - 7	Yes	Fair	4 - 5	Curb-tight	Yes	Low density development	3
Jennings Avenue	Valley View Road	City Limits	Both	30	2	N/A	Partial	None	N/A	N/A	No	Residential	4
Collector													
Dartmouth Street	OR 99E	Portland Avenue	Both	25	2	N/A	Yes	Fair	4 - 5	Landscaped	No	Residential	4
	Portland Avenue	Chicago Avenue	North	25	2	N/A	Yes	Poor	4 - 5	Curb-tight	Yes	Residential	3
	Chicago Avenue	Harvard Avenue	North	25	2	N/A	Yes	None	N/A	N/A	No	Residential	4
	Harvard Avenue	Yale Avenue	North	25	2	N/A	Yes	Poor	=> 5	Landscaped	No	Residential	4
	Yale Avenue	Oatfield Road	North	25	2	N/A	Yes	None	N/A	N/A	No	Residential	4
	Portland Avenue	Oatfield Road	South	25	2	N/A	Yes	Fair	4-5	Landscaped	Partial	Residential	3
Gloucester Street	River Road	OR 99E	North	25	2	N/A	Yes	Good	4 - 5	Curb-tight	No	Auto-oriented Commercial	4
	River Road	OR 99E	South	25	2	N/A	Yes	Good	=> 5	Curb-tight	No	Auto-oriented Commercial	3
	OR 99E	Yale Avenue	Both	25	2	N/A	Yes	Fair	4 - 5	Landscaped	No	Residential	4

	Yale Avenue	Oatfield Road	Both	25	2	N/A	Yes	Fair	=> 5	Curb-tight	No	Residential	3
Abernethy Lane	Glen Echo Avenue	Portland Avenue	North	25	2	N/A	Yes	Fair	=> 5	Curb-tight	Yes	Residential	2
	Glen Echo Avenue	Portland Avenue	South	25	2	N/A	No	Fair[2]	=> 5	Landscaped	Yes	Residential	2
Glen Echo Avenue	OR 99E	Abernethy Lane	Both	30	2	N/A	Partial	Fair	=> 5	Curb-tight	No	Residential	3
	Abernethy Lane	Portland Avenue	North	30	2	N/A	No	None	N/A	N/A	No	Residential	4
	Abernethy Lane	5800 Glen Echo Avenue	South	30	2	N/A	No	None	N/A	N/A	No	Residential	4
	5800 Glen Echo Avenue	Portland Avenue	South	30	2	N/A	No	Fair	=> 5	Curb-tight	No	Residential	3
	Portland Avenue	6740 Glen Echo Avenue	North	25	2	N/A	No	None	N/A	N/A	No	Residential	4
	6740 Glen Echo Avenue	6890 Glen Echo Avenue	North	25	2	N/A	No	Fair	=> 5	Curb-tight	No	Residential	3
	6890 Glen Echo Avenue	Oatfield Road	North	25	2	N/A	No	None	N/A	N/A	No	Residential	4
	Portland Avenue	Oatfield Road	South	25	2	N/A	No	None	N/A	N/A	No	Residential	4
Cason Road	Webster Road	City Limits	Both	30	2	5.5-7	No	Fair	=> 5	Curb-tight	Yes	Residential	3
Via Del Verde/Los Verdes Drive	Valley View Road	Crownview Drive	Both	25	2	N/A	Yes	Fair	4 - 5	Landscaped	Yes	Residential	3
	Crownview Drive	Webster Road	North	25	2	N/A	Yes	Fair	4 - 5	Landscaped	No	Residential	4
	Crownview Drive	Webster Road	South	25	2	N/A	Yes	Fair	=> 5	Curb-tight	No	Residential	4
Valley View Road/Valley View Drive	Los Verdes Drive	Valley View Road	Both	25	2	N/A	No	Fair	4 - 5	Landscaped	Yes	Residential	3
	Valley View Road	Churchill Drive	North	25	2	N/A	No	None	N/A	N/A	Yes	Residential	4
	Churchill Drive	Jennings Avenue	North	25	2	N/A	No	Fair	4 - 5	Curb-tight	Yes	Residential	3
	Valley View Road	Jennings Avenue	South	25	2	N/A	No	Fair	4 - 5	Curb-tight	Yes	Residential	3

[1] Sidewalk refers to sidewalks, shared-use paths, and pedestrian paths.
[2] Shared-use path.

Attachment C Travel Demand Model Data


Jennings Lodge
Gladstone
Gladstone Station
Park Place
Candy Lane Elementary
Glen Echo Wetlands
Gladstone High
Kraxberger Middle
Rivergate Adventist Elementary
John Wetten Elementary
Olson Property
Dierickx Park
Robinwood Open Space
Meldrum Bar Park
Rivergreens Golf Club
Dahl Beach
Goat Island
Cross Memorial Park
Park Place Elementary
High Rocks Park
Clackamas River
River
Ames
SE Ina Ave
SE Colony Cir
SE Clayson Ave
SE Jade Ct
SE Boardman Ave
SE Emerald Dr
SE Candy Ln
SE Cook St
SE Rose St
SE Arista Dr
SE Blanton St
SE Jennings Ave
SE Apartments
SE Addie St
SE Hull Ave
SE Abernethy Ln
SE Ashton Ln
SE Gill St
SE Wilmot St
SE River Dr
SE Meldrum Ave
SE Britton Ave
SE Kay St
SE Glen Echo Ave
SE River Rd
Oakridge Dr
Braden Ct
Oatfield Rd
Valley View Dr
Los Verdes Dr
Springhill Dr
Springhill Pl
Cason Ln
Ridgegate Dr
Monticello Dr
Webster Rd
SE Kirkwood Rd
Ridgewood Dr
Ridge Dr
Clayton Way
Stonewood Dr
Cason Rd
Angus Way
Collins Crest St
Stonehill St
Barbary Pl
Caldwell Rd
Portland Ave
Nelson Ln
High Ct
Patricia Dr
Harvard Ave
High St
Donna Lynn Way
Glen Echo Ave
Addie St
Barclay St
Abernethy Ln
Windsor Dr
Howell St
Manor Dr
E Jersey St
W Jersey St
Ipswich St
E Hereford St
W Hereford St
E Gloucester St
W Gloucester St
E Fairfield St
W Fairfield St
E Exeter St
W Exeter St
E Dartmouth St
E Clarendon St
E Berkeley St
W Berkeley St
E Arlington St
W Arlington St
1st St
Columbia Ave
Cornell Ave
Union Ave
Yale Ave
Chicago Ave
Bellevue Ave
Beatrice Ave
Barton Ave
82nd Dr
Edgewater Rd
W Clackamas Blvd
Meldrum Bar Park Rd
River Rd
Dahl Park Rd
Pope Ln
Park Place Ct
Clackamas River Dr
Melinda St
S La Rae St
Thurman St
Burnside
205
213
2484
1785
2546
1845
2482
1846
2473
2230
2453
2303
2315
2191
2075
1887
2869
2513
210
259
347
273
495
508
491
426
95
98
65
90
261
203
670
574
381
126
260
302
371
433
28
29
132
112
0
157
135
114
140
316
253
142
196
117
88
215
192
243
206
15
20
327
213
312
193
520
376
701
676
739
752
1016
996
1257
1259
1542
1464
2109
917
581
11385
10016
1638
1493
1678
1500
10548
9435
516
334
1979
1598
1700
1501
179
12499
11031
3982
3999
1144
2717
3314
8517
1151
1635
675
992
257
589
425
816
122
10
216
42
17
27
2
1


Jennings Lodge
Gladstone
Gladstone Station
Park Place
Ames
Kraxberger Middle
Candy Lane Elementary
Glen Echo Wetlands
Gladstone High
Olson Property
John Wetten Elementary
Dierickx Park
Robinwood Open Space
Meldrum Bar Park
Rivergreens Golf Club
Dahl Beach
Goat Island
Rivergate Adventist Elementary
Cross Memorial Park
High Rocks Park
Park Place Elementary
SE Ina Ave
SE Colony Cir
SE Clayson Ave
SE Jade Ct
SE Boardman Ave
SE Cook St
SE Rose St
SE Emerald Dr
SE Candy Ln
SE Arista Dr
SE Jennings Ave
SE Blanton St
Apartments
SE Addie St
SE Hull Ave
SE Abernethy Ln
SE Ashton Ln
SE Gill St
SE River Dr
SE Meldrum Ave
SE Britton Ave
SE Kay St
SE Glen Echo Ave
SE Wilmot St
SE River Rd
Meldrum Bar Park Rd
Dahl Park Rd
Oakridge Dr
Braden Ct
Valley View Dr
Los Verdes Dr
Park Way
Ridgegate Dr
Monticello Dr
Oatfield Rd
Caldwell Rd
Portland Ave
Nelson Ln
Harvard Ave
Patricia Dr
High Ct
High St
Angus Way
Collins Crest St
Stonehill St
Stonewood Dr
Barbary Ln
Donna Lynn Way
Webster Rd
Springhill Dr
Springhill Pl
Clayton Way
SE Kirkwood Rd
Ridgewood Dr
Ridge Dr
Cason Ln
Cason Rd
82nd Dr
Edgewater Rd
Clackamas River
Abernethy Ln
Windsor Dr
Manor Dr
Howell St
Barclay St
Glen Echo Ave
Addie St
E Jersey St
W Jersey St
Ipswich St
W Hereford St
E Hereford St
E Gloucester St
W Gloucester St
E Fairfield St
W Fairfield St
E Exeter St
W Exeter St
E Dartmouth St
E Clarendon St
E Berkeley St
W Berkeley St
E Arlington St
W Arlington St
1st St
W Clackamas Blvd
Bellevue Ave
Chicago Ave
Beatrice Ave
Barton Ave
Columbia Ave
Cornell Ave
Union Ave
Yale Ave
Melinda St
Thurman St
Park Place Ct
S La Rae St
River
ArcGIS Online © Esri. All rights reserved.

Attachment D Year 2040 Traffic Conditions Analysis Worksheets

1: OR-99E & W Arlington St

	→	↘	←	↖	↖	↑	↗	↘	↓
Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	74	716	249	64	472	1765	249	56	2304
v/c Ratio	0.18	1.49	0.87	0.15	1.74	0.79	0.24	0.35	1.17
Control Delay	39.9	258.1	74.7	3.6	373.9	20.0	2.4	10.7	103.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	258.1	74.7	3.6	373.9	20.0	2.4	10.7	103.5
Queue Length 50th (ft)	47	~648	187	0	~496	510	7	13	~1148
Queue Length 95th (ft)	90	#886	#336	16	#710	644	40	m13	m#1277
Internal Link Dist (ft)	442		371			477			1350
Turn Bay Length (ft)				175	200		280	250	
Base Capacity (vph)	401	480	286	414	272	2234	1043	261	1961
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	1.49	0.87	0.15	1.74	0.79	0.24	0.21	1.17

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱	↰	↑↑	↱	↰	↑↱	
Traffic Volume (vph)	6	65	680	175	62	61	448	1677	237	53	2176	12
Future Volume (vph)	6	65	680	175	62	61	448	1677	237	53	2176	12
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	4.8	4.8	4.0	4.8	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.97		1.00	0.98	1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1892	1529		1739	1565	1787	3505	1511	1770	3502	
Flt Permitted		0.97	1.00		0.73	1.00	0.06	1.00	1.00	0.07	1.00	
Satd. Flow (perm)		1851	1529		1323	1565	122	3505	1511	122	3502	
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)	6	68	716	184	65	64	472	1765	249	56	2291	13
RTOR Reduction (vph)	0	0	150	0	0	50	0	0	82	0	0	0
Lane Group Flow (vph)	0	74	566	0	249	14	472	1765	167	56	2304	0
Confl. Peds. (#/hr)	7		13	13		7	4		3	3		4
Confl. Bikes (#/hr)						1			2			
Heavy Vehicles (%)	0%	0%	3%	6%	0%	1%	1%	3%	4%	2%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)		26.0	26.0		26.0	26.0	76.5	75.7	75.7	66.4	66.4	
Effective Green, g (s)		26.0	26.0		26.0	26.0	76.5	75.7	75.7	66.4	66.4	
Actuated g/C Ratio		0.22	0.22		0.22	0.22	0.64	0.63	0.63	0.55	0.55	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	4.0	4.8	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		401	331		286	339	283	2211	953	143	1937	
v/s Ratio Prot							c0.21	0.50		0.02	c0.66	
v/s Ratio Perm		0.04	c0.37		0.19	0.01	c0.86		0.11	0.20		
v/c Ratio		0.18	1.71		0.87	0.04	1.67	0.80	0.17	0.39	1.19	
Uniform Delay, d1		38.4	47.0		45.4	37.1	48.9	16.5	9.2	22.4	26.8	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.67	0.76	
Incremental Delay, d2		0.2	332.6		23.7	0.0	315.7	3.1	0.4	0.5	87.6	
Delay (s)		38.5	379.6		69.0	37.2	364.5	19.6	9.6	15.6	108.1	
Level of Service		D	F		E	D	F	B	A	B	F	
Approach Delay (s)		347.6			62.5			84.1			105.9	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	126.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	129.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

2: OR-99E & W Gloucester St

	→	←	↰	↑	↱	↲	↓	↙
Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	53	260	39	1641	90	49	2184	19
v/c Ratio	0.17	1.00	0.26	0.74	0.09	0.17	0.89	0.02
Control Delay	31.8	103.9	9.6	23.1	4.0	12.5	16.6	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	103.9	9.6	23.1	4.0	12.5	16.6	1.7
Queue Length 50th (ft)	23	197	12	714	18	12	347	0
Queue Length 95th (ft)	61	#374	m12	787	m20	m20	m#458	m0
Internal Link Dist (ft)	261	413		1350			2302	
Turn Bay Length (ft)			220		175	250		160
Base Capacity (vph)	309	260	266	2213	962	309	2452	1061
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	1.00	0.15	0.74	0.09	0.16	0.89	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m   Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (vph)	6	27	17	139	52	51	36	1526	84	46	2031	18
Future Volume (vph)	6	27	17	139	52	51	36	1526	84	46	2031	18
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	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		0.99			1.00		1.00	1.00	0.95	1.00	1.00	0.96
Flpb, ped/bikes		1.00			0.99		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1731			1734		1805	3505	1487	1805	3505	1497
Flt Permitted		0.97			0.81		0.06	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)		1684			1443		108	3505	1487	167	3505	1497
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)	6	29	18	149	56	55	39	1641	90	49	2184	19
RTOR Reduction (vph)	0	15	0	0	8	0	0	0	24	0	0	6
Lane Group Flow (vph)	0	38	0	0	252	0	39	1641	66	49	2184	13
Confl. Peds. (#/hr)	6		11	11		6	5		10	10		5
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	6%	0%	2%	2%	4%	0%	3%	3%	0%	3%	4%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		21.0			21.0		74.2	74.2	74.2	83.2	82.4	82.4
Effective Green, g (s)		21.0			21.0		74.2	74.2	74.2	83.2	82.4	82.4
Actuated g/C Ratio		0.18			0.18		0.62	0.62	0.62	0.69	0.69	0.69
Clearance Time (s)		4.0			4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5			2.5		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		294			252		120	2167	919	279	2406	1027
v/s Ratio Prot							0.01	c0.47		0.02	c0.62	
v/s Ratio Perm		0.02			c0.17		0.19		0.04	0.10		0.01
v/c Ratio		0.13			1.00		0.33	0.76	0.07	0.18	0.91	0.01
Uniform Delay, d1		41.8			49.5		27.3	16.4	9.1	22.2	15.6	5.9
Progression Factor		1.00			1.00		0.74	1.29	0.98	0.99	0.81	5.10
Incremental Delay, d2		0.1			56.0		0.6	1.6	0.1	0.1	4.0	0.0
Delay (s)		41.9			105.5		20.8	22.8	9.1	22.1	16.7	30.3
Level of Service		D			F		C	C	A	C	B	C
Approach Delay (s)		41.9			105.5			22.1			16.9	
Approach LOS		D			F			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

3: OR-99E & Glen Echo Ave

	→	↘	←	↖	↑	↗	↘	↓	↙
Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	305	81	317	50	1678	60	121	1986	197
v/c Ratio	3.59	0.26	2.07	0.35	0.74	0.06	0.54	0.83	0.18
Control Delay	1209.3	20.5	525.1	19.4	11.7	5.5	18.5	18.2	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1209.3	20.5	525.1	19.4	11.7	5.5	18.5	18.2	3.9
Queue Length 50th (ft)	~423	18	~342	11	178	4	21	560	23
Queue Length 95th (ft)	#602	64	#525	m26	m297	m12	71	697	51
Internal Link Dist (ft)	271		213		2302			539	
Turn Bay Length (ft)		100		185		160	185		160
Base Capacity (vph)	85	311	153	277	2263	1001	313	2404	1094
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	3.59	0.26	2.07	0.18	0.74	0.06	0.39	0.83	0.18

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

3: OR-99E & Glen Echo Ave

Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰↱		↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (vph)	206	81	76	47	52	199	47	1577	56	114	1867	185
Future Volume (vph)	206	81	76	47	52	199	47	1577	56	114	1867	185
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	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00	0.95	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1812	1528		1671		1736	3505	1525	1805	3505	1548
Flt Permitted		0.26	1.00		0.32		0.05	1.00	1.00	0.07	1.00	1.00
Satd. Flow (perm)		487	1528		531		94	3505	1525	139	3505	1548
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)	219	86	81	50	55	212	50	1678	60	121	1986	197
RTOR Reduction (vph)	0	0	44	0	60	0	0	0	16	0	0	33
Lane Group Flow (vph)	0	305	37	0	257	0	50	1678	44	121	1986	164
Confl. Peds. (#/hr)	3		4	4		3	4		8	8		4
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	4%	3%	2%	1%	4%	3%	1%	0%	3%	1%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		21.0	21.0		21.0		82.2	77.5	77.5	90.2	81.5	81.5
Effective Green, g (s)		21.0	21.0		21.0		82.2	77.5	77.5	90.2	81.5	81.5
Actuated g/C Ratio		0.18	0.18		0.18		0.69	0.65	0.65	0.75	0.68	0.68
Clearance Time (s)		4.0	4.0		4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5	2.5		2.5		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		85	267		92		128	2263	984	225	2380	1051
v/s Ratio Prot							0.02	0.48		c0.04	c0.57	
v/s Ratio Perm		c0.63	0.02		0.48		0.25		0.03	0.36		0.11
v/c Ratio		3.59	0.14		2.79		0.39	0.74	0.04	0.54	0.83	0.16
Uniform Delay, d1		49.5	41.9		49.5		16.8	14.4	7.8	16.0	14.3	6.9
Progression Factor		1.00	1.00		1.00		1.68	0.67	1.49	1.00	1.00	1.00
Incremental Delay, d2		1193.4	0.2		835.4		0.8	1.6	0.1	1.6	3.6	0.3
Delay (s)		1242.9	42.0		884.9		28.9	11.2	11.6	17.6	17.9	7.2
Level of Service		F	D		F		C	B	B	B	B	A
Approach Delay (s)		990.9			884.9			11.7			17.0	
Approach LOS		F			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	150.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	105.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

	↗	→	↙	←	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	129	383	94	252	657	58	126	415	411	118
v/c Ratio	0.56	0.45	0.48	0.62	0.61	0.35	0.50	0.71	0.70	0.19
Control Delay	54.3	35.3	55.8	45.0	5.9	55.1	16.9	36.3	35.7	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.3	35.3	55.8	45.0	5.9	55.1	16.9	36.3	35.7	6.2
Queue Length 50th (ft)	75	104	55	140	52	34	0	225	222	2
Queue Length 95th (ft)	171	193	134	285	160	94	62	436	431	43
Internal Link Dist (ft)		452		736		230			650	
Turn Bay Length (ft)	80		170		170		100	110		110
Base Capacity (vph)	480	1915	388	910	1290	309	358	904	911	882
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.20	0.24	0.28	0.51	0.19	0.35	0.46	0.45	0.13

Intersection Summary

4: Oatfield Rd & 82nd Dr

Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱		↰↑	↱	↰	↰↑	↱
Traffic Volume (vph)	123	355	9	89	239	624	0	55	120	730	55	112
Future Volume (vph)	123	355	9	89	239	624	0	55	120	730	55	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0	5.0		5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00		1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99		1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1770	3526		1787	1863	1568		1900	1553	1665	1678	1538
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	1770	3526		1787	1863	1568		1900	1553	1665	1678	1538
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)	129	374	9	94	252	657	0	58	126	768	58	118
RTOR Reduction (vph)	0	2	0	0	0	186	0	0	115	0	0	73
Lane Group Flow (vph)	129	381	0	94	252	471	0	58	11	415	411	45
Confl. Peds. (#/hr)	2		3	3		2	5					5
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	2%	2%	0%	1%	2%	2%	0%	0%	4%	3%	4%	2%
Turn Type	Prot	NA		Prot	NA	pm+ov		NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4		8		4	4	
Permitted Phases						6	8		8			4
Actuated Green, G (s)	12.8	23.4		10.7	21.3	55.7		8.7	8.7	34.4	34.4	34.4
Effective Green, g (s)	12.8	23.4		10.7	21.3	55.7		8.7	8.7	34.4	34.4	34.4
Actuated g/C Ratio	0.13	0.24		0.11	0.22	0.58		0.09	0.09	0.36	0.36	0.36
Clearance Time (s)	4.5	5.0		4.5	5.0	5.0		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.3	4.2		2.3	4.2	2.5		2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	234	853		197	410	984		170	139	592	596	547
v/s Ratio Prot	c0.07	0.11		0.05	c0.14	0.17		c0.03		c0.25	0.24	
v/s Ratio Perm						0.13			0.01			0.03
v/c Ratio	0.55	0.45		0.48	0.61	0.48		0.34	0.08	0.70	0.69	0.08
Uniform Delay, d1	39.3	31.2		40.4	34.0	12.0		41.3	40.3	26.7	26.6	20.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.6		1.1	3.3	0.3		0.9	0.2	3.5	3.0	0.0
Delay (s)	41.2	31.7		41.4	37.3	12.3		42.2	40.5	30.2	29.6	20.7
Level of Service	D	C		D	D	B		D	D	C	C	C
Approach Delay (s)		34.1			21.3			41.0			28.8	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	96.7	Sum of lost time (s)	19.5
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

5: Oatfield Rd & Collins Crest St/Ridgegate Dr

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	1	1	7	21	1	17	10	576	29	34	652	3
Future Vol, veh/h	1	1	7	21	1	17	10	576	29	34	652	3
Conflicting Peds, #/hr	2	0	2	2	0	2	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	10	0	6	0	2	3	0	3	0
Mvmt Flow	1	1	7	22	1	18	11	606	31	36	686	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1415	1421	692	1411	1408	626	691	0	0	639	0	0
Stage 1	761	761	-	645	645	-	-	-	-	-	-	-
Stage 2	654	660	-	766	763	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.2	6.5	6.26	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.59	4	3.354	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	116	138	447	111	140	477	913	-	-	955	-	-
Stage 1	401	417	-	448	471	-	-	-	-	-	-	-
Stage 2	459	463	-	383	416	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	104	127	445	102	128	475	911	-	-	953	-	-
Mov Cap-2 Maneuver	104	127	-	102	128	-	-	-	-	-	-	-
Stage 1	393	391	-	439	461	-	-	-	-	-	-	-
Stage 2	432	453	-	352	390	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.8	36.1	0.1	0.4
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	911	-	-	271	156	953	-	-
HCM Lane V/C Ratio	0.012	-	-	0.035	0.263	0.038	-	-
HCM Control Delay (s)	9	0	-	18.8	36.1	8.9	0	-
HCM Lane LOS	A	A	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	1	0.1	-	-

6: Oatfield Rd & Glen Echo Ave

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	63	40	77	405	597	153
Future Vol, veh/h	63	40	77	405	597	153
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	120	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	6	1	0	3	3	0
Mvmt Flow	65	41	79	418	615	158

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1270	694	773	0	-	0
Stage 1	694	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Critical Hdwy	6.46	6.21	4.1	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.309	2.2	-	-	-
Pot Cap-1 Maneuver	182	444	851	-	-	-
Stage 1	488	-	-	-	-	-
Stage 2	554	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	165	444	851	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	488	-	-	-	-	-
Stage 2	503	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	36.3	1.5	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	851	-	218	-	-
HCM Lane V/C Ratio	0.093	-	0.487	-	-
HCM Control Delay (s)	9.7	-	36.3	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q(veh)	0.3	-	2.4	-	-

7: I-205 SB Ramps & 82nd Dr

	→	↘	↙	←	↓	↙
Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	564	675	792	669	20	331
v/c Ratio	0.91	0.94	1.33	0.48	0.10	0.70
Control Delay	45.3	37.6	175.9	2.7	31.3	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.3	37.6	175.9	2.7	31.3	13.1
Queue Length 50th (ft)	247	188	~490	52	8	0
Queue Length 95th (ft)	#436	#414	m#527	m69	28	#80
Internal Link Dist (ft)	736			638	725	
Turn Bay Length (ft)			310			
Base Capacity (vph)	621	719	596	1403	196	474
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.94	1.33	0.48	0.10	0.70

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

7: I-205 SB Ramps & 82nd Dr

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱	↰	↑						↰↑	↱
Traffic Volume (vph)	0	547	655	768	649	0	0	0	0	16	4	321
Future Volume (vph)	0	547	655	768	649	0	0	0	0	16	4	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5						5.5	5.5
Lane Util. Factor		1.00	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
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1827	1568	1687	1863						1730	1599
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		1827	1568	1687	1863						1730	1599
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)	0	564	675	792	669	0	0	0	0	16	4	331
RTOR Reduction (vph)	0	0	187	0	0	0	0	0	0	0	0	293
Lane Group Flow (vph)	0	564	488	792	669	0	0	0	0	0	20	38
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	3%	7%	2%	0%	0%	0%	0%	7%	0%	1%
Turn Type		NA	Perm	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			2									
Actuated Green, G (s)		25.5	25.5	26.5	56.5						8.5	8.5
Effective Green, g (s)		25.5	25.5	26.5	56.5						8.5	8.5
Actuated g/C Ratio		0.34	0.34	0.35	0.75						0.11	0.11
Clearance Time (s)		4.5	4.5	4.5	4.5						5.5	5.5
Vehicle Extension (s)		4.2	4.2	2.3	0.2						6.0	6.0
Lane Grp Cap (vph)		621	533	596	1403						196	181
v/s Ratio Prot		0.31		c0.47	0.36						0.01	c0.02
v/s Ratio Perm			c0.31									
v/c Ratio		0.91	0.92	1.33	0.48						0.10	0.21
Uniform Delay, d1		23.6	23.7	24.2	3.6						29.8	30.2
Progression Factor		1.00	1.00	0.93	0.62						1.00	1.00
Incremental Delay, d2		19.5	22.9	151.7	0.4						0.6	1.6
Delay (s)		43.1	46.6	174.2	2.6						30.5	31.8
Level of Service		D	D	F	A						C	C
Approach Delay (s)		45.0			95.6			0.0			31.7	
Approach LOS		D			F			A			C	

Intersection Summary			
HCM 2000 Control Delay	67.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

8: I-205 NB Ramps & 82nd Dr

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	369	263	16	1104	430	726
v/c Ratio	0.38	0.29	0.12	1.06	0.82	0.92
Control Delay	12.4	6.9	34.0	65.2	37.0	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.4	6.9	34.0	65.2	37.0	26.1
Queue Length 50th (ft)	64	29	7	~599	176	100
Queue Length 95th (ft)	m93	m32	25	#850	269	#338
Internal Link Dist (ft)	638			440	402	
Turn Bay Length (ft)		50	200			575
Base Capacity (vph)	972	912	240	1044	619	843
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.29	0.07	1.06	0.69	0.86

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

8: I-205 NB Ramps & 82nd Dr

Weekday PM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (vph)	347	247	15	1038	404	682
Future Volume (vph)	347	247	15	1038	404	682
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.0	4.5	5.5	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1810	1568	1805	1845	1752	1482
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1810	1568	1805	1845	1752	1482
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	369	263	16	1104	430	726
RTOR Reduction (vph)	0	77	0	0	0	345
Lane Group Flow (vph)	369	186	16	1104	430	381
Heavy Vehicles (%)	5%	3%	0%	3%	3%	9%
Turn Type	NA	Perm	Prot	NA	Prot	Prot
Protected Phases	2		1	6	8	8
Permitted Phases		2				
Actuated Green, G (s)	37.0	37.0	1.4	42.4	22.6	22.6
Effective Green, g (s)	37.0	37.0	1.4	42.4	22.6	22.6
Actuated g/C Ratio	0.49	0.49	0.02	0.57	0.30	0.30
Clearance Time (s)	4.5	4.5	4.0	4.5	5.5	5.5
Vehicle Extension (s)	0.2	0.2	2.3	4.2	2.3	2.3
Lane Grp Cap (vph)	892	773	33	1043	527	446
v/s Ratio Prot	0.20		0.01	c0.60	0.25	c0.26
v/s Ratio Perm		0.12				
v/c Ratio	0.41	0.24	0.48	1.06	0.82	0.85
Uniform Delay, d1	12.1	10.9	36.4	16.3	24.3	24.6
Progression Factor	0.93	1.11	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.4	6.4	44.7	9.1	14.4
Delay (s)	12.0	12.6	42.8	61.0	33.4	39.0
Level of Service	B	B	D	E	C	D
Approach Delay (s)	12.2			60.7	36.9	
Approach LOS	B			E	D	

Intersection Summary			
HCM 2000 Control Delay	40.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX G TECH MEMO #7: REGULATORY SOLUTIONS

City of Gladstone Transportation System Plan Update
REGULATORY SOLUTIONS

Date:	May 3, 2017	Project #: 19890.2
To:	Project Management Team	
Cc:	Transportation System Plan Advisory Committees	
From:	Clinton "CJ" Doxsee & Darci Rudzinski – Angelo Planning Group (APG) Matt Bell – Kittelson & Associates, Inc.	
Project:	City of Gladstone Transportation System Plan Update	
Subject:	Gladstone TSP Task 4.2, Tech Memo 7 Regulatory Solutions	

This memorandum provides the City with draft legislative code language to address the recommendations in Technical Memorandum #1 - Policy Framework and Code Review. Recommendations were made after an audit of the Gladstone Municipal Code (GMC) Title 17 and relevant sections of the Development Code. The audit highlights regulatory provisions that may need to be updated to: (1) be consistent with and implement the updated TSP; and (2) comply with the Metro's Regional Transportation Functional Plan (RTFP) requirements (see http://www.oregonmetro.gov/regional-transportation-functional-plan). Table 1 identifies the specific recommendations from the earlier audit and the corresponding RTFP reference. Recommended language is shown in <u>underlined</u> and strikeout text in the last column. In some instances, recommended language includes text in [brackets]; bracketed text includes placeholders that need to be made consistent with the existing Development Code or new standards that will need to be considered within the local context. Text in brackets will be discussed with City Staff and modified to reflect a reasonable requirement for the City of Gladstone.

Table 1: Regional Transportation Functional Plan

<table>
<tr><th>Regional Transportation Functional Plan</th><th colspan="3">Gladstone Municipal Code Title 17 Zoning and Development</th></tr>
<tr><th>Requirement</th><th>Notes and Recommendation</th><th>Original Text</th><th>Recommended Modifications</th></tr>
<tr>
<td>Allow complete street designs consistent with regional street design policies

(Title 1, Street System Design Sec 3.08.110A(1))</td>
<td>In Metro's Creating Livable Streets: Street Design Guidelines for 2040, regional streets are defined as major and minor arterial streets and some collectors of regional significance. Regional street design concepts are intended to serve all modes of travel in a manner that supports the needs of the 2040 design types.

Chapter 17.50 Vehicular and Pedestrian Circulation, Section 17.50.040 Street and road standards. Subsection (1) provides a table with ROW and Roadway width standards according to street classification. Sidewalks are required on all public streets per subsection (15), however sidewalk design standards are not currently provided.

Recommendation: Existing street design standards do not provide specific standards for sidewalk or bicycle facilities (i.e. cross-sections). Consider modifying 17.50.040 to include or refer to street design standards in the updated TSP.</td>
<td>17.50.040 Street and road standards

The design and improvement of streets within a development and streets adjacent but only partially within the development shall comply with improvement specifications adopted pursuant to GMC Section 17.42.030 and with the following standards:

(1) Right-of-way and Roadway Widths. Minimum right-of-way and roadway widths shall be as follows

<table>
<tr><th>Type of Street</th><th>R.O.W Width (in feet)</th><th>Roadway Width (in feet)</th></tr>
<tr><td>Major arterial</td><td>80' to 120'</td><td>72' to 80'</td></tr>
<tr><td>Minor arterial</td><td>60' to 80'</td><td>Minimum 42'</td></tr>
<tr><td>Collectors</td><td>50' to 60'</td><td>Minimum 36'</td></tr>
<tr><td>Local</td><td>Minimum 40'</td><td>Minimum 32' w/5'-foot utility easement on each side</td></tr>
<tr><td>Alley/Access way</td><td>Minimum 20'</td><td>Minimum 20'</td></tr>
</table>
</td>
<td>17.50.040 Street and road standards.

The design and improvement of streets within a development and streets adjacent but only partially within the development shall comply with improvement specifications adopted pursuant to GMC Section 17.42.030 and with the following standards:

(1) Right-of-Way and Roadway Widths.

(a) Outside of the Downtown Revitalization Plan area, minimum right-of-way and roadway widths shall conform to the standards found in <i>[Table XX]</i> of the Gladstone Transportation System Plan. ~~be as follows:~~

(b) Within the Downtown Revitalization Plan area, minimum right-of-way and roadway widths shall conform to the standards found in <i>[Table XX]</i> of the Gladstone Transportation Plan. Standards shall apply to Portland Avenue between Abernathy Lane and Clackamas Boulevard, as illustrated in <i>[Figure XX]</i> of the Transportation System Plan [or Downtown Revitalization Plan].

(c) The street cross sections found in the Gladstone Transportation System Plan may be modified to accommodate alternative stormwater management methods subject to the approval of the Public Works Supervisor. The Public Works Supervisor may require modification of the typical cross section to accommodate alternative stormwater management methods when associated with development proposals. Such modifications may be applied as conditions of development approval.

<table>
<tr><th>~~Type of Street~~</th><th>~~R.O.W Width (in feet)~~</th><th>~~Roadway Width (in feet)~~</th></tr>
<tr><td>~~Major arterial~~</td><td>~~80' to 120'~~</td><td>~~72' to 80'~~</td></tr>
<tr><td>~~Minor arterial~~</td><td>~~60' to 80'~~</td><td>~~Minimum 42'~~</td></tr>
<tr><td>~~Collectors~~</td><td>~~50' to 60'~~</td><td>~~Minimum 36'~~</td></tr>
<tr><td>~~Local~~</td><td>~~Minimum 40'~~</td><td>~~Minimum 32' w/5'-foot utility easement on each side~~</td></tr>
<tr><td>~~Alley/Access way~~</td><td>~~Minimum 20'~~</td><td>~~Minimum 20'~~</td></tr>
</table>
</td>
</tr>
<tr>
<td>Allow green street designs consistent with federal regulations for stream protection

(Title 1, Street System Design Sec 3.08.110A(2))</td>
<td>A key component of green street design is the integration of stormwater management and treatment within the right of way. Characteristics of green street system design include maximizing tree canopy coverage and biofiltration (swales). With regards to stream crossings or other sensitive area, "green" streets are located and designed to ensure the least impact on its surroundings.

Chapter 17.46 Landscaping, Section 17.46.020 Standards includes street tree and landscaping standards for parking and loading areas.

Chapter 17.50 Vehicular and Pedestrian Circulation, Section 17.50.020 Vehicular and</td>
<td>See comments and recommendations to (Title 1, Street System Design Sec 3.08.110A(1)) above.

17.56.020 Standards.

Adequate provisions shall be made to ensure proper drainage of surface waters, to preserve natural flow of watercourses and springs and to prevent soil erosion and flooding of neighboring properties or streets. Such provisions shall include, but not be limited to the following:</td>
<td>17.50.040 Street and road standards.

[See comments and recommendations to (Title 1, Street System Design Sec 3.08.110A(1)) above.]

17.56.020 Standards.

Adequate provisions shall be made to ensure proper drainage of surface waters, to preserve natural flow of watercourses and springs and to prevent soil erosion and flooding of neighboring properties or streets. Such provisions shall include, but not</td>
</tr>
</table>

Regional Transportation Functional Plan	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
	pedestrian circulation generally. Pedestrian circulation standards in subsection (6) require a form of separation between a path and auto travel lane. Landscaping features is one of the features mentioned that meets the requirement, but is not required. Section 17.50.040 Street and road standards. Subsection (1) provides a table with ROW and Roadway width standards according to street classification. "Green street" features are not addressed. Section 17.56 Drainage. This chapter includes development standards applicable to new development or redevelopment that meet specific impervious surface criteria. Standards ensure the proper drainage of surface water on-site. The chapter does not currently include provisions or standards allowing for stormwater management within the right-of-way. **Recommendation:** Existing standards do not address green street designs such as in-street stormwater facilities. Consider modifying 17.50.40 or 17.56 to include or refer to street design standards that include green street design standards.	… (5) Surface Drainage and the Storm Sewer System. Stormwater treatment and detention facilities shall be designed and installed in accordance with criteria outlined in the City of Gladstone Stormwater Treatment and Detention Standards.	be limited to the following: … (5) Surface Drainage and the Storm Sewer System. (a) Stormwater treatment and detention facilities shall be designed and installed in accordance with criteria outlined in the ~~City of Gladstone Stormwater Treatment and Detention Standards~~ Gladstone Public Works Design Standards and the Gladstone Public Works Standard Construction Specifications. (b) The street cross sections found in the Gladstone Transportation System Plan may be modified to accommodate alternative stormwater management methods subject to the approval of the Public Works Supervisor. The Public Works Supervisor may require modification of the typical cross section to accommodate alternative stormwater management methods when associated with development proposals. Such modifications may be applied as conditions of development approval.
Allow transit-supportive street designs that facilitate existing and planned transit service pursuant 3.08.120B **(Title 1, Street System Design Sec 3.08.110A(3))**	Transit-supportive street design attributes include streets and buildings that encourage pedestrian movement, streets that can accommodate 40-foot buses, and safe, direct and convenient pedestrian and bicycle access within communities and to transit stops (see 2014 RTP p. 2-44). The TSP update will be revising the City's transit system map to ensure consistency with the transit functional classifications in the Regional Transit Network (shown in RTP Figure 2.10). I-205 and OR 99E are part of the regional bus system (RTP Figure 2.10). I-205 is a Future High Capacity Transit Corridor and OR 99E is a regional bus line that has several major bus stops. "Regional bus" is described in the RTP as bus service that operates on arterial streets with typical frequencies of 15 minutes during most of the day, with stops generally spaced every 750 to 1000 feet. Chapter 17.50 Vehicular and Pedestrian Circulation, Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6) includes general standards to accommodate pedestrians (i.e. traffic separation, curbs and sidewalks, on-site circulation); however, there are no specific requirements for connections to existing transit stops. Subsection (7) requires new industrial, institutional, retail, and office developments subject to design review and that generate more than 1,000 average daily traffic trips to provide a transit stop on-site or a connection to a transit stop when required by the transit operator. Section 17.50.040 Street and road standards. Bicycle/pedestrian routes are required in subsection (16) when necessary to provide access to a transit stop for specific uses such as schools, parks, churches, commercial centers, or similar facilities. Chapter 17.64 Design Standards for Land Divisions and Property Line Adjustments, Section 17.64.020 Blocks. Easements with associated standards for pedestrian and bicycle paths are required under specific circumstances for land divisions and property line adjustments. However, there are no specific standards for connections to existing transit stops. **Recommendation:** The TSP update will revisit City street design standards to ensure that they continue to facilitate existing and planned transit service. Existing development requirement related to connecting to transit-supportive streets are limited. Consider creating additional requirements for connectivity to transit, particularly around major bus stops. Recommendations for block lengths are found later in this table and address	**17.50.020 Vehicular and pedestrian circulation generally.** … (7) New industrial, institutional, retail and office developments requiring full site design review that, when completed, generate an average daily traffic of 1,000 trips or greater based on the most recent edition of Institute of Transportation Engineers Report on Generation shall provide either a transit stop on-site or connection to a transit stop along a transit route when the transit operator requires such an improvement.	**17.50.020 Vehicular and pedestrian circulation generally.** … (7) Proposed ~~N~~new industrial, institutional, multi-family, retail and office developments requiring full site design review that are adjacent to or incorporate transit streets~~, when completed, generate an average daily traffic of 1,000 trips or greater based on the most recent edition of Institute of Transportation Engineers Report on Generation~~ shall provide transit improvements at any existing or planned transit stop located along the site's frontage ~~either a transit stop on-site or connection to a transit stop along a transit route when the~~ consistent with the transit operator's ~~requires such an improvement~~ adopted long-range plan . (a) Transit facilities include bus stops, shelters, and related facilities. Required transit facility improvements may include the dedication of land or the provision of a public easement. (c) Development shall provide reasonably direct pedestrian connections between building entrances and the transit facility and between buildings on the site and streets adjoining transit stops. (c) Improvements at Major Bus Stops. A proposed development that is adjacent to or includes an existing or planned major bus stop will be required to plan for access to the transit stop and provide for transit improvements, in consultation with TriMet and consistent with an agency adopted or approved plan at the time of development. (A) Major Bus Stops are identified as part of the regional transit system and depicted in the Gladstone Transportation System Plan Transit Plan as "Major Bus Stops" in [Figure XX] (B) Requirements apply where the subject parcel(s) or portions thereof are within 200 feet of a transit stop. Development requirements and improvements may include the following: (i) Intersection or mid-block traffic management improvements to allow for pedestrian crossings at major transit stops. (ii) Building placement within 20 feet of the transit stop, a transit street or an

Regional Transportation Functional Plan	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
	Title 1, Street System Design Sec 3.08.110F.		intersection street, or a pedestrian plaza at the stop or at street intersections. (iii) Transit passenger landing pads accessible to disabled persons to transit agency standards. (iv) An easement or dedication for a passenger shelter and an underground utility connection to a major transit stop if requested by TriMet. (v) Lighting to TriMet standards. (d) Any land divisions where further divisions are possible and multiple-family developments, community services uses, and commercial or industrial uses located on an existing or future planned frequent bus route shall meet the TriMet transit facility requirements. Applicants shall consult with TriMet to determine necessary transit facility improvements in conjunction with the proposed development. Proposals shall be consistent with the road crossing improvements that are identified in the transportation system plan on streets with existing or planned transit service.
Allow implementation of: • narrow streets (<28 ft curb to curb); • wide sidewalks (at least five feet of through zone); • landscaped pedestrian buffer strips or paved furnishing zones of at least five feet, that include street trees; • traffic calming to discourage traffic infiltration and excessive speeds; • short and direct right-of-way routes and shared-use paths to connect residences with commercial services, parks, schools, hospitals, institutions, transit corridors, regional trails and other neighborhood activity centers; and, • opportunities to extend streets in an incremental fashion, including posted notification on streets to be extended. **(Title 1, Street System Design Sec 3.08.110B)**	Narrow Streets Chapter 17.50 Vehicular and Pedestrian Circulation, Section 17.50.040 Street and road standards. Subsection (1) provides a table with ROW and Roadway width standards according to street classification. Minimum roadway width for Local streets is 32' with 5' utility easement on each side. Subsection (6) requires existing streets with inadequate widths to provide additional ROW at time of development. Chapter 17.50 does not have a local street standard that allows pavement width to be narrower than 28 feet under typical circumstances (e.g., no topographical site challenges), which is inconsistent with the RTFP as well as the "safe harbor" State recommendations for compliance with the Transportation Planning Rule (see Recommendations section and the Transportation and Growth Management program's Neighborhood Street Design Guideline https://www.oregon.gov/LCD/docs/publications/neighstreet.pdf). Chapter 17.73 Adjustments, Section 17.73.020 Circumstances for granting (Adjustments). Allows for up to a 20% modification of a quantifiable provisions (i.e. street standards) when specific criteria are met. Sidewalks Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (3) requires curbs and sidewalks within ROW or easements, but does not specify minimum width. Section 17.50.040 Street and road standards. Subsection (15) requires sidewalks to be installed on public streets with specific exceptions allowed with Planning Commission approval. It does not specify minimum sidewalk width standards. Landscape Treatments/Buffer Strips Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6)(e) requires a raised curb, bollards, landscaping, or other physical barrier when the pedestrian network is adjacent to an auto travel lane. It does not require more than one feature. Section 17.50.040 Street and road standards. Subsection (1) provides a table with ROW and Roadway width standards according to street classification. It does not include standards for buffer strips.	**17.50.020 Vehicular and pedestrian circulation generally.** … (3) Curbs and Sidewalks. Provide curbs, associated drainage, and sidewalks within the right-of-way or easement for public roads and streets. … (6) Pedestrian Circulation Standards. An on-site pedestrian circulation system shall be provided for new nonresidential and multi-family developments and for new buildings added to existing nonresidential and multi-family developments. The system shall comply with the following standards: (a) The system shall connect all adjacent streets to the main entrances of nonresidential buildings and to unit and/or building entrances of multi-family developments; (b) The system shall connect all buildings and other areas of the site, such as parking areas, bicycle parking, recreational areas, common outdoor areas and any pedestrian amenities. (c) The system shall be hard-surfaced. For nonresidential development, the system shall be a minimum of six feet (6') wide. For multi-family residential development, the system shall be a minimum of five feet (5') wide. (d) The system and off-street parking and loading areas shall be designed to avoid, to the maximum extent possible, the system's crossing off-street parking and loading areas. Where the system crosses driveways or off-street parking and loading areas, the system shall be clearly identifiable through the use of elevation changes, speed bumps, a different paving material or other similar method. Striping shall not fulfill this requirement; (e) Where the system is parallel and adjacent to an auto travel lane, the system shall be a raised path or be separated from the auto travel lane by a raised curb, bollards, landscaping or other physical barrier. If a raised path is used, the ends of the raised portions shall be equipped with curb ramps;	**17.50.020 Vehicular and pedestrian circulation generally.** … (3) Curbs and Sidewalks. Provide curbs, associated drainage, and sidewalks within the right-of-way or easement for public roads and streets. … (6) Pedestrian Circulation Standards. An on-site pedestrian circulation system shall be provided for new nonresidential and multi-family developments and for new buildings added to existing nonresidential and multi-family developments. The system may include sidewalks, as part of the public rights-of-way, walkways, and multi-use paths. (Walkways only provide for pedestrian circulation; multi-use pathways accommodate pedestrians and bicycles.)The system shall comply with the following standards: (a) The system shall connect all adjacent streets to the main entrances of nonresidential buildings and to unit and/or building entrances of multi-family developments; (b) The system shall connect all buildings and other areas of the site, such as parking areas, bicycle parking, recreational areas, common outdoor areas and any pedestrian amenities. (c) The system shall be hard-surfaced. For nonresidential development, the ~~system~~ walkways shall be a minimum of six feet (6') wide. For multi-family residential development, ~~the system~~ walkways shall be a minimum of five feet (5') wide. (d) The system and off-street parking and loading areas shall be designed to avoid, to the maximum extent possible, the system's crossing off-street parking and loading areas. Where the system crosses driveways or off-street parking and loading areas, the system shall be clearly identifiable through the use of elevation changes, speed bumps, a different paving material or other similar method. Striping shall not fulfill this requirement; (e) Where the system is parallel and adjacent to an auto travel lane, the system shall be a raised path or be separated from the auto travel lane by a raised curb, bollards,

<table>
<tr><th>Regional Transportation Functional Plan</th><th colspan="3">Gladstone Municipal Code Title 17 Zoning and Development</th></tr>
<tr><th>Requirement</th><th>Notes and Recommendation</th><th>Original Text</th><th>Recommended Modifications</th></tr>
<tr>
<td></td>
<td>Traffic Calming

No provisions found in the Code that allow traffic calming (e.g. medians, speed humps).

Street/Route Connections

Section 17.50.040 Street and road standards. Subsection (7) limits cul-de-sacs. Subsection (16) requires bicycle and pedestrian routes when consistent the Comprehensive Plan or when necessary to provide connections to transit stops for specific uses.

Street Extensions

Section 17.50.040 Street and road standards. Subsection (3) allows for dead-end streets to be approved with temporary turn-arounds to allow for future street extensions. Subsection (4) allows for reserve strips (street plugs) when necessary to preserve street extensions. No posting informing of street extension is required.

Recommendations: Update Section 17.50.040 to include or reference the updated TSP and provisions/standards for narrow streets, wide sidewalks, and landscape treatments/buffer strips. Consider adopting more rigorous requirements for pedestrian connectivity for all developments (with the exception of single family residential) that address; pathway systems (pedestrian and/or multi-use) within the site; connections to future phases of development, adjacent trails, public parks and open space areas, and other developed areas; and safe, reasonably direct and convenient connections between primary building entrances and all adjacent streets.

To provide for a narrow street option, revisit adopted local street standards, considering the State-recommended “safe harbor” dimensions:

<table>
<tr><th></th><th>Pavement</th><th>Right of-Way</th></tr>
<tr><td>No On-Street Parking</td><td>20’</td><td>42-48’</td></tr>
<tr><td>Parking on One Side</td><td>24’</td><td>47-52’</td></tr>
<tr><td>Parking on Two Sides</td><td>28’</td><td>52-56’</td></tr>
</table>

Specifically, explore allowing a narrower pavement width where parking is restricted on one or both sides of the street.

If necessary, modify 17.50.040(1) Right-of-Way and Roadway Widths to be consistent with the recommendations of the draft TSP. [See proposed modifications addressing Title 1, Street System Design Sec 3.08.110A(1)).]

Amend Section 17.50.040 to specify that posted notification regarding street extensions is required.</td>
<td>(f) The system shall comply with the Americans with Disabilities Act (ADA).

…

17.50.040 Street and road standards.

The design and improvement of streets within a development and streets adjacent but only partially within the development shall comply with improvement specifications adopted pursuant to GMC Section 17.42.030 and with the following standards:

(1) Right-of-Way and Roadway Widths. Minimum right-of-way and roadway widths shall be as follows:

<table>
<tr><th>Type of Street</th><th>R.O.W Width (in feet)</th><th>Roadway Width (in feet)</th></tr>
<tr><td>Major arterial</td><td>80’ to 120’</td><td>72’ to 80’</td></tr>
<tr><td>Minor arterial</td><td>60’ to 80’</td><td>Minimum 42’</td></tr>
<tr><td>Collectors</td><td>50’ to 60’</td><td>Minimum 36’</td></tr>
<tr><td>Local</td><td>Minimum 40’</td><td>Minimum 32’ w/5’-foot utility easement on each side</td></tr>
<tr><td>Alley/Access way</td><td>Minimum 20’</td><td>Minimum 20’</td></tr>
</table>

…

(3) Future Extension of Streets. Where necessary to give access to or permit a satisfactory future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision and the resulting dead-end streets may be approved with temporary turnarounds. Such temporary turnarounds shall be formed as an easement and will not affect building setback lines. The removal of a temporary turnaround shall occur when the street is extended and shall be paid for by the person extending the street. Reserve strips (street plugs) may be required to preserve the objectives of street extensions.</td>
<td>landscaping or other physical barrier. If a raised path is used, the ends of the raised portions shall be equipped with curb ramps;

(f) The system shall comply with the Americans with Disabilities Act (ADA).

(g) Walkways or multi-use paths shall be provided at or near midblock where the block length exceeds the length required by GMC 17.64.020. Multi-use paths shall also be provided where cul-de-sacs or dead-end streets are planned, to connect the ends of the streets together, to other streets, and/or to other developments, as applicable. Multi-use paths used to comply with these standards shall conform to all of the following criteria:

(A) Multi-use paths are required to be no less than 10 feet wide and located within a 20-foot-wide right-of-way or easement that allows access for emergency vehicles.

(B) The city may require landscaping within the pathway easement/right-of-way for screening and the privacy of adjoining properties.

(C) The [*hearings body or City Administrator*] may determine, based upon facts in the record, that a walkway or multi-use pathway is impracticable due to: physical or topographic conditions (e.g., freeways, railroads, extremely steep slopes, sensitive lands, and similar physical constraints); buildings or other existing development on adjacent properties that physically prevent a connection now or in the future, considering the potential for redevelopment; and sites where the provisions of recorded leases, easements, covenants, restrictions, or other agreements recorded as of the effective date of this code prohibit the pathway connection.

[Recommended changes to subsequent standards found in response to **(Title 1, Street System Design Sec 3.08.110A(3))** above.

…

17.50.040 Street and road standards. [See proposed modifications addressing Title 1, Street System Design Sec 3.08.110A(1)).]…

(3) Future Extension of Streets. Where necessary to give access to or permit a satisfactory future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision. The point where the streets temporarily end shall conform to the standards below: ~~Such temporary turnarounds shall be formed as an easement and will not affect building setback lines. The removal of a temporary turnaround shall occur when the street is extended and shall be paid for by the person extending the street. Reserve strips (street plugs) may be required to preserve the objectives of street extensions.~~

(a) Extended streets or street stubs to adjoining properties are not considered to be cul-de-sacs since they are intended to continue as through streets when the adjoining property is developed.

(b) A barricade (e.g., fence, bollards, boulders, or similar vehicle barrier) shall be constructed at the end of the street by the subdivider and shall not be removed until authorized by the city or other applicable agency with jurisdiction over the street.

(c) Temporary turnarounds (e.g., hammerhead or bulb-shaped configuration) shall be constructed for stub streets over 150 feet in length.</td>
</tr>
</table>

Regional Transportation Functional Plan	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
			(d) Temporary turnarounds shall be formed as an easement and will not affect building setback lines. The removal of a temporary turnaround shall occur when the street is extended and shall be paid for by the person extending the street. Reserve strips (street plugs) may be required to preserve the objectives of street extensions. (e) In the case of dead-end stub streets that will connect to streets on adjacent sites in the future, notification that the street is planned for future extension shall be posted on the stub street until the street is extended and shall inform the public that the dead-end street may be extended in the future.
Require new residential or mixed-use development (of five or more acres) that proposes or is required to construct or extend street(s) to provide a site plan (consistent with the conceptual new streets map required by Title 1, Sec 3.08.110D) that: • provides full street connections with spacing of no more than 530 feet between connections except where prevented by barriers; • Provides a crossing every 800 to 1,200 feet if streets must cross water features protected pursuant to Title 3 of the Urban Growth Management Functional Plan (UGMFP) (unless habitat quality or the length of the crossing prevents a full street connection) • provides bike and pedestrian accessways in lieu of streets with spacing of no more than 330 feet except where prevented by barriers • limits use of cul-de-sacs and other closed-end street systems to situations where barriers prevent full street connections • includes no closed-end street longer than 220 feet or having no more than 25 dwelling units **(Title 1, Street System Design Sec 3.08.110E)**	Section 17.80.061 Submittal Requirements (Design Review). Subsection (1)(b) lists information required to be included in a site plan when submitting an application subject to design review. Required information includes the location and dimensions of existing and proposed ROWs curbs, sidewalks, parking, and pedestrian/bicycle circulation. Section 17.50.030 Streets and roads generally. Subsection (2) requires new residential and mixed-use development on vacant land of five or more acres in specific districts to provide full street connections and accessways in lieu of streets. Section 17.50.040 Street and road standards. Subsection (7) limits the use of cul-de-sacs and hammerhead street design unless barriers are present which prevent connections. When used, cul-de-sacs are limited to 200' in length and serve no more than 25 single-family dwellings. **Recommendation:** Update Section 17.50.030 Streets and roads generally to reflect Title 3 UGMFP allowances. *[Note that this recommendation has been modified from the original recommendation in Tech Memo 1.]*	**17.50.030 Streets and roads generally.** … (2) For new residential and mixed-use development on vacant land of five acres or more in the R-5, R-7.2, MR and C-2 zoning districts, street connections and access ways shall be provided as follows: (a) Full street connections, of at least local street classification, shall be provided at intervals of no more than five hundred thirty feet (530'), except where prevented by topography, barriers such as railroads or freeways, or environmental constraints such as major streams and rivers; (b) Access ways for pedestrians, bicycles or emergency vehicles shall be provided on public easements or right-of-way where full street connections are not possible, with spacing between full streets or access way connections of not more than three hundred thirty feet (330'), except where prevented by topography, barriers such as railroads or freeways, or environmental constraints such as major streams and rivers;	**17.50.030 Streets and roads generally.** … (2) For new residential and mixed-use development on vacant land of five acres or more in the R-5, R-7.2, MR and C-2 zoning districts, street connections and access ways shall be provided as follows: (a) Full street connections~~, of at least local street classification,~~ shall be provided at intervals that are consistent with the adopted Transportation System Plan for the identified street classification ~~of no more than five hundred thirty feet (530')~~, except where prevented by topography, barriers such as railroads or freeways, or environmental constraints such as major streams and rivers; (b) Access ways for pedestrians, bicycles or emergency vehicles shall be provided on public easements or right-of-way where full street connections are not possible, with spacing between full streets or access way connections of not more than three hundred thirty feet (330'), except where prevented by topography, barriers such as railroads or freeways, or environmental constraints such as major streams and rivers; (c) A variance to street spacing standards may be granted pursuant to GMC 17.72 if resources are present that are mapped on the Natural Resources Map, where street spacing can be achieved at a minimum of 800 feet and no greater than 1,200 feet. Where habitat quality or the length of the crossing required prevents a full street connection, an exception to the street spacing standards may be granted, pursuant to GMC 17.72.
Establish city/county standards for local street connectivity, consistent with Title 1, Sec 3.08.110E, that applies to new residential or mixed-use development (of less than five acres) that proposes or is required to construct or extend street(s). **(Title 1, Street System Design Sec 3.08.110F)**	This RTFP subsection applies to redevelopment of contiguous lots and parcels less than five acres in size that require construction of new streets. The City's development standards (Division IV), including street and road standards, apply to all new development and require street connectivity. The City's block length requirements dictates local street spacing (Section 16.64.020, Chapter 17.64 Design Standards for Land Divisions and Property Line Adjustments). The code states that blocks shall not exceed one thousand feet (1,000') in length between street lines, except for blocks adjacent to arterial streets. **Recommendation:** Amend Section 16.64.020 to be consistent with updated TSP spacing	**17.64.020 Blocks.** … (2) Sizes. Except as modified by GMC Subsection 17.50.030(2), blocks shall not exceed one thousand feet (1,000') in length between street lines, except for blocks adjacent to arterial streets or unless topography, barriers such as railroads or freeways, environmental constraints such as major streams and rivers, pre-existing development or the layout of adjacent streets require a modification. The recommended minimum distance between intersections on arterial streets is one	**17.64.020 Blocks.** … (2) Sizes. Full street connections shall be provided at intervals consistent with the adopted Transportation System Plan for the identified street classification, except as modified by GMC Subsection 17.50.030(2), or where prevented by topography, existing development, barriers such as railroads or freeways, or environmental constraints such as major streams and rivers. ~~Except as modified by GMC Subsection 17.50.030(2), blocks shall not exceed one thousand feet (1,000') in length between street lines, except for blocks adjacent to arterial streets or unless topography,~~

Regional Transportation Functional Plan	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
	standards and the requirements of the RTFP, which requires that full street connections be provided no more than 530 feet between connections.	thousand three hundred twenty feet (1,320').	~~barriers such as railroads or freeways, environmental constraints such as major streams and rivers, pre-existing development or the layout of adjacent streets require a modification. The recommended minimum distance between intersections on arterial streets is one thousand three hundred twenty feet (1,320').~~
Applicable to both Development Code and TSP To the extent feasible, restrict driveway and street access in the vicinity of interchange ramp terminals, consistent with Oregon Highway Plan Access Management Standards, and accommodate local circulation on the local system. Public street connections, consistent with regional street design and spacing standards, shall be encouraged and shall supersede this access restriction. Multimodal street design features including pedestrian crossings and on-street parking shall be allowed where appropriate. **(Title 1,Street System Design Sec 3.08.110G)**	This section of Title 1 addresses how local jurisdictions can help protect the capacity, function and safe operation of existing and planned state highway interchanges or planned improvements to interchanges. The Street Plan Element of the adopted TSP (1995) provides an inventory and description of access management within the City. The TSP describes access management being reviewed by Planning Commission for specific developments or by the Traffic Safety Commission when requested as part of the design review process (Chapter 17.80). Ordinance No. 1245 (1997) in the Comprehensive Plan amended the TSP to include direction on access management affecting state highways. The Ordinance recognizes ODOT's authority to manage state highways, and defers to the state adopted access management guidelines for state highways as detailed in the Oregon Highway Plan. **Recommendation:** The updated TSP will address access management requirements for state highways and in the vicinity of interchanges.	Updates will be incorporated into TSP.	
Include Site design standards for new retail, office, multi-family and institutional buildings located near or at major transit stops shown in Figure 2.15 in the RTP: • Provide reasonably direct pedestrian connections between transit stops and building entrances and between building entrances and streets adjoining transit stops; • Provide safe, direct and logical pedestrian crossings at all transit stops where practicable At major transit stops, require the following: • Locate buildings within 20 feet of the transit stop, a transit street or an intersection street, or a pedestrian plaza at the stop or a street intersections; • Transit passenger landing pads accessible to disabled persons to transit agency standards; • An easement or dedication for a passenger shelter and an underground utility connection to a major transit stop if requested by the public transit provider; • Lighting to transit agency standards at	Figure 2, Existing Transit Services, in Draft Tech Memo 5 shows the major bus stops in Gladstone, consistent with Figure 2.10 – Regional Transit Network in the 2014 RTP. TriMet's current service map shows one frequent bus line (Line 33) travels through the City along OR 99E (Mcloughlin Boulevard). Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6) includes general standards to accommodate pedestrians (i.e. traffic separation, curbs and sidewalks, on-site circulation), however there are no specific standards for connections to existing transit stops. Subsection (7) requires new industrial, institutional, retail, and office developments subject to design review and that generate more than 1,000 average daily traffic trips are required to provide a transit stop on-site or a connection to a transit stop when required by the transit operator. Section 17.50.040 Street and road standards. Bicycle/pedestrian routes are required in subsection (16) when necessary to provide access to a transit stop for specific uses such as schools, parks, churches, commercial centers, or similar facilities. Section 17.64.020 Blocks. Easements with associated standards for pedestrian and bicycle paths are required under specific circumstances for land divisions and property line adjustments. However, there are no specific standards for connections to existing transit stops. Section 17.80.061 Submittal Requirements (Design Review). Subsection (1)(b) lists information required to be included in a site plan when submitting an application subject to design review. Required information includes the relation of the subject property to nearby transit stops. It does not include language or refer to language elsewhere in the Code to provide connections. **Recommendation:** Existing standards for transit-supportive street improvements are limited. Consider creating additional standards, particularly around major bus stops, that will facilitate transit service.	See comments and recommendations to **(Title 1, Street System Design Sec 3.08.110A(3))** above.	

Regional Transportation Functional Plan	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
the major transit stop; • Intersection and mid-block traffic management improvements as needed and practicable to enable marked crossings at major transit stops. **(Title 1, Transit System Design Sec 3.08.120B(2))**			
(Could be in Comprehensive plan or TSP as well) As an alternative to implementing site design standards at major transit stops (section 3.08.120B(2), a city or county may establish pedestrian districts with the following elements: • A connected street and pedestrian network for the district; • An inventory of existing facilities, gaps and deficiencies in the network of pedestrian routes; • Interconnection of pedestrian, transit and bicycle systems; • Parking management strategies; • Access management strategies; • Sidewalk and accessway location and width; • Landscaped or paved pedestrian buffer strip location and width; • Street tree location and spacing; • Pedestrian street crossing and intersection design; • Street lighting and furniture for pedestrians; • A mix of types and densities of land uses that will support a high level of pedestrian activity. **(Title 1, Pedestrian System Design Sec 3.08.130B)**	The Portland Avenue Streetscape Design (2008) illustrates a vision for a more pedestrian-oriented Portland Avenue in the downtown area. Several features of the design apply to the entire corridor and include pedestrian-scale lighting, bike lanes, improved intersection crossings, and formalized bus stops along Portland Avenue. The recommendation of this earlier planning process will be revisited as part of the Downtown Revitalization Plan, scheduled to be complete Spring 2017. **Recommendation:** Incorporate features of the Portland Avenue Streetscape Design document into the code as they apply to Portland Avenue.	See comments and recommendations to **(Title 1, Street System Design Sec 3.08.110A(1))** above.	
Require new development to provide on-site streets and accessways that offer reasonably direct routes for pedestrian travel. **(Title 1, Pedestrian System Design Sec**	Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6) includes standards for providing on-site pedestrian circulation for new non-residential and multi-family developments and for new buildings added to existing non-residential and multi-family developments. Standards specify specific connections between features and design elements.	n/a	

Regional Transportation Functional Plan	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
3.08.130C)	**Recommendation:** No change recommended. This standard is met. [*Note that changes were recommended to strengthen existing on-set non-motorized connectivity in response to Title 1, Street System Design Sec 3.08.110B .]*		
Establish parking ratios, consistent with the following: - No minimum ratios higher than those shown on Table 3.08-3. - No maximum ratios higher than those shown on Table 3.08-3 and illustrated in the Parking Maximum Map. If 20-minute peak hour transit service has become available to an area within a one-quarter mile walking distance from bus transit one-half mile walking distance from a high capacity transit station, that area shall be removed from Zone A. Cities and counties should designate Zone A parking ratios in areas with good pedestrian access to commercial or employment areas (within one-third mile walk) from adjacent residential areas. Establish a process for variances from minimum and maximum parking ratios that include criteria for a variance. Require that free surface parking be consistent with the regional parking maximums for Zones A and B in Table 3.08-3. Following an adopted exemption process and criteria, cities and counties may exempt parking structures; fleet parking; vehicle parking for sale, lease, or rent; employee car pool parking; dedicated valet parking; user-paid parking; market rate parking; and other high-efficiency parking management alternatives from maximum parking standards. Reductions associated with redevelopment may be done in phases. Where mixed-use development is proposed, cities and counties shall provide for blended parking rates. Cities and counties may count adjacent on-street parking spaces, nearby public parking and shared parking toward required parking minimum standards. Use categories or standards other than those in Table 3.08-3 upon demonstration that the effect will be substantially the same as the application of the ratios in the table. Provide for the designation of residential	Parking Ratios Chapter 17.48 Off-street parking and loading, Section 17.48.030 Standards for developments subject to design review. Minimum and maximum parking requirements for Gladstone are found in Table 17.48.030 Table 1. With the exception of multi-family, minimum parking requirements do not exceed those in the RTFP. The RTFP defines multi-family uses based on the number of bedrooms present (1-, 2-, 3-bedroom). Gladstone's Code categorizes the use as "Two-family or multi-family" and is consistent with the RTFP requirement for 2-bedroom multi-family uses. The calculation of parking requirements (17.48.030(1), allows for shared parking and on-street parking counting towards minimum off-street requirements. Maximum parking ratios for all uses are categorized according to Zone A or Zone B, which are defined according to proximity to frequent transit service. All uses for each zone in the Code do not exceed those shown in Table 3.08-3 of the RTFP. Section 17.48.060 Car pool and van pool parking. New industrial, institutional, and office developments subject to design review and with more than 50 parking spaces are required to designate at least 10% to car pool or van pool parking. Variances and Exemptions Section 17.48.030 Standards for developments subject to design review. Subsection (2)(c) exempts specific types of parking spaces such as parking structures, fleet parking, or carpool parking, from the maximum parking requirement. Provisions for blended parking or shared parking standards are not currently found in the Code. Section 17.80.090 Minor Exceptions (Design Review). Exceptions up to 25% of minimum and maximum parking ratios can be granted by the Planning Commission pursuant to specific factors listed in paragraph (2)(c). Exceptions greater than 25% are subject to variance procedures. Chapter 17.72 Variances. The variance procedure, referred to in 17.80.090 for exceptions greater than 25%, allows variances in situations of undue or unnecessary hardship. Variances are subject to administrative procedures in the Code. Chapter 17.73 Adjustments. Although not referred to in 17.80.090, the adjustments procedure allows adjustments of up to 20% of a quantifiable provision when specific criteria are demonstrated. Parking Lots Chapter 17.46 Landscaping, Section 17.46.020 Standards includes street tree and landscaping standards for parking and loading areas, specifically for those with ten (10) or more parking spaces. Loading Section 10.04.250 Use of loading zone. This section restricts the use of loading zones to hours applicable to the respective zone, however it does not specify areas for which the standard applies. Section 17.48.040 Design requirements for permanent off-street parking and loading. All	**17.18.070 Off-street parking standards.** (1) Where one commercial use allowed outright is substituted for another in an existing building and the building is not expanded by more than ten percent (10%) of the floor area used for commercial purposes on January 1, 1980, no more off-street parking shall be required than was possessed by the previous commercial use. Where successive expansions of a building are proposed, the total area of all expansions shall not exceed the ten-percent (10%) standard. (2) When an existing residence in the C-2 zoning district along Portland Avenue is converted to commercial or mixed use development, additional off-street parking shall not be required, subject to the following standards: (a) The new commercial use shall not exceed a "B" occupancy rating as described in the Oregon Structural Specialty Code or its successor and shall be identified in GMC Section 17.18.020 (2), (5) or (8); (b) Signs shall be on-building and indirectly illuminated; (c) The use shall generate low traffic volumes and require minimal off-street parking; and (d) Structures and landscaping shall retain a residential appearance. … **17.46.020 Standards.** … (2) Parking and Loading Areas. The following landscape requirements shall apply to off-street parking and loading areas: (a) An off-street parking and loading area providing ten (10) or more parking spaces shall be improved with defined landscaped areas totaling no less than ten square feet per parking space; (b) A parking or loading area shall be separated from any lot line adjacent to a street by a landscaped strip at least ten feet (10') in width, and any other lot line by a landscaped strip at least five feet (5') in width; (c) A landscaped strip separating a parking or loading area from a street shall contain: (A) Street trees spaced as appropriate to the species, not to exceed twenty-five feet (25') apart, on the average, (B) Low shrubs not to reach a height greater than three feet (3') spaced no more than five feet (5') apart, on the average, and (C) Vegetative ground cover. …	**17.18.070 Off-street parking standards.** ***[The Draft Downtown Gladstone Revitalization Plan will recommend parking reductions for both the C-2 zoning district, as well as a Downtown Commercial Core overlay district. Existing standards in 17.18.070 will be review and potentially revised to be consistent with the Revitalization Plan.]*** **17.46.020 Standards.** … (2) Parking and Loading Areas. The following landscape requirements shall apply to off-street parking and loading areas: (a) An off-street parking and loading area providing ten (10) or more parking spaces shall be improved with defined landscaped areas totaling no less than ten square feet per parking space; ***[The Draft Downtown Gladstone Revitalization Plan will recommend exempting development in the C-2 zone from this standard.]*** (b) A parking or loading area shall be separated from any lot line adjacent to a street by a landscaped strip at least ten feet (10') in width, and any other lot line by a landscaped strip at least five feet (5') in width; ***[The Draft Downtown Gladstone Revitalization Plan will recommend reducing the landscape strip to 5' in the C-2 zoning district.]*** (c) A landscaped strip separating a parking or loading area from a street shall contain: (A) Street trees spaced as appropriate to the species, not to exceed twenty-five feet (25') apart, on the average, (B) Low shrubs not to reach a height greater than three feet (3') spaced no more than five feet (5') apart, on the average, and (C) Vegetative ground cover. (e) In parking areas three acres and larger intended for use by the general public, pedestrian walkways shall be raised or separated from parking, parking aisles, and travel lanes by a raised curb, concrete bumpers, bollards, landscaping, or other physical barrier. If a raised pathway is used, curb ramps shall be provided in accordance with the Americans with Disabilities Act Accessibility Guidelines. … **17.48.030 Standards for developments subject to design review.** At the time of construction, enlargement, or change of use of any structure or development subject to GMC Chapter 17.80 (design review), except as provided in the C-2 district, off-street parking spaces shall be provided as follows unless greater requirements are otherwise established under this title: (1) Calculation of parking requirements. (a) Square Footage as Basis for Requirement. Where square feet of the structure or

Regional Transportation Functional Plan	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
parking districts in local comprehensive plans or implementing ordinances. Require that parking lots more than three acres in size provide street-like features along major driveways, including curbs, sidewalks and street trees or planting strips. Major driveways in new residential and mixed-use areas shall meet the connectivity standards for full street connections in section 3.08.110, and should line up with surrounding streets except where prevented by topography, rail lines, freeways, pre-existing development or leases, easements or covenants that existed prior to May 1, 1995, or the requirements of Titles 3 and 13 of the UGMFP. Require on-street freight loading and unloading areas at appropriate locations in centers. Establish short-term and long-term bicycle parking minimums for: • New multi-family residential developments of four units or more; • New retail, office and institutional developments; • Transit centers, high capacity transit stations, inter-city bus and rail passenger terminals; and • Bicycle facilities at transit stops and park-and-ride lots. **(Title 4, Parking Management Sec 3.08.410)**	structures and developments subject to design review are subject to this section. This section provides standards for off-street loading areas such as screening/buffering, compatibility with off-street parking, and location of loading areas. No provisions for on-street loading were found in the Code. Bicycle Parking Section 17.48.050 Bicycle parking standards. Bicycle parking standards apply to new multi-family dwellings of four units or more and new commercial/industrial developments. Bicycle parking standards applicable to transit centers, transit stops, or park-and-ride lots are not currently in the Code. The minimum bicycle parking required for all development subject to the section is two (2) spaces or 5% of the minimum required automobile parking spaces. Bicycle parking spaces are not distinguished as short-term or long-term in the code, however standards require bicycle parking be sheltered when more than 7 spaces are provided or in all multi-family developments. **Recommendation:** Consider amendments to Chapter 17.46 Landscaping, Section 17.46.020 Standards, to improved pedestrian safety and circulation in large parking lots (3 acres) and pedestrian circulation and safety. Revise off-street parking and loading requirements to allow exemptions from off-street loading requirements within the Town Center. Criteria for the exemption(s) and whether these will be site specific within the Town Center will need to determined. Revise Section 17.48.050 to require bike parking at transit stops. Consider adding a description of “long-term” bicycle parking and refining the requirements for its design and placement.	**17.48.030 Standards for developments subject to design review.** At the time of construction, enlargement, or change of use of any structure or development subject to GMC Chapter 17.80 (design review), except as provided in the C-2 district, off-street parking spaces shall be provided as follows unless greater requirements are otherwise established under this title: (1) Calculation of parking requirements. (a) Square Footage as Basis for Requirement. Where square feet of the structure or use is specified as the basis for the parking requirement, the calculation shall be based on the gross leasable area (GLA). (b) Number of Employees as Basis of Requirement. When the number of employees is specified as the basis for the parking space requirement, the calculation shall be based on the number of employees working on the premises during the largest shift at peak season. (c) If more than one use occupies a single structure or lot, the total minimum and maximum parking requirements for the structure or lot shall be the sum of the requirements for each use computed separately. (d) When calculation of a minimum or maximum parking requirement results in a fractional space requirement, such fraction shall be rounded down to the nearest whole number. (e) Owners of two or more uses, structures or lots may agree to utilize jointly the same parking and loading spaces when the peak hours of operation do not substantially overlap. Satisfactory legal evidence shall be presented to establish the joint use. Shared parking spaces shall be included in the calculation of the minimum parking requirement for each of the joint users. For the purpose of calculating the maximum permitted parking for each of the joint users, shared spaces shall be apportioned between the joint users. (f) On-street parking may count towards fulfilling up to one-quarter of the off-street parking requirements where on-street parking is allowed and the applicant can demonstrate that on-street parking is available. (g) Parking spaces fulfilling the minimum off-street parking space requirement shall not be used for display or storage and shall not be rented, leased or assigned to any other person or organization, except as authorized under Subsection 17.48.030(l)(e). **17.48.040 Design requirements for permanent off-street parking and loading.** All structures and developments subject to design review shall provide permanent off-street parking and loading as follows: … (3) Loading: … **17.48.050 Bicycle parking standards.** (1) Standards for bicycle parking apply to full-site design review of new construction for multi-family residential (four units and larger) and new commercial/industrial developments. The Planning Commission may grant exemptions to bicycle parking	use is specified as the basis for the parking requirement, the calculation shall be based on the gross leasable area (GLA). (b) Number of Employees as Basis of Requirement. When the number of employees is specified as the basis for the parking space requirement, the calculation shall be based on the number of employees working on the premises during the largest shift at peak season. (c) If more than one use occupies a single structure or lot, the total minimum and maximum parking requirements for the structure or lot shall be the sum of the requirements for ~~each use computed separately~~ all uses, unless it can be shown that the peak parking demands are actually less (i.e., the uses operate on different days or at different times of the day). In that case, the total requirements may be reduced accordingly. (d) When calculation of a minimum or maximum parking requirement results in a fractional space requirement, such fraction shall be rounded down to the nearest whole number. (e) Owners of two or more uses, structures or lots may agree to utilize jointly the same parking and loading spaces when the peak hours of operation do not substantially overlap. Satisfactory legal evidence shall be presented to establish the joint use. Shared parking spaces shall be included in the calculation of the minimum parking requirement for each of the joint users. For the purpose of calculating the maximum permitted parking for each of the joint users, shared spaces shall be apportioned between the joint users. (f) On-street parking may count towards fulfilling up to one-quarter of the off-street parking requirements where on-street parking is allowed and the applicant can demonstrate that on-street parking is available. On-street parking must be available on the subject site’s frontage in order to be credited towards the off-street parking requirement. On-street parking credited for a specific use may not be used exclusively by that use, but shall be available to for general public use at all times. No signs or actions limiting general public use of on-street spaces is permitted. (g) Parking spaces fulfilling the minimum off-street parking space requirement shall not be used for display or storage and shall not be rented, leased or assigned to any other person or organization, except as authorized under Subsection 17.48.030(l)(e). (h) Off-Site Parking. Except for single-family dwellings, the vehicle parking spaces required by this chapter may be located on another parcel of land, provided the parcel is within 500 feet walking distance of the use it serves. The distance from the parking area to the use shall be measured from the nearest parking space to a building entrance, following a sidewalk or other pedestrian route. The right to use the off-site parking must be evidenced by a recorded deed, lease, easement, or similar written instrument. **17.48.040 Design requirements for permanent off-street parking and loading.** All structures and developments subject to design review shall provide permanent off-street parking and loading as follows: … (3) Loading:

Regional Transportation Functional Plan	Gladstone Municipal Code Title 17 Zoning and Development		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
		requirements in connection with temporary uses or uses that are not likely to generate the need for bicycle parking. (2) Required bicycle parking must be lighted and be located within fifty feet (50') of an entrance to the building: (a) Location. Bicycle parking may be provided within a building if the location is easily accessible for bicycles; (b) Covered Spaces. Cover for bicycle parking can be accommodated by buildings or roof overhangs, awnings, bicycle lockers, bicycle storage within buildings or free-standing shelters; (c) Signs. If the bicycle parking is not visible from the street or main building entrance, then a sign conforming to the city's standards for on-site traffic control, Section 17.52.060(1), shall be posted indicating the location of the parking facilities; (d) Rack Type and Dimensions: (A) Bicycle racks must hold bicycles securely by the frame and be securely anchored; (B) Bicycle racks must accommodate: (i) Locking the frame and one wheel to the rack with a high-security U-shaped shackle lock, or approved substitute; or (ii) Locking the frame and both wheels to the rack with a chain or cable not longer than six feet (6'); (C) The Planning Commission may approve alternate bicycle racks provided they are convenient and secure; (e) Bicycle parking spaces must be at least six feet (6') long and two feet (2') wide, and in covered situations the overhead clearance must be at least seven feet (7'). An aisle five feet (5') wide for bicycle maneuvering must be provided; (f) Areas set aside for required bicycle parking must be clearly marked and reserved for bicycle parking only; (g) Required parking in all developments required to comply with this section shall provide a minimum five percent (5%) bicycle parking spaces based on the city's required minimum number of automobile parking spaces: (A) All development shall have a minimum two (2) bicycle parking spaces; (B) If more than seven (7) bicycle parking spaces are required, fifty percent (50%) of the spaces shall be covered. One hundred percent (100%) of all bicycle parking spaces for multi-family development of four (4) units and more shall be covered.	… (e) Exceptions and Adjustments. Loading areas within a street right-of-way in areas zoned mixed-use commercial in the [C-2 zoning district] may be approved when all of the following conditions are met: (A) Loading areas must be signed to limit the duration of the activity, which may not exceed one hour for each loading operation. (B) Proposed loading areas must support a use that requires infrequent loading activity. Infrequent loading activity is defined as less than three (3) operations that occur daily between 5:00 a.m. and 12:00 a.m., or all operations that occur between 12:00 a.m. and 5:00 a.m. at a location that is not adjacent to a residential zone. (C) The proposed loading area: (i) Does not unreasonably obstruct traffic; (ii) Does not obstruct a primary emergency response route; and (iii) Is acceptable to the applicable roadway authority. … **17.48.050 Bicycle parking standards** (1) General Provisions (a) Applicability. Standards for bicycle parking apply to full-site design review of new construction for multi-family residential (four units and larger) and new commercial/industrial developments. The Planning Commission may grant exemptions to bicycle parking requirements in connection with temporary uses or uses that are not likely to generate the need for bicycle parking. (b) Types of spaces. Bicycle parking facilities shall be provided in terms of short-term bicycle parking and long-term bicycle parking. Short-term bicycle parking is intended to encourage customers and other visitors to use bicycles by providing a convenient and readily accessible place to park bicycles. Long-term bicycle parking provides a weather-protected place to park bicycles for employees, students, residents, commuters, and others who generally stay at a site for at least several hours. (c) Minimum Number of Spaces. All developments required to comply with this section shall provide a minimum five percent (5%) bicycle parking spaces based on the city's required minimum number of automobile parking spaces. In addition, the following applies: (A) All development shall have a minimum two (2) bicycle parking spaces; (B) If more than seven (7) bicycle parking spaces are required, at least fifty percent (50%) of the spaces shall be provided as long-term bicycle parking. (C) One hundred percent (100%) of all bicycle parking spaces for multi-family development of four (4) units and more shall be provided as long-term bicycle parking. (2) Location and Design. ~~Required bicycle parking must be lighted and be located within fifty feet (50') of an entrance to the building:~~ (a) Short-term bicycle parking. ~~Location. Bicycle parking may be provided within a~~

Regional Transportation Functional Plan	Gladstone Municipal Code Title 17 Zoning and Development		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
			~~building if the location is easily accessible for bicycles;~~ Short-term bicycle parking facilities are lockers or racks that meet the standards of this section and that are located inside a building, or located outside within thirty (30) feet of the main entrance to the building or at least as close as the nearest vehicle parking space, whichever is closer. (b) Long-term bicycle parking. ~~Covered Spaces. Cover for bicycle parking can be accommodated by buildings or roof overhangs, awnings, bicycle lockers, bicycle storage within buildings or free-standing shelters;~~ Long term bicycle parking includes: (A) Racks, storage rooms, or lockers in areas that are secure or monitored (e.g. visible to employees or customers or monitored by security). (B) Covered outside bicycle parking spaces that meet the requirements of 17.48.050.2(g) and are located within one hundred (100) feet of an entrance to the building. (c) Signs. If the bicycle parking is not visible from the street or main building entrance, then a sign conforming to the city's standards for on-site traffic control, Section 17.52.060(1), shall be posted indicating the location of the parking facilities;. (d) Rack Type and Dimensions: (A) Bicycle racks must hold bicycles securely by the frame and be securely anchored; (B) Bicycle racks must accommodate: (i) Locking the frame and one wheel to the rack with a high-security U-shaped shackle lock, or approved substitute; or (ii) Locking the frame and both wheels to the rack with a chain or cable not longer than six feet (6'); (C) The Planning Commission may approve alternate bicycle racks provided they are convenient and secure;. (e) Bicycle parking spaces must be at least six feet (6') long and two feet (2') wide~~, and in covered situations the overhead clearance must be at least seven feet (7')~~. An aisle five feet (5') wide for bicycle maneuvering must be provided;. (f) Areas set aside for required bicycle parking must be clearly marked and reserved for bicycle parking only; (g) Covered Parking (Weather Protection): (A) When required, covered bicycle parking shall be provided in one (1) of the following ways: inside buildings, under roof overhangs or awnings, in bicycle lockers, or within or under other structures. (B) Where required covered bicycle parking is not proposed to be located within a building or locker, the cover must be permanent and designed to protect the bicycle from rainfall and provide seven-foot minimum overhead clearance. (C) Where required bicycle parking is provided in lockers, the lockers shall be securely anchored. ~~Required parking in all developments required to comply with this section shall~~

Regional Transportation Functional Plan	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
			~~provide a minimum five percent (5%) bicycle parking spaces based on the city's required minimum number of automobile parking spaces:~~ ~~(A) All development shall have a minimum two (2) bicycle parking spaces;~~ ~~(B) If more than seven (7) bicycle parking spaces are required, fifty percent (50%) of the spaces shall be covered. One hundred percent (100%) of all bicycle parking spaces for multi-family development of four (4) units and more shall be covered.~~
When proposing an amendment to the comprehensive plan or to a zoning designation, consider the strategies in subsection 3.08.220A as part of the analysis required by OAR 660-012-0060. If a city or county adopts the actions set forth in 3.08.230E (parking ratios, designs for street, transit, bicycle, pedestrian, freight systems, TSMO projects and strategies, and land use actions) and section 3.07.630.B of Title 6 of the UGMFP, it shall be eligible for an automatic reduction of 30 percent below the vehicular trip generation rates recommended by the Institute of Transportation Engineers when analyzing the traffic impacts, pursuant to OAR 660-012-0060, of a plan amendment in a Center, Main Street, Corridor or Station Community. (Title 5, Amendments of City and County Comprehensive and Transportation System Plans Sec 3.08.510A,B)	<u>Amendments</u> Chapter <u>17.68</u> Amendments and zone changes. This chapter includes provisions and procedures allowing for amendments to the Comprehensive Plan, Zoning Map, Comprehensive Plan Map, or Title 17 of the Code. Amendments are reviewed through administrative procedures (Section 16.68.020). Conditions may be applied by the City Council (Section 17.68.040) when they can further the objectives of the comprehensive plan or zoning ordinance. Section <u>17.68.050</u> Evidence supplied by applicant. Applicants for amendments must provide evidence meeting five criteria. Criteria include consistency with the Comprehensive Plan and Metro's UGMFP as well as adequate public facilities such as transportation systems are present or concurrent with development. Policy 5 under "Plan Evaluation and Update" of the Comprehensive Plan provides procedures for making amendments to the Comprehensive Plan. <u>UGMFP Title 6</u> The City currently has a designated Town Center boundary as shown in the Urban Growth Management Functional Plan (UGMFP). Progress towards implementing Town Center design is supported by the Portland Avenue Streetscape Design (2008) and is a focus of the Downtown Revitalization Plan project. **Recommendation:** Consider modifying Section 17.68.050 to include compliance with the Transportation Planning Rule, reviewed consistent with OAR 660-012-0060, when a comprehensive plan amendment or land use district change is proposed.	**17.68.050 Evidence supplied by applicant.** The applicant seeking a zoning map change pursuant to the provisions of Section 17.68.010 must show by a preponderance of the evidence all of the following, unless otherwise provided for in this title: (1) Granting the request fulfills a public need, the greater departure from present development policies or land use patterns, the greater the burden of the applicant. (2) The public need is best carried out by granting the petition for the proposed action, and that need is best served by granting the petition at this time. (3) The proposed action is consistent with the Comprehensive Plan and Metro's Functional Plan (Metro Code 3.07). (4) Proof of significant change in a neighborhood or community or a mistake in the planning or zoning for the property under consideration, when relevant. (5) The property and affected area is presently provided with, or concurrent with development can be provided with, adequate public facilities, including, but not limited to, transportation systems.	**17.68.050 Evidence supplied by applicant.** The applicant seeking a zoning map change pursuant to the provisions of Section 17.68.010 must show by a preponderance of the evidence all of the following, unless otherwise provided for in this title: (1) Granting the request fulfills a public need, the greater departure from present development policies or land use patterns, the greater the burden of the applicant. (2) The public need is best carried out by granting the petition for the proposed action, and that need is best served by granting the petition at this time. (3) The proposed action is consistent with the Comprehensive Plan and Metro's Functional Plan (Metro Code 3.07). (4) Proof of significant change in a neighborhood or community or a mistake in the planning or zoning for the property under consideration, when relevant. (5) The property and affected area is presently provided with, or concurrent with development can be provided with, adequate public facilities, including, but not limited to, transportation systems. <u>(6) The transportation system is capable of safely supporting the uses allowed by the proposed designation in addition to the existing and planned uses in the area, consistent with the Transportation Planning Rule (OAR 660-012-0060). Requirements of the State Transportation Planning Rule shall apply to those land use actions that significantly affect the transportation system, as defined by OAR 660-012-0060.</u>
(Could be located in TSP or other adopted policy document) Adopt parking policies, management plans and regulations for Centers and Station Communities. Plans may be adopted in TSPs or other adopted policy documents and may focus on sub-areas of Centers. Plans shall include an inventory of parking supply and usage, an evaluation of bicycle parking needs with consideration of TriMet Bicycle Parking Guidelines. Policies shall be adopted in the TSP. Policies, plans and regulations must consider and may include the following range of strategies: • By-right exemptions from minimum parking requirements;	As documented earlier, the City's parking regulations are mostly consistent with the RTFP. The City does not currently have an adopted parking management plan. However, progress towards regulating parking demand is supported by the Downtown Parking Plan (2006), which provides future implementation recommendations. Policy 4 of the Comprehensive Plan Transportation Element states "Address the parking needs of commercial district". The implementation of which includes a parking district feasibility study and establishing parking limits within the downtown business district. **Recommendations:** • Incorporate the implementation recommendations, to the extent available, in Chapter 17.48 or 17.50. • Update Policy 4 of the Comprehensive Plan Transportation Element to reflect the implementation recommendations of the Downtown Parking Plan.	See comments and recommendations to **(Title 4, Parking Management Sec 3.08.410), (Title 1, Street System Design Sec 3.08.110B)**, and **(Title 1, Street System Design Sec 3.08.110A(3))** above for recommendations to Chapter 17.48 and 17.50. Existing transportation policies in the Comprehensive Plan are proposed to be replaced with new transportation policies based on TSP project goals and objectives. The new transportation policies are proposed to be incorporated into the updated TSP, which will act as the transportation element of the City's Comprehensive Plan.	

Regional Transportation Functional Plan	Gladstone Municipal Code Title 17 Zoning and Development		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
• Parking districts; • Shared parking; • Structured parking; • Bicycle parking; • Timed parking; • Differentiation between employee parking and parking for customers, visitors and patients; • Real-time parking information; • Priced parking; • Parking enforcement. (Title 4, Parking Management Sec 3.08.410I)			

Table 2: Transportation Planning Rule

Transportation Planning Rule (TPR)	Gladstone Municipal Code Title 17 Zoning and Development		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
Each local government shall amend its land use regulations to implement the TSP. The following transportation facilities, services and improvements need not be subject to land use regulations except as necessary to implement the TSP and, under ordinary circumstances do not have a significant impact on land use: • Operation, maintenance, and repair of existing transportation facilities identified in the TSP, such as road, bicycle, pedestrian, port, airport and rail facilities, and major regional pipelines and terminals; • Dedication of right-of-way, authorization of construction and the construction of facilities and improvements, where the improvements are consistent with clear and objective dimensional standards; • Changes in the frequency of transit, rail and airport	Transportation facilities described in OAR - 0045(1) are not included in Title 17, and therefore the capacity to permit them outright is unclear. **Recommendation:** Revise Title 17 to allow outright specific transportation facilities, services, and improvements in individual zones, or for specific transportation improvements, where consistent with the adopted TSP, to be exempt from land use permitting approval processes.	17.50.010 Applicability Vehicular and pedestrian circulation standards shall apply to all land divisions and to all development that is subject to design review.	17.50.010 Applicability (1) Vehicular and pedestrian circulation standards shall apply to all land divisions and to all development that is subject to design review. (2) Transportation Improvements Permitted Outright. Except where otherwise specifically regulated by this ordinance, the following improvements are permitted outright: (a) Normal operation, maintenance, repair, and preservation activities of existing transportation facilities. (b) Installation of culverts, pathways, medians, fencing, guardrails, lighting, and similar types of improvements within the existing right-of-way. (c) Projects that are consistent with projects identified and planned for in the Transportation System Plan. (d) Landscaping as part of a transportation facility. (e) Emergency measure necessary for the safety and protection of property. (f) Acquisition of right-of-way for public roads, highways, and other transportation improvements designated in the Transportation System Plan. (g) Construction of a street or road as part of an approved subdivision or land partition consistent with the applicable design standards for land divisions and property line adjustments.

Transportation Planning Rule (TPR)	Gladstone Municipal Code Title 17 Zoning and Development		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
services. To the extent, if any, that a transportation facility, service, or improvement concerns the application of a comprehensive plan provision or land use regulation, it may be allowed without further land use review if it is permitted outright or if it is subject to standards that do not require interpretation or the exercise of factual, policy or legal judgment. (TPR Subsection -0045(1)(a)-(b))			
Where a transportation facility, service or improvement is determined to have a significant impact on land use or requires interpretation or the exercise of factual, policy or legal judgment regarding the application of a comprehensive plan or land use regulation, the local government shall provide a review and approval process that is consistent with 660-012-0050 (Transportation Project Development). Local governments shall amend regulations to provide for consolidated review of land use decisions required to permit a transportation project. (TPR Subsection -0045(1)(c))	Section 17.94.020 Notice. Written notice of quasi-judicial hearings and hearings for legislative zone changes are required to be sent to affected agencies a minimum of 20 days in advance of the scheduled hearing. Affected agencies are not defined, but can be interpreted to include state and regional transportation agencies. In addition, all legislative actions, according to subsection (4), are required to provide notice to by publication in a newspaper. Consolidated applications are not specifically allowed or prohibited in the code, except consolidated permits are allowed within the Habitat Conservation Area District (Section 17.25). **Recommendation:** Consider creating adding "consolidated procedure" language to Chapter 17.66 General Provisions (Use Permits and Amendments).	17.66.010 Purpose The purpose of the chapters on use permits and amendments is to set forth the process and standards for reviewing land use permits and for amending this title and the comprehensive plan.	17.66.010 Purpose The purpose of the chapters on use permits and amendments is to set forth the process and standards for reviewing land use permits and for amending this title and the comprehensive plan. 17.66.015 Coordination of Applications and Procedures. (1) Staff Coordination. The [*City Administrator*] shall be responsible for coordinating applications and the decision-making procedures required by this Ordinance. (2) Consolidation. The applicant shall be provided with the opportunity to apply for all permits necessary for a development project at one time, in accordance with ORS 227.175(2). The consolidated application shall be processed under the most stringent procedure required for any part of the development proposal. (3) Permits. No permit for a proposed use shall be issued until a final decision has been made approving or conditionally approving a completed application. The issuance of a permit shall conform with the regulations of this Ordinance and any conditions of approval.
Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities for their identified functions. Standards to protect the future operations of roadways and transit corridors (TPR Subsection -0045(2)(b))	Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (4), Traffic Volume Expansion, requires provisions to be made to accommodate any increased volume of traffic resulting from development. Provisions include street widening, dedication of property for future widening, or other street improvements. Thresholds, impact studies, and street capacity standards are not included in the Code. **Recommendation:** Consider adding provisions requiring transportation impact analysis or studies when development is expected to increase traffic volume over a specified threshold in Division IV. Development Standards.	17.50.020 Vehicular and pedestrian circulation generally. (4) Traffic Volume Expansion. Provision shall be made to accommodate any increased volume of traffic resulting from the development. If streets adjacent to or serving the site are inadequate, widening, dedication of property for future widening, or other street improvements may be required. The development shall be designed to minimize traffic volume increases on minor streets and underdeveloped streets.	17.50.020 Vehicular and pedestrian circulation generally. (4) Traffic Volume Expansion. Provision shall be made to accommodate any increased volume of traffic resulting from the development consistent with 17.50.050. If streets adjacent to or serving the site are inadequate, widening, dedication of property for future widening, or other street improvements may be required. The development shall be designed to minimize traffic volume increases on minor streets and underdeveloped streets. 17.50.050 Traffic Impact Analysis (TIA) (1) Purpose. The purpose of this section is to implement Sections 660-012-0045(2)(b) and -0045(2)(e) of the State Transportation Planning Rule (TPR), which require the City to adopt performance standards and a process to apply conditions to land use proposals in order to minimize impacts on and protect transportation facilities. This section establishes requirements for when a traffic impact analysis (TIA) must be prepared and submitted; the analysis methods and content involved in a TIA; criteria used to review the TIA; and authority to attach conditions of approval to minimize the impacts of the proposal on transportation facilities. This section refers to the TSP for performance standards for transportation facilities as well as for projects that may need to be constructed as mitigation measures for a proposal's projected impacts. This section also relies on the Gladstone Public Works Design Standards and Gladstone Public Works Standard Construction Specifications

Transportation Planning Rule (TPR)	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
			to provide street design standards and construction specifications for improvements and projects that may be constructed as part of the proposal and mitigation measures approved for the proposal. (2) Applicability. A traffic impact analysis (TIA) shall be required to be submitted to the City with a land use application at the request of the City Public Works Supervisor or if the proposal is expected to involve one or more of the following: (a) An amendment to the Gladstone Comprehensive Plan or zoning map. (b) ODOT requires a TIA in conjunction with a requested approach road permit, as specified in OAR 734-051-3030(4). (c) The proposal generates twenty-five (25) PM peak-hour trips or more on the local transportation system. (d) The location of an existing or proposed access driveway does not meet minimum spacing or sight distance requirements. (e) A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area. (3) Requirements. The following are typical requirements that may be modified in coordination with Public Works Staff based on the specific application. (a) Pre-application Conference. The applicant shall meet with the Public Works Supervisor prior to submitting an application that requires a TIA. This meeting will be coordinated with Clackamas County and ODOT when an approach road to a County road or Highway 99E serves the property, so that the TIA will meet the requirements of all relevant agencies. (b) Preparation. The TIA shall be prepared by an Oregon Registered Professional Engineer qualified to perform traffic Engineering analysis and will be paid for by the applicant. (c) Typical Average Daily Trips and Peak Hour Trips. The latest edition of the Trip Generation Manual, published by the Institute of Transportation Engineers (ITE), shall be used to gauge PM peak hour vehicle trips, unless a specific trip generation study that is approved by the City Public Works Supervisor indicates an alternative trip generation rate is appropriate. (d) Intersection-level Analysis. Intersection-level analysis shall be determined based on the methodologies identified in the Highway Capacity Manual (HCM).. (e) Transportation Planning Rule Compliance. The requirements of OAR 660-012-0060 shall apply to those land use actions that significantly affect the transportation system, as defined by the Transportation Planning Rule. (4) Study Area. The following facilities shall be included in the study area for all TIAs: (a) All site-access points and intersections (signalized and unsignalized) adjacent to the proposed development site. If the site fronts an arterial or collector street, the analysis shall address all intersections and driveways along the site frontage and within the access spacing distances extending out from the boundary of the site frontage. (b) Roads and streets through and adjacent to the site. (c) All intersections were the analysis shows that 10% or more of an approach volume can be expected to result from the development.

Transportation Planning Rule (TPR)	Gladstone Municipal Code Title 17 Zoning and Development		
Requirement	Notes and Recommendation	Original Text	Recommended Modifications
			(d) In addition to these requirements, the City Public Works Supervisor may require analysis of any additional intersections or roadway links that are deemed necessary to address safety or operational concerns in proximity to the site. (5) Analysis Periods. To adequately assess the impacts of a proposed land use action, the following study periods, or horizon years, should be addressed in the transportation impact analysis where applicable: (a) Existing Year. (b) Background Conditions in Project Completion Year. The conditions in the year in which the proposed land use action will be completed and occupied, but without the expected traffic from the proposed land use action. This analysis should account for all City-approved developments that are expected to be fully built out in the proposed land use action horizon year, as well as all planned transportation system improvements. (c) Full Buildout Conditions in Project Completion Year. The background condition plus traffic from the proposed land use action assuming full build-out and occupancy. (d) Phased Years of Completion. If the project involves construction or occupancy in phases, the applicant shall assess the expected roadway and intersection conditions resulting from major development phases. Phased years of analysis will be determined in coordination with City staff. (e) Twenty-Year or TSP Horizon Year. For comprehensive plan amendments or zoning map amendments, the applicant shall assess the expected future roadway, intersection, and land use conditions as compared to approved comprehensive planning documents. (6) Approval Criteria. When a TIA is required, a proposal is subject to the following criteria, in addition to all criteria otherwise applicable to the underlying land use proposal: (a) The analysis complies with the requirements of 17.50.020(3); (b) The analysis demonstrates that adequate transportation facilities exist to serve the proposed development or identifies mitigation measures in a manner that is satisfactory to the City Public Works Supervisor and, when County or State highway facilities are affected, to Clackamas County and ODOT; (c) For affected non-highway facilities, the TIA demonstrates that applicable performance standards established in the adopted Transportation System Plan have been met; (d) Proposed public improvements are designed and will be constructed to the street standards specified in Transportation System Plan and the Gladstone Public Works Design Standards and Gladstone Public Works Standard Construction Specifications; and (7) Conditions of Approval. The City may deny, approve, or approve a development proposal with conditions needed to ensure transportation safety and operations standards and provide the necessary right-of-way and improvements to ensure consistency with the future planned transportation system. Improvements required as a condition of development approval, when not voluntarily provided by the applicant, shall be roughly proportional to the impact of the development on transportation facilities. Findings in the development approval shall indicate how the required improvements are directly related to and are roughly proportional to

Transportation Planning Rule (TPR)	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
			the impact of development.
Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: land use applications that require public hearings, subdivision and partition applications, applications which affect private access to roads, applications within airport noise corridor and imaginary surfaces which affect airport operations. (TPR Subsection -0045(2)(f))	See response to -0045(1)(c)		
Regulations assuring amendments to land use designations, densities, design standards are consistent with the function, capacities, and levels of service of facilities designated in the TSP. (TPR Subsection -0045(2)(g))	Amendments Chapter 17.68 Amendments and zone changes. This chapter includes provisions and procedures allowing for amendments to the Comprehensive Plan, Zoning Map, Comprehensive Plan Map, or Title 17 of the Code. Amendments are reviewed through administrative procedures (Section 16.68.020). Conditions may be applied by the City Council (17.68.040) when they can further the objectives of the comprehensive plan or zoning ordinance. Section 17.68.050 Evidence supplied by applicant. Applicants for amendments must provide evidence meeting five criteria. Criteria include consistency with the Comprehensive Plan and Metro's UGMFP as well as adequate public facilities such as transportation systems are present or concurrent with development. Policy 5 under "Plan Evaluation and Update" of the Comprehensive Plan provides procedures for making amendments to the Comprehensive Plan. **Recommendation:** Consider modifying 17.68.050 to include compliance with the Transportation Planning Rule, reviewed consistent with OAR 660-012-0060, when a comprehensive plan amendment or land use district change is proposed.	17.68.050 Evidence supplied by applicant. The applicant seeking a zoning map change pursuant to the provisions of Section 17.68.010 must show by a preponderance of the evidence all of the following, unless otherwise provided for in this title: (1) Granting the request fulfills a public need, the greater departure from present development policies or land use patterns, the greater the burden of the applicant. (2) The public need is best carried out by granting the petition for the proposed action, and that need is best served by granting the petition at this time. (3) The proposed action is consistent with the Comprehensive Plan and Metro's Functional Plan (Metro Code 3.07). (4) Proof of significant change in a neighborhood or community or a mistake in the planning or zoning for the property under consideration, when relevant. (5) The property and affected area is presently provided with, or concurrent with development can be provided with, adequate public facilities, including, but not limited to, transportation systems.	17.68.050 Evidence supplied by applicant. The applicant seeking a zoning map change pursuant to the provisions of Section 17.68.010 must show by a preponderance of the evidence all of the following, unless otherwise provided for in this title: (1) Granting the request fulfills a public need, the greater departure from present development policies or land use patterns, the greater the burden of the applicant. (2) The public need is best carried out by granting the petition for the proposed action, and that need is best served by granting the petition at this time. (3) The proposed action is consistent with the Comprehensive Plan, ~~and~~ Metro's Functional Plan (Metro Code 3.07), and the Transportation Planning Rule (OAR 660-012-0060). (4) Proof of significant change in a neighborhood or community or a mistake in the planning or zoning for the property under consideration, when relevant. (5) The property and affected area is presently provided with, or concurrent with development can be provided with, adequate public facilities, including, but not limited to, the planned function, capacity, and performance standards of the transportation system~~s~~ as adopted in the Transportation System Plan.
Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth in 660-012-0040(3)(a-d): Provide "safe and convenient" (per subsection 660-012-0045.3(d)) pedestrian and bicycle connections from new subdivisions/multifamily development to neighborhood activity centers; bikeways are required along arterials and major collectors; sidewalks are required along arterials, collectors, and most local streets in urban areas except controlled access roadways (TPR Subsection -0045(3)(b))	Section 17.50.020 Vehicular and pedestrian circulation generally. Subsection (6) includes standards for providing on-site pedestrian circulation for new non-residential and multi-family developments and for new buildings added to existing non-residential and multi-family developments. Standards specify specific connections between features and design elements. Section 17.50.040 Street and road standards. Subsection (15) requires sidewalks on both sides of a public street, unless modified by the Planning Commission under specific conditions. Bicycle/pedestrian routes are required in subsection (16) when consistent with Map 5 of the Comprehensive Plan or when necessary to provide access to a transit stop for specific uses such as schools, parks, churches, commercial centers, or similar facilities. The requirements for sidewalks or bicycle/pedestrian routes are not correlated with street classification standards. **Recommendation:** No change. This criterion is met.		
Where off-site road improvements are required as a condition of development	Section 17.68.040 Conditions. This section allows the City Council to apply types of conditions designed to limit access, provide additional right-of-way, limit the use or	17.70.010 Authorization to grant or deny.	17.70.010 Authorization to grant or deny.

Transportation Planning Rule (TPR)	Gladstone Municipal Code Title 17 Zoning and Development		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
approval, they must accommodate bicycle and pedestrian travel, including facilities on arterials and major collectors (TPR Subsection -0045(3)(c))	density, among other listed types. It does not specifically include off-street improvements beyond just the dedication of right-of-way. Section 17.70.010 Authorization to grant or deny. Conditions of approval for conditional uses include requiring additional right-of-way to be dedicated for street improvements. It does not specifically include off-street approval conditions, however the conditions of approval is not limited to the listed conditions. Section 17.94.040 Hearing procedure and Section 17.94.080 Action of applications. These sections authorize the Planning Commission or City Council approve an application/recommendation with conditions as part of a hearing procedure. It does not specify types of conditions, similar to what's listed in Section 17.70.010. **Recommendation:** Consider adding types of conditions that specifically or generally include off-street improvements such as bicycle or pedestrian facilities to Section 17.68.040 and 17.70.010, or to 17.94.040.	… (2) Conditions of Approval. In addition to the specific requirements of this title, including those set forth in GMC Chapter 17.62 (special uses), and the comprehensive plan, approval of a conditional use may be granted subject to additional conditions that are found necessary to protect the best interests of the surrounding area or the city as a whole. These conditions may include, but are not limited to, the following: (a) Limiting the hours, days, place and manner of operation; (b) Requiring design features that minimize environmental impacts such as noise, vibration, smoke, dust, fumes and glare; (c) Requiring increased setbacks, lot area, lot depth and lot width; (d) Limiting building height, size, lot coverage and location on the site; (e) Designating the size, number, location and design of vehicle access points; (f) Requiring street right-of-way to be dedicated and streets to be improved; (g) Requiring landscaping, screening, drainage and surfacing of parking and loading areas; (h) Limiting the number, size, location, height and lighting of signs; (i) Regulating the location and intensity of outdoor lighting; and (j) Requiring a sight-obscuring fence or hedge to screen the conditional use from adjacent to or nearby property. … 17.68.040 Conditions. … (3) Type of conditions. Conditions may include special measures designed to limit use or density, screen or separate buildings or portions of the site from adjoining property; limit access from important thoroughfares or through residential areas; provide additional right-of-way for an abutting street, preserve or provide public access to greenspace, floodplains, or river frontage.	… (2) Conditions of Approval. In addition to the specific requirements of this title, including those set forth in GMC Chapter 17.62 (special uses), and the comprehensive plan, approval of a conditional use may be granted subject to additional conditions that are found necessary to protect the best interests of the surrounding area or the city as a whole. These conditions may include, but are not limited to, the following: (a) Limiting the hours, days, place and manner of operation; (b) Requiring design features that minimize environmental impacts such as noise, vibration, smoke, dust, fumes and glare; (c) Requiring increased setbacks, lot area, lot depth and lot width; (d) Limiting building height, size, lot coverage and location on the site; (e) Designating the size, number, location and design of vehicle access points; (f) Requiring street right-of-way to be dedicated and streets to be improved; (g) Requiring landscaping, screening, drainage and surfacing of parking and loading areas; (h) Limiting the number, size, location, height and lighting of signs; (i) Regulating the location and intensity of outdoor lighting; and (j) Requiring a sight-obscuring fence or hedge to screen the conditional use from adjacent to or nearby property. (k) Construction of off-site transportation improvements to mitigate impacts resulting from development that relate to capacity deficiencies and public safety. (l) Upgrade or construct public facilities to city standards. … 17.68.040 Conditions. … (3) Type of conditions. Conditions may include special measures designed to limit use or density, screen or separate buildings or portions of the site from adjoining property; limit access from important thoroughfares or through residential areas; provide additional right-of-way for an abutting street, preserve or provide public access to greenspace, floodplains, or river frontage; improve bicycle or pedestrian safety and connectivity; or improve transit capacity and efficiency.
To support transit in urban areas containing a population greater than 25,000, where the area is already served by a public transit system or where a determination has been made that a public transit system is feasible, local governments shall adopt land use and subdivision regulations as provided in the subsections below: Designated employee parking areas in new developments shall provide preferential	While Gladstone's population does not meet the threshold in the following TPR requirements, it is currently served by transit and should have adopted land use and subdivision requirements that are transit-supportive. Section 17.48.060 Car pool and van pool parking. New industrial, institutional, and office developments with more than 50 employee parking spaces are required to designate spaces for car pool and van pool parking. **Recommendation:** No change. This criterion is met.		

Transportation Planning Rule (TPR)	**Gladstone Municipal Code Title 17 Zoning and Development**		
Requirement	**Notes and Recommendation**	**Original Text**	**Recommended Modifications**
parking for carpools and vanpools. (TPR Subsection -0045(4)(d))			
Existing development shall be allowed to redevelop a portion of existing parking areas for transit-oriented uses, including bus stops and pullouts, bus shelters, park and ride stations, transit-oriented developments, and similar facilities, where appropriate. (TPR Subsection -0045(4)(e))	No provisions were found that meet this criteria. **Recommendation:** Add provisions that allow existing or new developments to offset the use parking requirements in Section 17.48.030.	See comments and recommendations to **(Title 4, Parking Management Sec 3.08.410)** above for recommendations to Chapter 17.48	
Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility. (TPR Section -0060)	Amendments Chapter 17.68 Amendments and zone changes. This chapter includes provisions and procedures allowing for amendments to the Comprehensive Plan, Zoning Map, Comprehensive Plan Map, or Title 17 of the Code. Amendments are reviewed through administrative procedures (Section 16.68.020). Conditions may be applied by the City Council (17.68.040) when they can further the objectives of the comprehensive plan or zoning ordinance. Section 17.68.050 Evidence supplied by applicant. Applicants for amendments must provide evidence meeting five criteria. Criteria include consistency with the Comprehensive Plan and Metro's UGMFP as well as adequate public facilities such as transportation systems are present or concurrent with development. Policy 5 under "Plan Evaluation and Update" of the Comprehensive Plan provides procedures for making amendments to the Comprehensive Plan. **Recommendation:** Consider modifying Section 17.68.050 to include compliance with the Transportation Planning Rule, reviewed consistent with OAR 660-012-0060, when a comprehensive plan amendment or land use district change is proposed.	See comments and recommendations to (TPR Subsection -0045(2)(g)) above for recommendations to Chapter 17.68.	

APPENDIX H TECH MEMO #8: TSP SOLUTIONS

KITTELSON & ASSOCIATES
610 SW ALDER STREET, SUITE 700
PORTLAND, OR 97205
P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

Date:	June 28, 2017	Project #: 19890.4
To:	Jim Whynot and Jacque Betz, City of Gladstone Gail Curtis, Oregon Department of Transportation, Region 1	
From:	Matt Bell and Molly McCormick, Kittelson and Associates, Inc.	
Project:	Gladstone Transportation System Plan (TSP) Update	
Subject:	Final Tech Memo 8: TSP Solutions (Subtask 5.6)	

This memorandum identifies potential solutions to address the issues identified in *Tech Memo 5: Existing Gaps and Deficiencies* and *Tech Memo 6: Needs Analysis*. The solutions include:

- Transportation System Management and Operations (TSMO)
- Access Management
- Safety
- Pedestrian, Bicycle, and Transit
- Street System Connectivity
- Freight Mobility and Reliability
- Roadway Capacity

The solutions include potential policies, plans, programs, and projects for inclusion in the Gladstone Transportation System Plan (TSP) update. These solutions were reviewed by the project Technical Advisory Committee (TAC), Policy Advisory Committee (CAC), and general public to determine if they should move forward into the Draft TSP update and to identify the highest priorities for limited funding.

TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS

Transportation Demand Management (TDM) and Transportation System Management (TSM) strategies are two complementary approaches to managing transportation and maximizing the existing system. Together, these strategies are referred to as Transportation System Management and Operations (TSMO). TDM addresses the *demand* on the system: the number of vehicles traveling on the roadways each day. TDM measures include any method intended to shift travel demand from single occupant vehicles to non-auto modes or carpooling, travel along less congested roadways, or at less congested times of the day. TSM addresses the *supply* of the system: using strategies to improve the system efficiency without increasing roadway widths or building new roads. TSM measures are focused on improving operations by enhancing capacity during peak times, typically with advanced technologies to improve traffic operations.

Metro's Regional TSMO Plan identifies four main areas of investment to improve system performance:

- Multi-modal traffic management – traffic signal coordination, transit signal priority, detection and countdown timers for bicycles and pedestrians.
- Traveler information – real-time traveler information for freeways and arterials and enhance traveler information tools.
- Traffic incident management – such as improved surveillance and expanded incident management teams and training.
- Transportation demand management (TDM) – ridesharing, collaborative marketing, individualized marketing, Transportation Management Associations (TMAs), and employer outreach.

The Plan also identifies specific strategies for 24 mobility corridors in the region. The following strategies are identified for Mobility Corridor 8: Oregon City to Gateway and Mobility Corridor 11: Milwaukie to Clackamas, which impact facilities in the City of Gladstone:

- Freeway Management for I-205
- Arterial Corridor Management with Transit Priority Treatment for OR 99E

Freeway Management refers to the expansion of freeway vehicle detection to provide comprehensive freeway traveler information including travel speed, travel times, volumes, forecasted information, incident conditions, and weather conditions. Arterial Corridor Management (ACM) refers to installing upgraded traffic signal controllers, establishing communications to the central traffic signal system, providing arterial detection (including bicycle detection where appropriate), routinely updating signal timings, upgrading traffic signage, and performing on-going maintenance and parts replacement. In addition, it may include providing real-time and forecast traveler information on arterial roadways including current roadway conditions, congestion information, travel times, incident information, construction work zones, current weather conditions and other events that may affect traffic conditions. The following section provides an overview of a broad range of TSMO measures that are being implemented and considered in the region and identifies and explains those that are most applicable to the City of Gladstone.

Solutions

Successful implementation of TSMO strategies relies on the participation of a variety of public and private entities. Strategies can be implemented by the city, a neighborhood, or particular employer. In addition, they can be categorized as policies, programs, or physical infrastructure investments. Table 1 provides a summary of potential measures that can be implemented within Gladstone and which entities are generally in the position to implement each one. As the city continues to grow and redevelop over the next 10 to 20 years, the applicability of these strategies can be further reviewed. Additional information on potential strategy implementation within Gladstone is discussed below.

Table 1: Transportation System Management and Transportation Demand Management strategies

TSMO Strategy	TDM or TSM?	Type of Investment	City	State	Transit Provider	Employers	Developers
Parking management	TSM/TDM	Policy	P		S	S	S
Limited/flexible parking requirements	TDM	Policy	P			S	S
Access management	TSM/TDM	Policy/ Infrastructure	P	P			
Connectivity standards	TSM/TDM	Policy/ Infrastructure	P	P			
Congestion pricing	TSM/TDM	Policy/ Infrastructure	P	P			
Flexible Work Shifts	TDM	Program/Policy	S			P	
Frequent transit service	TDM	Program	S		P		
Free or subsidized transit passes	TDM	Program	S			P	
Preferential carpool parking	TDM	Program	S			P	
Carpool match services	TDM	Program	S			S	
Parking cash out	TDM	Program			S	P	
Carsharing program support	TDM	Program	S			P	P
Bicycle facilities	TDM	Infrastructure	P	S	S	S	S
Pedestrian Facilities	TDM	Infrastructure	P	S	S	S	S
Regional ITS	TSM	Infrastructure	S	P			
Regional traffic management	TSM	Infrastructure	S	P			
Advanced signal systems	TSM	Infrastructure	S	P			
Real time traveler data	TSM	Infrastructure	S	P			
Arterial corridor management	TSM	Infrastructure	S	P			

TMA: Transportation Management Association – A TMA does not currently exist in Gladstone
P: Primary role
S: Secondary/Support role

The following section provides more detail on policy, programming and infrastructure strategies that may be effective for managing transportation demand and increasing system efficiency in the City of Gladstone, especially within the next 10 to 20 years.

Programming

Programming solutions can provide effective and low cost options for reducing transportation demand. Some of the most effective programming strategies can be implemented by employers and are aimed at encouraging non-single occupancy vehicle (SOV) commuting. These strategies are discussed below.

Carpool Match Services

Metro coordinates a rideshare/carpool program (see the DriveLessConnect.com website) that regional commuters can use to find other commuters with similar routes to work. The program allows commuters to connect and coordinate with others on locations, departure times, and driving responsibilities. Local employers can also play a role in encouraging carpooling by sharing information about the system, providing preferential carpool parking, and allowing employees to have flexibility in workday schedules.

Collaborative Marketing

Public agencies, local business owners and operators, developers, and transit service providers can collaborate on marketing to get the word out to residents about transportation options that provide an alternative to single-occupancy vehicles.

Policy

Policy solutions can be implemented by cities, counties, regions, or at the statewide level. Regional and state-level policies will affect transportation demand in Gladstone, but local policies can also have an impact. These policies are discussed below.

Limited and/or Flexible Parking Requirements

Cities set policies related to parking requirements for new developments. In order to allow developments that encourage multi-modal transportation, cities can set parking maximums and low minimums and/or allow for shared parking between uses. Cities can also provide developers the option to pay in-lieu fees instead of constructing additional parking. This option provides additional flexibility to developers that can increase the likelihood of development, especially on smaller lots where surface parking would cover a high portion of the total property.

Cities can also set policies that require provision of parking to the rear of buildings, allowing buildings in commercial areas to directly front the street. This urban form creates a more appealing environment for walking and window-shopping. In-lieu parking fees support this type of development for parcels that do not have rear- or side-access points.

Parking Management

Parking plays a large role in transportation demand management, and effective management of parking resources can encourage use of non-single occupancy vehicle modes. Cities can tailor policies to charge for public parking in certain areas or impose time limits on street parking in retail centers. Cities can also monitor public parking supply and utilization in order to inform future parking strategy.

Access Management

Access management describes a practice of managing the number, placement, and allowed movements at intersections and driveways that provide access to adjacent land uses. Access management policies can be an important tool to improve transportation system efficiency by limiting the number of opportunities for turning movements on to or off of certain streets.

In addition, well deployed access management strategies can help manage travel demand by improving travel conditions for pedestrian and bicycles. Eliminating the number of access points on roadways allows for continuous sidewalk and bicycle facilities and reduces the number of potential interruptions and conflict points between pedestrians, bicyclists, and motor vehicles.

Access management is typically adopted as a policy in development guidelines. It can be extremely difficult to implement an access management program once properties have been developed along a corridor. Cooperation among and involvement of relevant government agencies, business owners, land developers and the public is necessary to establish an access management plan that benefits all roadway users and businesses. Additional information on potential access management solutions is provided in a following section.

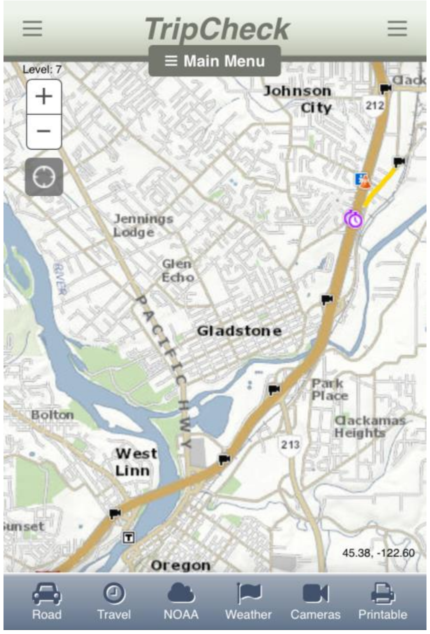
Signal Systems Improvements

Signal retiming and optimization offer a relatively low cost option to increase system efficiency. Retiming and optimization refers to updating timing plans to better match prevailing traffic conditions and coordinating signals. Timing optimization can be applied to existing systems or may include upgrading signal technology, such as signal communication infrastructure, signal controllers, or cabinets. Signal retiming can reduce travel times and be especially beneficial to improving travel time reliability. In high pedestrian or desired pedestrian areas, signal retiming can facilitate pedestrian movements through intersections by increasing minimum green times to give pedestrians time to cross during each cycle, eliminating the need to push pedestrian crossing buttons. Signals can also facilitate bicycle movements with the inclusion of bicycle detectors.

Signal upgrades often come at a higher cost and usually require further coordination between jurisdictions. However, upgrading signals provides the opportunity to incorporate advanced signal systems to further improve the efficiency of a transportation network. Strategies include coordinated signal operations across jurisdictions, centralized control of traffic signals, adaptive or active signal control, and transit or freight signal priority. These advanced signal systems can reduce delay, travel time and the number of stops for transit, freight, and other vehicles. In addition, these systems may help reduce vehicle emissions and improve travel time reliability. The following signal system solutions have been identified for consideration within Gladstone:

- **Transit signal priority** systems use sensors to detect approaching transit vehicles and alter signal timings to improve transit performance. This improves travel times for transit, reliability of transit travel time, and overall attractiveness of transit. The City of Portland has the only system of bus priority in the region, which is applied on most major arterial corridors, including OR 99E.
- **Truck signal priority** systems use sensors to detect approaching heavy vehicles and alter signal timings to improve truck freight travel. While truck signal priority may improve travel times for trucks, its primary purpose is to improve the overall performance of intersection operations by clearing any trucks that would otherwise be stopped at the intersection and subsequently have to spend a longer time getting back up to speed. Implementing truck signal priority requires additional advanced detector loops, usually placed in pairs back from the approach to the intersection.

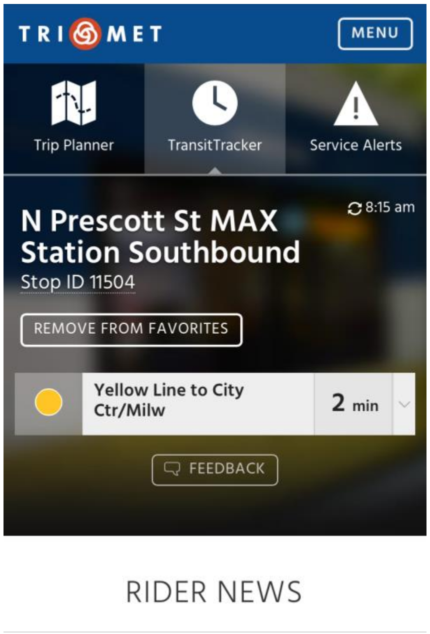
Real-Time Traveler Information



Traveler information consists of collecting and disseminating real-time transportation system information to the traveling public. This includes information on traffic and road conditions, general public transportation and parking information, interruptions due to roadway incidents, roadway maintenance and construction, and weather conditions. Traveler information is collected from roadway sensors, traffic cameras, vehicle probes, and more recently, media access control (MAC) devices such as cell phones or laptops. Data from these sources are sent to a central system and subsequently disseminated to the public so that drivers track conditions specific to their cars and can provide historical and real-time traffic conditions for travelers.

When roadway travelers are supplied with information on their trips, they may be able to avoid heavy congestion by altering a travel path, delaying the start of a trip, or changing which mode they can choose. This can reduce overall delay and fuel emissions. Traveler information projects can be prioritized over increasing capacity on roadway, often with high project visibility among the public.

Real-Time Transit Information



N Prescott St MAX Station Southbound
8:15 am
Stop ID 11504

Yellow Line to City Ctr/Milw — 2 min

RIDER NEWS

Transit agencies or third-party sources can disseminate both schedule and system performance information to travelers through a variety of applications, such as in-vehicle, wayside, or in-terminal dynamic message signs, as well as the Internet or wireless devices. Coordination with regional or multimodal traveler information efforts can increase the availability of this transit schedule and system performance information. TriMet has implemented this through its Transit Tracker system.

These systems enhance passenger convenience and may increase the attractiveness of transit to the public by encouraging travelers to consider transit as opposed to driving alone. They do require cooperation and integration between agencies for disseminating the information.

Improvements

- Lead or provide support of potential TSM and TDM strategies within the City
- Identify opportunities to for collaborative marketing with local business owners and operators, developers, and transit service providers

- Update the Gladstone Municipal Code to limit and/or allow for flexible parking requirements – Tech Memo 7: Regulator Solutions identifies potential changes to the GMC
- Develop access management standards for city streets that reflect the functional classification of the roadway – Additional information on potential access management measures is provided below
- Coordinate the traffic signals along SE 82nd Drive at the SE 82nd Drive/Oatfield Road and I-205 Northbound and Southbound Ramp Terminals – Further evaluation of the traffic operations associated with this potential improvements is provided in the motor vehicle section
- Implement truck signal priority at all signalized intersections along OR 99E and SE 82nd Drive

ACCESS MANAGEMENT

The Oregon Highway Plan (OHP) defines access management as a set of measures regulating access to streets, roads, and highways, from public roads and private driveways. Measures may include but are not limited to restrictions on the siting of interchanges, restrictions on the type and amount of access to roadways, and use of physical controls, such as signals and channelization including raised medians, to reduce impacts of approach road traffic on the main facility. The OHP requires that new connections to arterials and state highways be consistent with designated access management categories. The intent of this requirement is to provide guidance on the spacing of future extensions and connections along existing and future streets that are needed to provide reasonably direct routes for bicycle and pedestrian travel.

Solutions

The TSP should identify access management techniques and strategies that help to preserve transportation system investments and guard against deteriorations in safety and increased congestion. The City’s approach to access management should balance the need for land use activities and property parcels to be served with appropriate access while preserving safe and efficient movement of traffic. Access management solutions include:

- setting city-wide access spacing standards according to a roadway’s functional classification;
- obtaining special area designations along ODOT facilities that have alternative access spacing standards; and,
- defining a variance process for when the standard cannot be met;
- establishing an approach for access consolidation over time to move in the direction of the standards at each opportunity.

Access Spacing Standards

ODOT Standards

Oregon Administrative Rule 734, Division 51 establishes procedures, standards, and approval criteria used by ODOT to govern highway approach permitting and access management consistent with Oregon Revised Statutes (ORS), Oregon Administrative Rules (OAR), statewide planning goals, acknowledged comprehensive plans, and the OHP. The OHP serves as the policy basis for implementing Division 51 and guides the administration of access management rules, including mitigation and public investment, when required, to ensure highway safety and operations pursuant to this division.

Access management standards for approaches to state highways are based on the classification of the highway and highway designation, type of area, and posted speed. Within the Gladstone city limits, the OHP classifies OR 99E as a District Highway. Future developments along OR 99E (new development, redevelopment, zone changes, and/or comprehensive plan amendments) will be required to meet the OHP access management policies and standards. Table 2 summarizes ODOT's current access management standards for OR 99E per the OHP.

Table 2: OR 99E Access Spacing Standards

Highway Classification	Posted Speed (MPH)	Spacing Standards (Feet)[1]
District Highway	40	500

[1] These access management spacing standards do not apply to approaches in existence prior to April 1, 2000 except as provided in OAR 734-051-5120(9).

Special Transportation Area

Special Transportation Areas (STA) are highways or highway segments where alternate mobility and access management standards are considered. STAs look like traditional main streets with development generally located near the back of sidewalk on both sides of the highway. The primary objective of STAs is to provide access to and circulation amongst community activities, businesses and residences and to accommodate pedestrian, bicycle and transit movement on and across the highway. Direct local street connections and shared on-street parking are encouraged. Local auto, pedestrian, bicycle and transit movements to the area are generally as important as the through movement of traffic. Traffic speeds are slow, generally 25 miles per hour or lower.

STAs can be located on Statewide Highway and District Highways, such as OR 99E. While STAs may include some properties that are currently developed for auto dependent uses (e.g. drive through restaurants, gas stations, car washes), areas where the predominant land use pattern is auto-dependent uses are generally not appropriate for STA designation. STAs that include properties developed for auto-dependent uses should include planning and zoning that provide for redevelopment of the properties overtime to uses consistent with STA implementation.

City Standards

Access spacing standards for approaches to City streets are based on the roadway functional classification. Gladstone Municipal Code (GMC) Section 17.50.030 states that "full street connections, of at least local street classification, shall be provided at intervals of no more than five hundred thirty feet (530')" except where there are physical constraints. The city could include access spacing standards by functional classification. Table 1 identifies potential access spacing standards for the City.

Table 1: Access Spacing Standards

	Mixed-use or Residential			Commercial or Industrial		
Functional Classification	Max Block Size (Street to Street)[1]	Min Block Size (Street to Street)	Min Dwy Spacing (Street to Dwy & Dwy to Dwy)[2]	Max Block Size (Street to Street)[1]	Min Block Size (Street to Street)	Min Dwy Spacing (Street to Dwy & Dwy to Dwy)[2]
Major Arterial	530 feet	150 feet	150 feet	530 feet	150 feet	200 feet
Minor Arterial	530 feet	150 feet	150 feet	530 feet	150 feet	200 feet
Collector	530 feet	150 feet	100 feet	530 feet	150 feet	150 feet
Local Street	530 feet	150 feet	50 feet	530 feet	150 feet	50 feet

1. If the maximum block size is exceeded, mid-block pedestrian and bicycle accessways must be provided at spacing of no more than 330 feet, unless the connection is impractical due to existing development, topography, or environmental constraints.
2. Single family and two-family dwellings are exempt from the driveway to driveway spacing standards.

In addition to adopting access spacing standards, the City could adopt a policy that requires access be taken from lower classification streets whenever possible.

Access Spacing Variances

Access spacing variances may be provided to parcels whose highway/street frontage, topography, or location would otherwise preclude issuance of a conforming permit and would either have no reasonable access or cannot obtain reasonable alternate access to the public road system. In such a situation, a conditional access permit may be issued by ODOT or the City, as appropriate, for a connection to a property that cannot be accessed in a manner that is consistent with the spacing standards. The permit can carry a condition that the access may be closed at such time that reasonable access becomes available to a local public street. The approval condition might also require a given land owner to work in cooperation with adjacent land owners to provide either joint access points, front and rear cross-over easements, or a rear access upon future redevelopment.

The requirements for obtaining a deviation from ODOT's minimum spacing standards are documented in OAR 734-051-3050. For streets under the City's jurisdiction, the City may reduce the access spacing standards at the discretion of the City Engineer if the following conditions exist:

- Joint access driveways and cross access easements are provided in accordance with the standards;
- The site plan incorporates a unified access and circulation system in accordance with the standards;

- The property owner enters into a written agreement with the City that pre-existing connections on the site will be closed and eliminated after construction of each side of the joint use driveway; and/or,
- The proposed access plan for redevelopment properties moves in the direction of the spacing standards.

The City Engineer may modify or waive the access spacing standards for streets under the City's jurisdiction where the physical site characteristics or layout of abutting properties would make development of a unified or shared access and circulation system impractical, subject to the following considerations:

- Unless modified, application of the access standard will result in the degradation of operational and safety integrity of the transportation system.
- The granting of the variance shall meet the purpose and intent of these standards and shall not be considered until every feasible option for meeting access standards is explored.
- Applicants for variance from these standards must provide proof of unique or special conditions that make strict application of the standards impractical. Applicants shall include proof that:
    - Indirect or restricted access cannot be obtained;
    - No engineering or construction solutions can be applied to mitigate the condition; and,
    - No alternative access is available from a road with a lower functional classification than the primary roadway.

No variance shall be granted where such hardship is self-created. Consistency between access spacing requirements and exceptions in the TSP and GMC is an important regulatory solution to be addressed as part of this TSP update.

Access Consolidation through Management

From an operational perspective, access management measures limit the number of redundant access points along roadways. This enhances roadway capacity, improves safety, and benefits circulation. Enforcement of the access spacing standards should be complemented with provision of alternative access points. Purchasing right-of-way and closing driveways without a parallel road system and/or other local access could seriously affect the viability of the impacted properties. Thus, if an access management approach is taken, alternative access should be developed to avoid "land-locking" a given property.

As part of every land use action, the City should evaluate the potential need for conditioning a given development proposal with the following items in order to maintain and/or improve traffic operations and safety along the arterial and collector roadways.

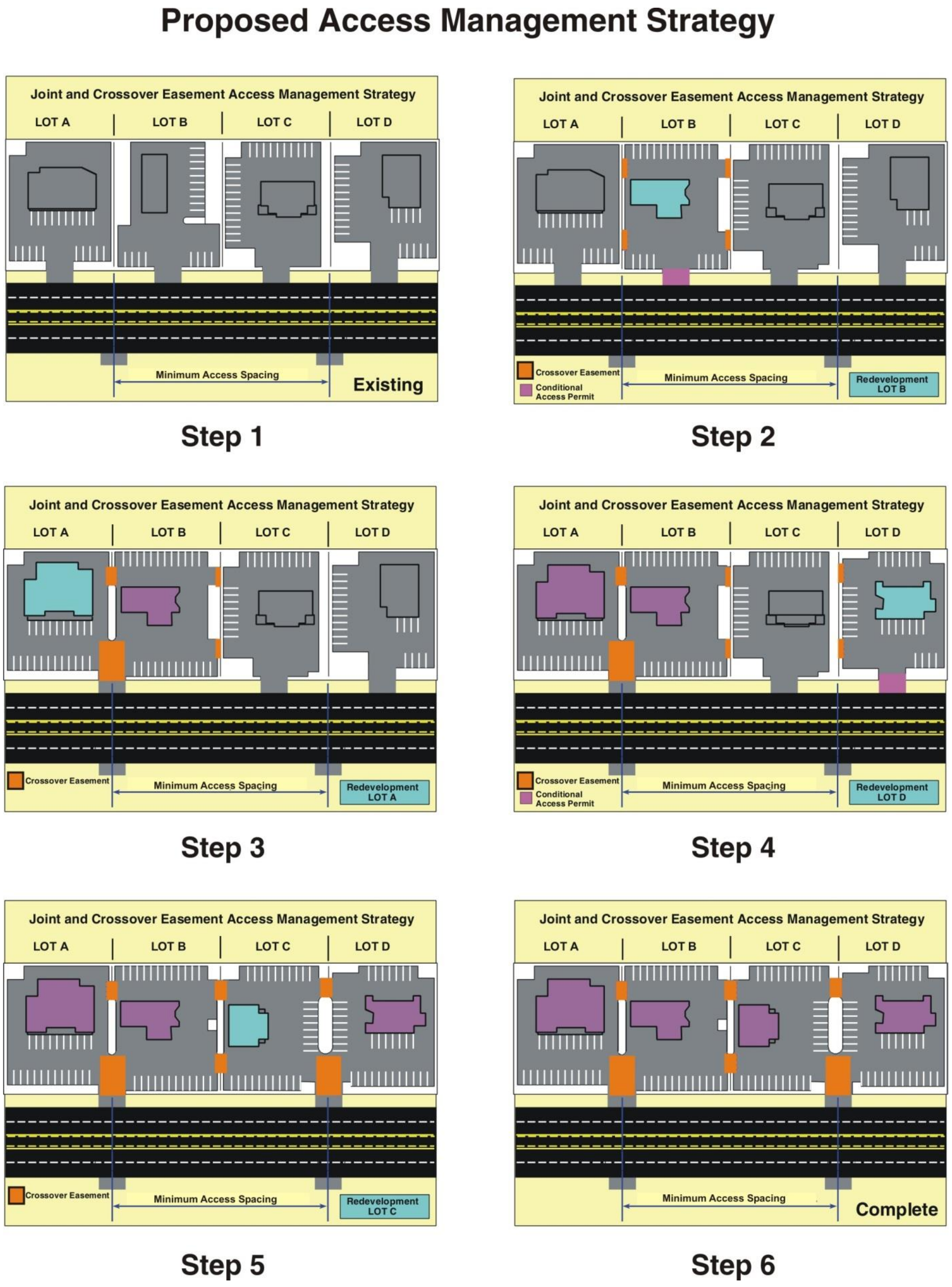
- Providing access only to the lower classification roadway when multiple roadways abut the property.
- Provision of crossover easements on all compatible parcels (considering topography, access, and land use) to facilitate future access between adjoining parcels.
- Issuance of conditional access permits to developments having proposed access points that do not meet the designated access spacing policy and/or have the ability to align with opposing driveways.
- Right-of-way dedications to facilitate the future planned roadway system in the vicinity of proposed developments.
- Half-street improvements (sidewalks, curb and gutter, bike lanes/paths, and/or travel lanes) along site frontages that do not have full build-out improvements in place at the time of development.

Exhibit 1 illustrates the application of cross-over easements and conditional access permits over time to achieve access management objectives. The individual steps are described in Table 3. As illustrated in the exhibit and supporting table, by using these guidelines, all driveways along the highways can eventually move in the overall direction of the access spacing standards as development and redevelopment occur along a given street.

Table 3: Example of Crossover Easement/Indenture/Consolidation

Step	Process
1	EXISTING – Currently Lots A, B, C, and D have site-access driveways that neither meet the access spacing criteria of 500 feet nor align with driveways or access points on the opposite side of the highway. Under these conditions motorists are into situations of potential conflict (conflicting left turns) with opposing traffic. Additionally, the number of side-street (or site-access driveway) intersections decreases the operation and safety of the highway
2	REDEVELOPMENT OF LOT B – At the time that Lot B redevelops, the City would review the proposed site plan and make recommendations to ensure that the site could promote future crossover or consolidated access. Next, the City would issue conditional permits for the development to provide crossover easements with Lots A and C, and ODOT/City would grant a conditional access permit to the lot. After evaluating the land use action, ODOT/City would determine that LOT B does not have either alternative access, nor can an access point be aligned with an opposing access point, nor can the available lot frontage provide an access point that meets the access spacing criteria set forth for segment of highway.
3	REDEVELOPMENT OF LOT A – At the time Lot A redevelops, the City/ODOT would undertake the same review process as with the redevelopment of LOT B (see Step 2); however, under this scenario ODOT and the City would use the previously obtained cross-over easement at Lot B consolidate the access points of Lots A and B. ODOT/City would then relocate the conditional access of Lot B to align with the opposing access point and provide and efficient access to both Lots A and B. The consolidation of site-access driveways for Lots A and B will not only reduce the number of driveways accessing the highway, but will also eliminate the conflicting left-turn movements the highway by the alignment with the opposing access point.
4	REDEVELOPMENT OF LOT D – The redevelopment of Lot D will be handled in same manner as the redevelopment of Lot B (see Step 2)
5	REDEVELOPMENT OF LOT C – The redevelopment of Lot C will be reviewed once again to ensure that the site will accommodate crossover and/or consolidated access. Using the crossover agreements with Lots B and D, Lot C would share a consolidated access point with Lot D and will also have alternative frontage access the shared site-access driveway of Lots A and B. By using the crossover agreement and conditional access permit process, the City and ODOT will be able to eliminate another access point and provide the alignment with the opposing access points.
6	COMPLETE – After Lots A, B, C, and D redevelop over time, the number of access points will be reduced and aligned, and the remaining access points will meet the access spacing standard.

Exhibit 1: Cross Over Easement



Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

Improvements

- Develop city-wide access spacing standards according to a roadway's functional classification
- Define a variance process for when the standard cannot be met (See above)
- Establishing an approach for access consolidation over time to move in the direction of the standards at each opportunity (See above)

SAFETY

Traffic safety plays an important role in determining the most appropriate solutions for a given gap or deficiency, particularly in areas where real or perceived safety risks may prevent people from using more active travel modes, such as walking, biking, and taking transit. The real or perceived safety risks may reflect the crash history of an area or the physical and/or operational characteristics of the roadways (narrow travel lanes, winding curves, steep grades, high traffic volumes, high travel speeds, lots of heavy vehicles, etc.). Several methodologies have been developed to analyze and identify solutions for addressing traffic safety within an area. Many of which are documented in the Highway Safety Manual (HSM) as well as several other resources developed by ODOT for addressing safety along roadway segments, at intersections, and for pedestrian and bicyclists.

Solutions

This section summarizes the solutions considered for implementation within the City of Gladstone to address real or perceived safety issues along roadway segments, at intersections, and/or for pedestrians and bicyclists. Note: many of the solutions overlap, which illustrates how some solutions address multiple safety issues.

Roadway Segments

There are a variety of potential safety solutions that can be applied within Gladstone to address systemic crashes that occur along roadway segments, such as sideswipe and run off the road crashes as well as general speeding and other driver behaviors.

- Enhanced signs and pavement markings for curves (with and without flashing beacons)
- Rumble strips (e.g. centerline, shoulder line, and edge line)
- Tree/vegetation removal
- Traffic calming
- Enhanced enforcement
- Road diet

Intersections

There are a variety of potential safety solutions that can be applied within Gladstone to address systemic crashes that occur at intersections, such as angle crashes, turning movement crashes, rear-end crashes, and crashes that involve other travel modes. The solutions include:

- Enhanced signs and pavement markings (e.g. stop signs, warning signs, and/or beacons)
- Signal improvements (e.g. signal timing, signal phasing)
- Left-turn phasing (e.g. permitted, protected, permitted-protected)
- Enhanced enforcement
- Pedestrian and bicycle improvements (see below)
- Intersection lighting
- Traffic calming

Pedestrian and Bicycle

There are a variety of potential safety solutions that can be applied within Gladstone to address pedestrian and bicycle safety. The following provides a summary of the solutions by traffic control.

Signalized intersections

Pedestrian Safety Solutions

- Street lighting
- Right-turn channelization
- Countdown pedestrian heads
- Leading pedestrian interval
- Left-turn phasing
- Vehicle turning movement restrictions

Bicycle Safety Solutions

- Street lighting
- Bicycle signal
- Bicycle detection
- Pavement markings
- Right-turn channelization
- Leading bicycle interval
- Left-turn phasing
- Vehicle turning movement restrictions

Unsignalized intersections

Pedestrian Safety Solutions

- Street lighting
- Enhanced crossing treatments
- Reduced curb radii
- Pedestrian refuge island or median
- Speed reduction treatments
- Vehicle turning movement restrictions

Bicycle Safety Solutions

- Street lighting
- Enhanced crossing treatments
- Reduced curb radii
- Skip Striping
- Supplemental signs and markings
- Bicycle boulevards
- Longitudinal bike stencil
- Speed reduction treatments
- Vehicle turning movement restrictions
- Strip bike lanes

Roadway segment – No traffic control

Pedestrian Safety Solutions

- Street lighting
- Access management
- Sidewalks Street lighting
- Enhanced mid-block crossing treatments
- Road Diet
- Pedestrian refuge island or median

Bicycle Safety Solutions

- Access management
- Bicycle route signage
- Longitudinal bike stencil
- Cycle tracks
- Dynamic warning signs
- Enhanced mid-block crossing treatments
- Street lighting
- Restrict on-street parking
- Road Diet
- Refuge Island or median

Improvements

A majority of the safety improvements are addressed within subsequent sections of this memorandum for the pedestrian, bicycle, and motor vehicle systems, with the exception of the safety improvements at a few key intersections as described below.

I-205 Southbound Ramp Terminal/SE 82nd Drive

The crash rate at the I-205 Southbound Ramp Terminal/SE 82nd Drive intersection currently exceeds the critical crash rate by both intersection type and by volume. The crash data shows a trend for rear-end crashes at the intersection. Of the 30 rear-end crashes observed in the five years of data, 23 occurred on the north leg of the intersection as vehicles were exiting I-205, 22 of the crashes were caused by a driver following too closely. The following improvements are being considered at the intersection:

- **Install enhanced signs with flashing beacons and pavement markings that "SLOW" traffic on the southbound approach**
- Reduce the posted speed limit at the southbound approach to 35 mph

OR 99E/Arlington Street

The OR 99E/Arlington Street intersection is identified on the current ODOT Statewide Priority Index System (SPIS) as within the top five percent of crash sites in Oregon. While ODOT has not completed an investigation of the intersection, potential safety solutions have been discussed with the Traffic Safety Committee. Per those discussions, the following improvement is being considered at the intersection:

- Reconfigure the westbound approach to include a separate left-turn lane with protected phasing and shared through/right-turn lane and reconfigure the eastbound approach to restrict the left-turn movement. Maintain the eastbound approach as permitted.

Solution	V/C	Delay (seconds)	LOS
Reconfigure Intersection	0.90	36.4	D

Additional capacity based improvements are described below under Motor Vehicle System

SE 82nd Drive/Arlington Street

The SE 82nd Drive/Arlington Street intersection is an all-way stop controlled intersection with multiple lanes at the northbound and southbound approaches. Several safety concerns have been expressed related to pedestrians crossing SE 82nd Drive to/from the Safeway. Therefore, the following improvement is being considered at the intersection.

- Reconfigure the southbound approach to a shared through/left-turn lane and maintain the separate right-turn lane; install a raised median island in the southbound left-turn lane and install a stop sign in the median; install a crosswalk across the north leg and curb extensions, where feasible, to shorten crossing distances across Arlington Street and SE 82nd Drive

City-wide

A number of safety issues have been identified throughout the planning process along key corridors throughout the city, including OR 99E, Oatfield Road, SE 82nd Drive, and others. While several projects have been identified along each of these corridors that will address some of the safety concerns, other concerns may not be addressed. Therefore the following improvements are being considered to address safety issues throughout the city:

- Evaluate traffic safety along OR 99E, Oatfield Road, SE 82nd Drive, and other key corridors to identify appropriate countermeasures.

PEDESTRIAN SYSTEM

Pedestrian facilities are the elements of the transportation system that enable people to walk safely and efficiently between neighborhoods, retail centers, employment areas, and transit stops. These include facilities for pedestrian movement along key roadways (e.g., sidewalks, multi-use paths, and trails) and for safe roadway crossings (e.g., crosswalks, crossing beacons, pedestrian refuge islands). Each facility plays an important role in developing a comprehensive pedestrian network.

Solutions

This section summarizes the solutions considered for implementation within the City of Gladstone to address existing gaps and deficiencies in the pedestrian system and future needs.

Sidewalks

Sidewalks are the fundamental building blocks of the pedestrian system. They enable people to walk comfortably, conveniently, and safely from place to place. They also provide an important means of mobility for people with disabilities, families with strollers, and others who may not be able to travel on an unimproved roadside surface. Sidewalks are usually 6 to 8-feet wide and constructed from concrete. They are also frequently separated from the roadway by a curb, landscaping, and/or on-street parking. Sidewalks are widely used in urban and suburban settings. Ideally, sidewalks could be provided along both sides of the roadway; however, some areas with physical or right-of-way constraints may require that sidewalk be located on only one side. Sidewalk solutions include:

- Fill in the gaps
- Install sidewalks on one-side of the roadway
- Install sidewalks on both sides of the roadway
- Re-construct existing sidewalks with appropriate width and buffer
- Improve existing sidewalks with appropriate lighting

Sidewalk Improvements

Sidewalk Improvements

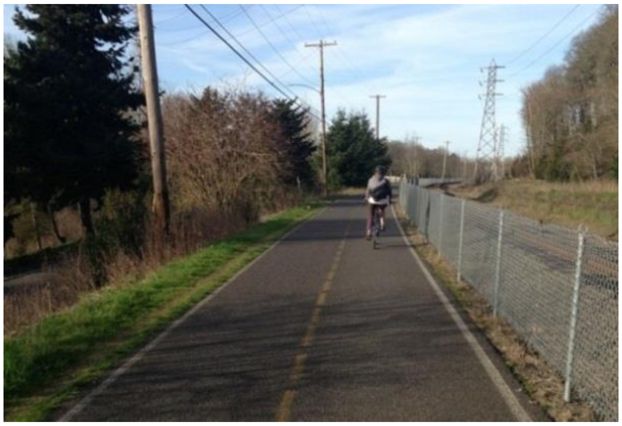
Accessways

Non-vehicular connections between cul-de-sacs and adjacent roadways can significantly reduce travel distances for pedestrians, thereby encouraging more people to walk. Appropriate improvements should provide for more direct, convenient, and safe bicycle or pedestrian travel within and between residential areas and neighborhood activity centers. Gladstone has several existing accessways that create connections between neighborhoods and pedestrian and bicycle routes. Potential new connections could use existing City right-of-way between cul-de-sacs or unconnected roadways to provide a paved or unpaved path or trail for non-motorized use.

Shared-use Paths and Trails

Shared-use paths are paved, bi-directional, trails that can serve both pedestrians and bicyclists. Shared-use paths and trails can be constructed adjacent to roadways where the topography, right-of-way, or other issues don't allow for the construction of sidewalks and bike facilities. A minimum width of 10 feet is recommended for low-pedestrian/bicycle-traffic contexts; 12 to 20 feet should be considered in areas with moderate to high levels of bicycle and pedestrian traffic. Shared-use paths can be used to create longer-distance links within and between communities and provide regional connections. They play an integral role in recreation, commuting, and accessibility due to their appeal to users of all ages and skill levels.

Accessways



Shared-use Paths and Trails

Enhanced Pedestrian Crossings

Pedestrian crossing facilities enable pedestrians to safely cross streets, railroad tracks, and other transportation facilities. Planning for appropriate pedestrian crossings requires the community to balance vehicular mobility needs with providing crossing locations that the desired routes of walkers. Enhanced pedestrian crossing treatments include:

- Median refuge islands
- High visibility pavement markings and signs
- Rapid rectangular flashing beacons (RRFB)
- Pedestrian Hybrid Beacons (HAWK)
- Curb extensions
- Pedestrian signals
  - Pedestrian countdown heads
  - Leading Pedestrian interval

Many of the treatments listed above can be applied together at one crossing location to further alert drivers of the presence of pedestrians in the roadway. See Attachment "A" for a detailed description of enhanced pedestrian crossing treatments.

Enhanced Pedestrian Crossing with RRFBs

Enhanced Pedestrian Crossing with Pedestrian Signal

Improvements

The following improvements have been organized by streets segment, intersection, and off-street improvements. Where there are multiple improvements, the improvements shown in **bold text** were identified as the preferred improvement based on an evaluation of environmental, engineering, land use "fatal flaws" and anticipated funding capacity as well as discussions with the project team, advisory committees, and the general public.

Street Segment Improvements

The following street segment improvements have been organized by functional classification.

Arterials

Arterials serve an important function for pedestrian access and circulation within Gladstone, particularly those that are served by local transit service. The following provides a summary of the pedestrian improvements along arterial streets.

SE 82nd Drive

SE 82nd Drive has continuous sidewalks along both sides of the roadway from the north city limits to the southern terminus at Cross Park, with the exception of a gap along the south side of the roadway from Edgewater Road to the I-205 southbound ramp terminal. While the majority of the roadway has sidewalks, the PLTS analysis indicates that the sidewalks may not be suitable for all pedestrians. This is primarily due to poor sidewalk condition, narrow sidewalk width, lack of a buffer, and limited street lighting. Therefore, the following improvements are being considered along the roadway:

- Fill in the gap on the south side of the roadway with new sidewalks from Edgewater Road to the I-205 southbound ramp terminal

- Remove existing sidewalks and install new sidewalks of appropriate width along both sides of the roadway
- Remove the existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway
- Regardless of the sidewalk improvements, evaluate light levels and install street lighting from 1st Street to the southern terminus of the roadway as necessary

OR 99E (McLoughlin Boulevard)

OR 99E currently has continuous sidewalks along both sides of the roadway from the north city limits to the south city limits, with the exception of an approximately 400-foot section along the west side of the roadway, south of Glen Echo Avenue. Several of the sidewalk segments also have landscape strips. However, the PLTS analysis indicates that some segments the sidewalks may not be suitable for all pedestrians. This is primarily due to lack of a landscape strips in some areas, limited street lighting, and relatively high traffic volumes and travel speeds along OR 99E. Therefore, the following improvements are being considered along the roadway.

- **Fill in the gap on the west side of the roadway with new sidewalks, south of Glen Echo Avenue**
- **Plant street trees along both sides of OR 99E within the existing landscape strips. Note: ODOT Permits are required for street trees**
- **Reduce the posted speed limit to 35 mph**
- Remove the existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway
- Regardless of the sidewalk improvements, evaluate light levels and install street lighting along the full length of the roadway as necessary

Arlington Street

Arlington Street currently has continuous sidewalks along both sides of the roadway from OR 99E to Oatfield Road. Several segments also have landscape strips. However, the PLTS analysis indicates that the sidewalks may not be suitable for all pedestrians. This is primarily due to poor sidewalk condition, narrow sidewalk width, lack of a buffer, and limited street lighting. Therefore, the following improvements are being considered along the roadway:

- Remove the existing sidewalks and install new sidewalks of appropriate width on both sides of the roadway
- Remove the existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway
- Regardless of the sidewalk improvements, evaluate light levels and install street lighting along the full length of the roadway as necessary

Oatfield Road

Oatfield Road currently has continuous sidewalks along both sides of the roadway from Webster Road to SE 82nd Drive; however, there are several gaps in the sidewalks on the south side of the roadway from Webster Road to the north city limits and one gap along the north side of the roadway from Pak Way to the north city limits, this is due, in part, to the steep grades on both sides of the roadway. The PLTS analysis indicates that where sidewalks are present along Oatfield Road, they may not be suitable for all pedestrians. This is primarily due to narrow sidewalk width, lack of a buffer, and poor sidewalk condition. In all other areas the PLTS analysis reflects the lack of sidewalks. Therefore, the following improvements are being considered along the roadway:

- **Fill in the gaps on one or two sides of the roadway, as grades allow, from Webster Road to the north city limits.**
- Remove the existing sidewalks and install new sidewalks of appropriate width along one or two sides of the roadway as grades allow
- Remove the existing sidewalks and install landscape strips and new sidewalks of appropriate width along one or two sides of the roadway as grades allow

Portland Avenue

Portland Avenue currently has continuous sidewalks along both sides of the roadway from Clackamas Boulevard to Nelson Lane; however, there are several gaps in the sidewalks on both sides of the roadway from Nelson Lane to the north city limits. The PLTS analysis indicates that the majority of the sidewalks along Portland Avenue may not be suitable for all pedestrians. This is primarily due to poor sidewalk condition and narrow sidewalk width. Therefore, the following improvements are being considered along the roadway:

- **Fill in the gap on both sides of the roadway from Nelson Lane to the north city limits**
- Remove the existing sidewalks and install new sidewalks of appropriate width along both sides of the roadway
- Remove existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway

Webster Road

Webster Road currently has continuous sidewalks along both sides of the roadway from Oatfield Road to the north city limits, with the exception of a gap along the east side of the roadway from Charolais Drive to the north city limits. However, the PLTS analysis indicates that the pedestrian facilities along Webster Road may not be suitable for all pedestrians. This is primarily due to poor sidewalk condition, narrow sidewalk width, and lack of a buffer. Therefore, the following improvements are being considered along the roadway:

- **Fill in the gap on the east side of the roadway from Charolais Drive to the north city limits**

- Remove the existing sidewalks and install new sidewalks of appropriate width along both sides of the roadway
- Remove the existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway

Arlington Street, Facing East

Oatfield Road, Facing North

Collectors

Collectors also serve an important function for pedestrian access and circulation within Gladstone and may provide direct access to essential destinations, such as schools, parks, churches, and commercial areas. The following provides a summary of the pedestrian improvements along collector streets.

Abernathy Lane

Abernathy Lane currently has continuous sidewalks along the north side of the roadway and a shared-use path adjacent to the south side of the roadway from Glen Echo Avenue to Portland Avenue. The PLTS analysis indicates that the pedestrian facilities along Abernathy Lane are suitable for a majority of pedestrians. To further improve the facilities and encourage pedestrian use, the following improvements are being considered along the roadway:

- **Provide pedestrian-scale lighting along the shared-use path in addition to the street lighting already provided along the roadway**

Cason Road

Cason Road currently has continuous sidewalks along both sides of the roadway from Webster Road to the eastern City limits, with the exception of a gap along the south side of the roadway from Ohlson Road to the eastern city limits. However, the PLTS analysis indicates that the sidewalks may not be suitable for all pedestrians. This is primarily due to lack of a buffer. Therefore, the following improvements are being considered along the roadway:

- **Fill in the gap on the south side of the roadway from Ohlson Road to the east city limits**
- Remove the existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway

Dartmouth Street

Dartmouth Street currently has continuous sidewalks along both sides of the roadway from OR 99E to Oatfield Road, with the exception of gaps along the north side of the roadway from Chicago Avenue to Harvard Street and from Yale Avenue to Oatfield Road. The PLTS analysis indicates that the sidewalks may not be suitable for all pedestrians. This is primarily due to poor sidewalk condition, narrow sidewalk width, and limited street lighting. Therefore, the following improvements are being considered along the roadway:

- **Fill in the gaps along on the north side of the roadway from Chicago Avenue to Harvard Street and from Yale Avenue to Oatfield Road**
- Remove the existing sidewalks and install new sidewalks of appropriate width along both sides of the roadway
- Remove the existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway
- Regardless of the sidewalk improvements, evaluate light levels and install street lighting along the full length of the roadway as necessary

Gloucester Street

Gloucester Street currently has continuous sidewalks along both sides of the roadway from OR 99E to Oatfield Road; however, the PLTS analysis indicates that the sidewalks may not be suitable for all pedestrians. This is primarily due to poor sidewalk condition, narrow sidewalk width, and limited street lighting. Therefore, the following improvements are being considered along the roadway:

- Remove the existing sidewalks and install new sidewalks of appropriate width along both sides of the roadway
- Remove the existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway
- Regardless of the sidewalk improvements, install street lighting along the full length of the roadway as necessary

Glen Echo Avenue

There are several gaps in the sidewalks along Glen Echo Avenue from OR 99E to Oatfield Road. The PLTS analysis indicates that the roadway may not be suitable for all pedestrians. This is primarily due to sidewalk gaps, poor pavement condition, lack of a buffer, and limited street lighting. Therefore, the following improvements are being considered along the roadway:

- **Fill in the gaps along on one or two sides of the roadway from OR 99E to Oatfield Road as appropriate – due to significant right-of-way constraints, sidewalks may only be developed on one side of the roadway.**
- Remove the existing sidewalks and install new sidewalks along one or two sides of the roadway as appropriate

- Remove the existing sidewalks and install alnd scape strips and new sidewalks of appropriate width along both sides of the roadway
- Regardless of the sidewalk improvements, evaluate light levels and install street lighting along the full length of the roadway as necessary

Los Verdes Drive/Valley View Road

Los Verdes Drive currently has continuous sidewalks along both sides of the roadway from Webster Road to Valley View Road; there are several gaps in the sidewalk along both sides of Valley View Road from Jennings Avenue to Los Verdes Drive. The PLTS analysis indicates that the sidewalks may not be suitable for all pedestrians. This primarily due to sidewalk gaps, poor sidewalk condition, narrow sidewalk width, and limited street lighting. Therefore, the following improvements are being considered along the roadway:

- **Fill in the gap along both sides of the roadway from Valley View Road to Jennings Avenue**
- Remove the existing sidewalks and install new sidewalks of appropriate width along both sides of the roadway
- Remove the existing sidewalks and install new landscape strips and sidewalks of appropriate width along both sides of the roadway
- Regardless of the sidewalk improvements, evaluate light levels and install street lighting from Crownview Drive to Webster Road as necessary

River Road

River Road currently has continuous sidewalks along both sides of the roadway from Arlington Street to the northern city limits; however, the PLTS analysis indicates that the sidewalks may not be suitable for all pedestrians. This is primarily due to lack of a buffer. Therefore, the following improvements are being considered along the roadway:

- Remove existing sidewalks and install new sidewalks of appropriate width along both sides of the roadway
- Remove existing sidewalks and install landscape strips and new sidewalks of appropriate width along both sides of the roadway

Abernathy Lane, Facing North

Glen Echo Avenue, Facing East

Local Streets

Local streets provide direct access to essential destinations throughout Gladstone, such as schools, parks, churches, and commercial areas. Pedestrian facilities should be provided along at least one side of each street to ensure adequate access for pedestrians.

Beatrice Avenue

Beatrice Avenue provides an important north-south connection between Clackamas Boulevard and Abernathy Lane (assuming provision of the Beatrice Avenue accessway described below) that parallels OR 99E and Portland Avenue. There are currently no sidewalks from Hereford Street to Clackamas Boulevard. Therefore, the following improvements are being considered along the roadway:

- Install new sidewalks of appropriate width on one side of the roadway
- **Install new sidewalks of appropriate width along both sides of the roadway**

Beverly Lane

Beverly Lane provides an important east-west connection between Oatfield Road and Harvard Avenue and access to Gladstone High School. There are currently sidewalks along both sides of the roadway from Harvard Avenue to the roadway terminus, with the exception of a gap on the south side of the roadway from Harvard Avenue to Beverly Drive. Therefore, the following improvements are being considered along the roadway:

- **Fill in the gap on the south side of the roadway from Harvard Avenue to Beverly Drive**

Chicago Avenue

Chicago Avenue provides an important north-south connection between Arlington Street and Hereford Street and access to John Wetten Elementary School. There are partial sidewalk provided on both sides of the roadway between Hereford Avenue and Exeter Street. Therefore, the following improvements are being considered along the roadway:

- Fill in the gaps on the east side of the roadway between Hereford Street and Exeter Street and adjacent to John Wetten Elementary School
- **Fill in the gaps along both sides of the roadway between Hereford Street and Exeter Street**

Clackamas Boulevard

Clackamas Boulevard provides an important east-west connection that parallels Arlington Street. It also provides access to Cross Park and Chief Charles Ames Memorial Park. There are sidewalks provided on the south side of the roadway between the two parks; however, there are no sidewalks located west of Chief Charles Ames Memorial Park. The roadway through this area is also relatively narrow and houses are built close to the edge of the roadway, which may make adding sidewalks difficult. Therefore, the following improvements are being considered along the roadway:

- **Install a mixed-use shoulders along one or two sides of the roadway**
- Install sidewalks on the south side of the roadway from Charles Ames Memorial Park to Arlington Street

Clayton Way

Clayton Way provides an important east-west connection between Ridgegate Drive and Webster Road for pedestrians and access within the vicinity of Walter L Kaxberger Middle School. There are partial sidewalks provided on both sides of the roadway between Stonewood Drive and Webster Road. Therefore, the following improvements are being considered along the roadway:

- Fill in the gaps on one side of the roadway from the roadway terminus to Webster Road
- **Fill in the gaps on both sides of the roadway from the roadway terminus to Webster Road**

Cornell Avenue

Cornell Avenue provides an important north south connection between Clackamas Boulevard and Collins Crest Street that parallels Oatfield Road. There are currently no sidewalks along both sides the roadway. Therefore, the following improvements are being considered along the roadway:

- Install new sidewalks of appropriate width along one side of the roadway
- **Install new sidewalks of appropriate width along both sides of the roadway**

Fairfield Street

Fairfield Street provides an important east-west connection between Oatfield Road and Harvard Avenue and access to John Wetten Elementary School. There are currently continuous sidewalks on both sides of the roadway except one gap located on the south side of the road between Portland Avenue and Chicago Avenue. Therefore, the following improvement is being considered along the roadway:

- **Fill in the gap on the south side of the roadway between Portland Avenue and Chicago Avenue**

Harvard Avenue

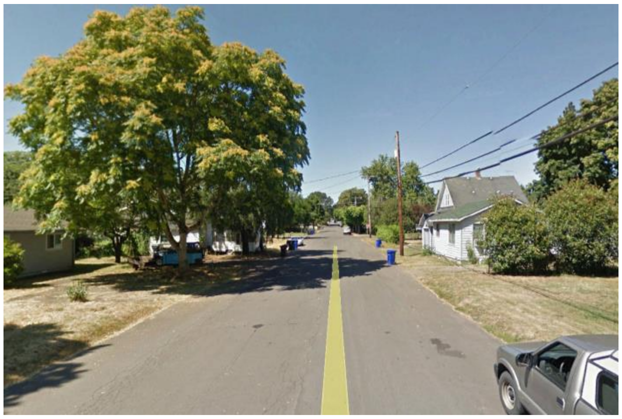
Harvard Avenue provides an important north-south connection between Hereford Street and Nelson Lane and access to Gladstone High School. There are partial sidewalks provided on both sides of the roadway between Herford Street and Beverly Lane. Therefore, the following improvements are being considered along the roadway:

- Fill in the gaps along the west side of the roadway between Herford Street and Beverly Lane and adjacent to Gladstone High School
- **Fill in the gaps along both sides of the roadway between Herford Street and Beverly Lane and adjacent to Gladstone High School**

Oakridge Drive

Oakridge Drive provides an important east-west connection between Oatfield Road and Valley View Road. There are partial sidewalks provided on both sides of the roadway. Therefore, the following improvements are being considered along the roadway:

- Fill in the gaps along the south side of the roadway
- **Fill in the gaps along both sides of the roadway**



Beatrice Avenue, Facing North

Clackamas Boulevard, Facing East

Intersections Improvements

Beatrice Avenue/Abernathy Lane

There are no enhanced pedestrian crossings within the vicinity of the Beatrice Avenue/Abernathy Lane intersection. Therefore, the following improvement is being considered:

- Install an enhanced pedestrian crossing to facilitate movement across Abernathy Lane. The types of enhanced crossing treatments are to be determined.

SE 82nd Drive/I-205 Southbound Ramp Terminal

The SE 82nd Drive/I-205 Southbound Ramp Terminal intersection does not have an enhanced crossing from the southwest corner of the intersection to the right-turn splitter island.

- Install a signalized pedestrian crossing in the southwest corner of the intersection to the right-turn splitter island. The crosswalk should include ADA compliant pedestrian ramps, continental striping, and countdown pedestrian heads.

Cason Road/Ohlson Road

There are no enhanced pedestrian crossings within the vicinity of the Cason Road/Ohlson Road intersection. Therefore, the following improvement is being considered:

- Install an enhanced pedestrian crossing to facilitate movement across Cason Road. The types of enhanced crossing treatments are to be determined.

Jennings Avenue/Valley View Road

There are no enhanced pedestrian crossings within the vicinity of the Jennings Avenue/Valley View Road intersection. Therefore, the following improvement is being considered:

- Install an enhanced pedestrian crossing to facilitate movement across Jennings Road. The types of enhanced crossing treatments are to be determined.

Oatfield Road/Glen Echo Avenue

There are no enhanced pedestrian crossings within the vicinity of the Oatfield Road/Glen Echo Avenue intersection. Therefore, the following improvement is being considered:

- Install an enhanced pedestrian crossing to facilitate movement across Oatfield Road. The types of enhanced crossing treatments are to be determined; however, given the traffic volumes and travel speeds along Oatfield Road it is assumed that the crossing will include:
    - Median refuge islands
    - High visibility pavement markings and signs
    - Rectangular Rapid Flash Beacons (RRFBs)

SE 82nd Drive/I-205 Southbound Ramp Terminal

Oatfield Road/Glen Echo Avenue

Oatfield Road/Gloucester Street

There are no enhanced pedestrian crossings within the vicinity of the Oatfield Road/Gloucester Street intersection. Therefore, the following improvement is being considered:

- Install an enhanced pedestrian crossing to facilitate movement across Oatfield Road. The types of enhanced crossing treatments are to be determined; however, given the traffic volumes and travel speeds along Oatfield Road it is assumed that the crossing will include:
    - High visibility pavement markings and signs
    - Rectangular Rapid Flash Beacons (RRFBs)

Portland Avenue/Arlington Street

There are no marked crosswalks within the vicinity of the Portland Avenue/Arlington Street intersection. Therefore the following improvement is being considered:

- Install marked crosswalks at the east, west, and south legs of the intersection.

Portland Avenue/Exeter Street

There are marked crosswalks across the north leg of the Portland Avenue/Exeter Street intersection; however, the east, west, and south legs are unmarked. Therefore the following improvement is being considered:

- Install marked crosswalks at the east, west, and south legs of the intersection.

Portland Avenue/Glen Echo Avenue

There are no enhanced pedestrian crossings within the vicinity of the Portland Avenue/Glen Echo Avenue (north) intersection. Therefore, the following improvement is being considered:

- Install an enhanced pedestrian crossing to facilitate movement across Portland Avenue. The types of enhanced crossing treatments are to be determined.

Portland Avenue/Glen Echo Avenue (south location)

There are no enhanced pedestrian crossings within the vicinity of the Portland Avenue/Glen Echo Avenue (south) intersection. Therefore, the following improvement is being considered:

- Install an enhanced pedestrian crossing to facilitate movement across Portland Avenue. The types of enhanced crossing treatments are to be determined.

Portland Avenue/Arlington Street

Portland Avenue/Glen Echo Avenue (north and south)

Webster Road/Cason Road

There are no enhanced pedestrian crossings within the vicinity of the Webster Road/Cason Road intersection. Therefore, the following improvement is being considered:

- Install an enhanced pedestrian crossing to facilitate movements across Webster Road and Cason Road. The types of enhanced crossing treatments are to be determined; however, given the traffic volumes and travel speeds along Oatfield Road it is assumed that the crossing will include:
    - High visibility pavement markings and signs
    - Rectangular Rapid Flash Beacons (RRFBs)

Portland Avenue

Portland Avenue provides on-street parking along both sides of the roadway. It also provides marked crosswalks at most major intersections between Arlington Street and Nelson Lane. Therefore, the following improvement is being considered:

- Install curb extensions along Portland Avenue at every major intersection between Arlington Street and Nelson Lane (up to 15 locations)

Arlington Street

Arlington Street provides on-street parking along both sides of the roadway. It also has marked crosswalks a most intersections between Arlington Street and Nelson Lane. Therefore, the following improvement is being considered:

- Install curb extensions along Arlington Street at every major intersection between OR 99E and SE 82nd Drive (up to 10 locations)

Other Intersection Improvements

- Reconfigure the marked crosswalks at the Crownview Drive/Los Verdes Drive intersection and the Valley View Road/Valley View Drive intersections – Install pedestrian ramps as necessary.

Off-street Improvements

The following off-street improvements consist of the pedestrian accessways between cul-de-sacs and dead-end streets, new shared-use paths and trails, and a new pedestrian/bicycle bridge.

Duniway Avenue Accessway

Right of way between Duniway Avenue (east) and Duniway Avenue (west) has been preserved; however, a new roadway connection may not be feasible. Therefore, the following improvement is being considered:

- Install a new accessway that connects Duniway Avenue (east) and Duniway Avenue (west). Due to grade constraints, an accessway at this location would need to be raised.

Beatrice Avenue Accessway

Right of way along Beatrice Avenue has been preserved between Ipswitch Street and Jersey Street; however, a new roadway connection may not be feasible. Therefore, the following improvement is being considered:

- Install a new accessway that connects Beatrice Avenue from Ipswich Street to W Jersey Street. There are considerable constraints due to a nearby creek.

Jenson Road Shared-use Path

Jenson Road is currently being used as a shared-use path. The right-of-way is under consideration for making the use of the roadway as a shared-use path permanent and including signing and pedestrian-scale lighting to encourage pedestrian and cyclist usage between River Road and Dahl Park Road.

Beatrice Avenue Accessway, Facing North

Jenson Road Shared-use Path, Facing West

Shared-use Path under OR 99E

OR 99E can be an obstacle for pedestrian wishing to access the Clackamas and Willamette Rivers and their adjacent beaches on the west portion of Gladstone. Therefore, a shared-use path that would travel under the OR 99E bridge is being considered. Such a path would connect Clackamas Boulevard to Dahl Park Road. There are considerable constraints to the path due to rising water levels in the Clackamas River.

Olson Wetlands Shared-use Path

A potential shared-use path connection is being considered from Abernethy Court to Risley Avenue to provide further pedestrian and bicycle connectivity from the Trolley Trail to southwest Gladstone.

Trolley Trail Bridge

The City has explored the possibility of constructing a pedestrian bridge crossing the Clackamas River south of Gladstone to create a connection between Gladstone and Oregon City. The previous rail bridge in the same location was demolished in 2014 after being unused for many years and becoming structurally unstable.

BICYCLE SYSTEM

Bicycle facilities are the elements of the transportation system that enable people to travel safely and efficiently by bike. These include facilities along key roadways (e.g., shared lane pavement markings, on-street bike lanes, and separated bike facilities) and facilities at key crossing locations (e.g., enhanced bike crossings). These also include end of trip facilities (e.g. secure bike parking, changing rooms, and showers at worksites); however, these facilities are addressed through the development code. Each facility plays a role in developing a comprehensive bicycle system.

Solutions

This section summarizes the solutions considered for implementation within the City of Gladstone to address existing gaps and deficiencies in the bicycle system and future needs.

Alternative Routes

Designate an alternative route along a parallel street that provides a more comfortable environment for cyclists with the same level of connectivity. The alternative route could be identified by wayfinding signs, which could also be used to identify essential destinations that can be reached by the route. The alternative route may provide shared-lane pavement markings and signs, on-street bike lanes, or other bicycle facilities.

Shared Lane Pavement Markings and Signs

Shared-lane pavement markings (often called “sharrows”) are not a bicycle facility, but a tool designed to help accommodate bicyclists on roadways where bike lanes are desirable but infeasible to construct. Sharrows indicate a shared roadway space for cyclists and motorists and are typically centered in the roadway or approximately four feet from the edge of the travelway. Sharrows are suitable on roadways with relatively low travel speeds (<35 mph) and low ADT (<3,000 ADT); however, they may also be used to transition between discontinuous bicycle facilities. Sharrows could be applied along a variety of streets within Gladstone where room for on-street bike lanes is limited.

On-Street bike lanes

On-street bike lanes are striped lanes on the roadway dedicated for the exclusive use of cyclists. Bike lanes are typically placed at the outer edge of pavement (but to the inside of right-turn lanes and/or on-street parking). Bicycle lanes can improve safety and security of cyclists and (if comprehensive) can provide direct connections between origins and destinations. On-street bike lanes could be applied along a variety of streets within Gladstone where space allows.

Separated Bike Facilities

Separated bike facilities include buffered bike lanes and separated bike lanes, or cycle tracks. Buffered bike lanes are on-street bike lanes that include an additional striped buffer of typically 2-3 feet between the bicycle lane and the vehicle travel lane and/or between the bicycle lane and the vehicle parking lane. They are typically located along streets that require a higher level of separation to improve the comfort of bicycling. Separated bike lanes, also known as cycle tracks, are bicycle facilities that are separated from motor vehicle traffic by a buffer and a physical barrier, such as planters, flexible posts, parked cars, or a mountable curb. One-way separated bike lanes are typically found on each side of the street, like a standard bike lane, while a two-way separated bike lanes are typically found on one side of the street.

On-street Bike Lanes

Buffered Bike Lanes

Enhanced Crossings

Enhanced bicycle crossing facilities enable cyclists to safely cross streets, railroad tracks, and other transportation facilities. Planning for appropriate bicycle crossings requires the community to balance vehicular mobility needs with providing crossing locations that the desired routes of cyclists. Enhanced bicycle crossings include:

- Bike Boxes – designated space at an intersection that allows cyclists to wait in front of motor vehicles while waiting to turn or continue through the intersection.
- Two-Stage Left-turn Boxes – designated space at a signalized intersection outside of the travel lane that provides cyclists with a place to wait while making a two-stage left-turn.
- Pavement marking through intersections – pavement markings that extend and bike lane through an intersection.
- Bike Only Signals – A traffic signal that is dedicated for cyclists
- Bicycle Detection – Vehicle detection for bicycles

Additional information on the Enhanced bicycle crossing treatments is provided in Attachment A.

Wayfinding Signs

Wayfinding signs are signs located along roadways or at intersections that direct bicyclists towards destinations in the area and/or to define a bicycle route. They typically include distances and average walk/cycle times. Wayfinding signs are generally used on primary bicycle routes and multiuse paths.

Improvements

The following improvements have been organized by streets segment, intersection, and off-street improvements. Where there are multiple improvements, the improvement shown in **bold text** was identified as the preferred improvement based on an evaluation of environmental, engineering, land use "fatal flaws" and anticipated funding capacity as well as discussions with the project team, advisory committees, and the general public.

Street Segment Improvements

The following street segment improvements have been organized by functional classification.

Arterials

Arterials serve an important function for bicycle access and circulation within Gladstone, particularly those that are served by local transit service. The following provides a summary of the bicycle improvements along arterial streets.

SE 82nd Drive

SE 82nd Drive currently has on-street bike lanes along both sides of the roadway; however, the BLTS analysis indicates that the segment from Oatfield Road to the north-east City limits is NOT suitable for most cyclists. This is primarily due to the relatively high travel speeds and narrow bike lanes along the roadway. Therefore, the following improvements are being considered along the roadway:

- Reduce the posted speed limit to 30 mph
- Reduce the travel lane width and install wider bike lanes on both sides of the roadway
- **Reduce the travel lane width and install buffered bike lanes on both sides of the roadway**
- Install separated bike facilities on one or two sides of the roadway

OR 99E (McLoughlin Boulevard)

OR 99E is a state facility. It currently has on-street bike lanes along both sides of the roadway; buffered bike lanes are provided where space is available; however, the BLTS analysis indicates that the roadway is currently NOT suitable for most cyclists. This is primarily due to the relatively high travel speeds and narrow bike lanes (in the non-buffered areas) along the roadway. Therefore, the following improvements are being considered along the roadway:

- **Reduce the posted speed limit to 35 mph**
- Reduce the travel lane width and install wider bike lanes on both sides of the roadway
- **Reduce the travel lane width and install buffered bike lanes on both sides of the roadway**
- Install separated bike facilities on one or two sides of the roadway

Arlington Street

Arlington Street currently does not have bicycle facilities; however, the BLTS analysis indicates that the roadway is currently suitable for most cyclists. This is primarily due to the relatively low speeds along the roadway. Therefore, the following improvements are being considered along the roadway:

- **Establish and alternative route along Clackamas River Drive with wayfinding signs and pavement markings**
- Install shared lane pavement marking and signs
- **Remove parking from both sides of the roadway from OR 99E to Clackamas Boulevard and install on-street bike lanes**
- **Remove parking from both sides of the roadway from Clackamas Boulevard to SE 82nd Drive and install on-street bike lanes**
- **Widen the roadway from Clackamas Boulevard to SE 82nd Drive and install on-street bike lanes and parking on both sides**

Oatfield Road

Oatfield Road currently has on-street bike lanes on both sides of the roadway; however, the BLTS analysis indicates that the roadway is currently NOT suitable for most cyclists. This is primarily due to the relatively high travel speeds and narrow bike lanes along the roadway. Therefore, the following improvements are being considered along the roadway:

- **Reduce the posted speed limit to 30 mph**
- **Reduce the travel lane width and install wider bike lanes on both sides of the roadway**
- Reduce the travel lane width and install buffered bike lanes on both sides of the roadway
- Install separated bike facilities on one or two sides of the roadway

Portland Avenue

Portland Avenue currently does not have bicycle facilities; however, the BLTS analysis indicates that the roadway is currently suitable for most cyclists. This is primarily due to the relatively low speeds along the roadway. Portland Avenue has a center two-way left-turn lane from Clackamas Boulevard to Nelson Lane, which is largely unnecessary given the relatively low traffic volumes along the roadway. North of Nelson Lane, Portland Avenue is relatively narrow. Therefore, the following improvements are being considered along the roadway:

- Portland Avenue from Clackamas Boulevard to Nelson Lane:
    - Install shared lane pavement marking and signs
    - **Remove the center two-way left-turn lane and install on-street bike lanes on both sides of the roadway**

    - Improvements along Portland Avenue will be determined through the downtown revitalization plan
  - Remove the center two-way left-turn lane and install separated bike facilities on both sides of the roadway
- Portland Avenue from Nelson Lane to Jennings Road
  - Install shared lane pavement marking and signs
  - Establish and alternative route to Jennings Avenue along Abernathy Lane – Emphasize the route with wayfinding signage
  - Remove parking from one side of the roadway and install on-street bike lanes
  - **Widen the roadway and install on-street bike lanes and parking on both sides**

Webster Road

Webster Road currently has on-street bike lanes on both sides of the roadway; however, the BLTS analysis indicates that the roadway is currently NOT suitable for most cyclists. This is primarily due to the relatively high travel speeds and narrow bike lanes along the roadway. Therefore, the following improvements are being considered along the roadway:

- **Reduce the posted speed limit to 30 mph**
- **Reduce the travel lane width and install wider bike lanes on both sides of the roadway**
- Reduce the travel lane width and install buffered bike lanes on both sides of the roadway
- Install separated bike facilities on one or two sides of the roadway

Portland Avenue, Facing South

Oatfield Road, Facing South

Collectors

Collectors also serve an important function for bicycle access and circulation within Gladstone and may provide direct access to essential destinations, such as schools, parks, churches, and commercial areas. The following provides a summary of the bicycle improvements along collector streets.

Abernathy Lane

Abernathy Lane currently has a relatively wide shoulder/on-street parking lane on the north side of the roadway and a shared-use path adjacent to the south side of the roadway from Glen Echo Avenue to Portland Avenue. The BLTS analysis indicates that the roadway is currently suitable for most cyclists. This is primarily due to the relatively low travel speeds along the roadway and the presence of a shoulder/on-street parking lane. Therefore, the following improvements are being considered along the roadway:

- **Install bike lanes on the north side of the roadway adjacent to the parking lane**
- Remove the parking and install bike lanes on both sides of the roadway

Cason Road

Cason Road currently has on-street bike lanes on both sides of the roadway and the BLTS analysis indicates that the roadway is currently suitable for most cyclists. However, there are no bike symbols within the on-street bike lanes and the bike lanes drop prior to Webster Road. Therefore, the following improvements are being considered along the roadway:

- **Install bike symbols within the on-street bike lanes**
- **Restripe the east leg of the Webster Road/Cason Road intersection to emphasize the bike connection**

Cason Road, Facing West

Abernathy Lane, Facing East

Dartmouth Street

Dartmouth Street does not have bicycle facilities; however, the BLTS analysis indicates that the roadway is currently suitable for most cyclists. This is primarily due to the relatively low travel speeds along the roadway. Therefore, the following improvements are being considered along the roadway:

- **Install shared lane pavement marking and signs from OR 99E to Portland Avenue and (given the width of the roadway) on-street bike lanes from Portland Avenue to Oatfield Road**
- Remove parking from both sides of the roadway and install on-street bike lanes from OR 99E to Portland Avenue

- Widen the roadway from OR 99E to Portland Avenue and install on-street bike lanes and parking on both sides

Gloucester Street

Gloucester Street currently does not have bicycle facilities; however, the BLTS analysis indicates that the roadway is currently suitable for most cyclists. This is primarily due to the relatively low travel speeds along the roadway. Therefore, the following improvements are being considered along the roadway:

- Install shared lane pavement marking and signs
- **Remove parking from both sides of the roadway and install on-street bike lanes**
- **Widen the roadway and install on-street bike lanes and parking on both sides**

Glen Echo Avenue

Glen Echo Avenue does not have bicycle facilities. The BLTS analysis indicates that the segment from OR 99E to Portland Avenue is NOT suitable for most cyclists. This is primarily due to the lack of bike facilities. Therefore, the following improvements are being considered along the roadway:

- **Reduce the posted speed limit to 25 mph**
- Install shared lane pavement marking and signs
- **Widen the roadway and install on-street bike lanes and parking on both sides**

The BLTS analysis also indicates that the segment from Portland Avenue to Oatfield Road is suitable for most cyclists. This is primarily due to the relatively low travel speeds. Therefore, the following improvements are being considered along the roadway:

- Install shared lane pavement marking and signs
- **Widen the roadway and install on-street bike lanes and parking on both sides**

Los Verdes Drive

Los Verdes Drive does not have bicycle facilities; however, the BLTS analysis indicates that the roadway is currently suitable for most cyclists. This is primarily due to the relatively low travel speeds along the roadway. Therefore, the following improvements are being considered along the roadway:

- **Install shared lane pavement marking and signs**
- Remove parking from both sides of the roadway and install on-street bike lanes
- Widen the roadway and install on-street bike lanes and parking on both sides

River Road

River Road currently has on-street bike lanes on both sides of the roadway and the BLTS analysis indicates that the roadway is currently suitable for most cyclists. However, the bike lanes on the west side of the roadway drop at the south-eastbound approach to OR 99E. Therefore, the following improvements are being considered along the roadway:

- **Install a "Bike Lane Ends" sign at the south-eastbound approach to OR 99E**
- **Install shared lane pavement marking at the south-eastbound approach to OR 99E**
- **Install a shared bike-lane/right-turn lane at the south-eastbound approach to OR 99E**

Local Streets

Local streets also play an important role in providing bicycle connectivity within the city. The following local streets have been identified as playing a critical role in providing connectivity to essential destinations. The types of treatments considered along these roadways include shared pavement markings and signs, wayfinding signs to essential destinations, and mixed-use shoulders.

- Clackamas Boulevard, Arlington Street to SE 82nd Drive
- Beatrice Avenue, from Abernathy Lane to Clackamas Boulevard
- Hereford Street, from Beatrice Avenue to Oatfield Road
- Nelson Lane/Harvard Avenue, from Portland Avenue to Hereford Street
- Beverly Lane/Collins Crest, from Harvard Avenue to Oatfield Road
- Ridgegate Drive/Penny Court/Clayton Way, from Oatfield Road to Webster Road
- Duniway Avenue, from Abernathy Lane Abernathy Lane to Portland Avenue
- Fairfield Street, from Cornell Avenue to Oatfield Road
- Cornell Avenue, from Clackamas Boulevard to Collins Crest
- Chicago Avenue, from Hereford Street to Arlington Street

Intersection Improvements

OR 99E/Arlington Street

The OR 99E/Arlington Street intersection currently has on-street bike lanes at the northbound and southbound approaches to the intersection; the on-street bike lanes along River Road drop at the eastbound approach to the intersection and there are no on-street bike lanes along Arlington Street at the westbound approach. Therefore, the following improvements have been identified for the intersection:

- Install two-stage left-turn bike boxes at the northbound and southbound approaches to the intersection

- Install bike boxes at the eastbound and westbound approaches to the intersection
- **Install skip striping along OR 99E through the intersection with green paint in the conflict areas – implement this treatment at all major intersections along OR 99E and in all conflict areas**

SE 82nd Drive/Oatfield Road

The SE 82nd Drive/Oatfield Road intersection currently has on-street bike lanes at the northbound, southbound, and eastbound approaches to the intersection. However, there are no enhanced crossing treatments to facilitate movement through the intersection. Therefore, the following improvements have been identified for the intersection:

- Install two-stage left-turn bike boxes at the northbound, southbound, and eastbound approaches to the intersection
- Install bike boxes at the eastbound and westbound approaches to the intersection
- **Install skip striping along SE 82nd Drive through the intersection with green paint in the conflict areas – implement this treatment at all major intersections along SE 82nd Drive and in all conflict areas**

OR 99E at Arlington Street

SE 82nd Drive at Oatfield Road

Oatfield Road/Webster Road

The Oatfield Road/Webster Road intersection currently has on-street bike lanes at the northbound, southbound, and westbound approaches to the intersection. However, there are no enhanced crossing treatments to facilitate movement through the intersection. Also, the northbound and westbound bike lanes are on the outside of the right-turn lanes. Therefore, the following improvements have been identified for the intersection:

- **Install skip striping along Oatfield Road through the intersection with green paint in the conflict areas – implement this treatment at all major intersections along Oatfield Road and in all conflict areas**

- **Reconfigure the northbound and westbound approaches to the intersection so that the bike lane is between the through (or left-turn) lane and the right-turn lane.**

Portland Avenue/Trolley Trail

The Trolley Trail travels along the south side of Abernathy Lane between the north city limits and Portland Avenue. The trail continues along Portland Avenue between Abernathy Lane and Columbia Boulevard at the future head of the Trolley Trail Bridge. Currently there is no way to transition from the Trolley Trail to Portland Avenue on the east side of the roadway by foot or by bike. Therefore, the following improvements have been identified for the Portland Avenue/Trolley Trail intersection:

- Install an enhanced pedestrian/bicycle crossing at the Portland Avenue/Trolley Trail intersection. The types of enhanced crossing treatments are to be determined.

Other Intersection Improvements

- Reconfigure the marked crosswalks at the Crownview Drive/Los Verdes Drive intersection and the Valley View Road/Valley View Drive intersections – Install pedestrian ramps as necessary.

TRANSIT

Public transit can provide important connections to destinations for people that do not drive or bike and can provide an additional option for all transportation system users for certain trips. Public transit links to walking, bicycling, or driving trips: users can walk to and from transit stops and their homes, shopping or work places, people can drive to park-and-ride locations to access a bus, or people can bring their bikes on transit vehicles and bicycle from a transit stop to their final destination.

Providing transit service in smaller cities is generally led by a local or regional transit agency, and is dependent on having the land use and densities that can support service. The city can plan for transit-supportive land use patterns and support future transit viability by designing and building streets that will comfortably accommodate transit stops and include the right-of-way that could allow for transit stops to be located as close as possible to important destinations. At a minimum, a transit stop should be well-signed and have a comfortable space to wait. Benches and shelter from the weather can improve user comfort, and including bike parking near bus stops allows people the option to leave their bike at one trip-end instead of bringing it on the bus.

Solutions

This section summarizes the solutions considered for implementation within the City of Gladstone to address existing gaps and deficiencies in the transit system and future needs.

New or Re-routed Fixed-Route Service

Fixed-route service enhancement can include:

- Increase the service frequency by reducing headways or time between arrivals

- Increase hours of service by providing service earlier in the morning and/or later in the evening
- Increase service coverage by re-routing existing service or implementing new service

Stop Enhancements

Transit stops are designated locations where residents can access local transit service. Transit stops are normally located at major intersections. The types of amenities provided at each transit stop (i.e. pole, bench, shelter, ridership information, trash receptacles) tend to reflect the level of usage, as discussed in the TriMet Bus Stops Guidelines from July 2010.

- Pole and bus stop sign – All bus stops require a pole and bus stop sign to identify the bus stop location. TriMet prefers that bus signs are provided on their own dedicated TriMet pole instead of being placed on existing poles, columns, and other locations as done historically.
- Bus stop shelters – Shelters are preferred for stops with 50 or more boardings per weekday but may be considered at stops served by infrequent service that have a minimum of 35 boardings per day on routes with peak headways greater than 17 minutes.
- Seating – Seating can be considered at any stop as long as accessibility is provided, safety and accessibility are not compromised by seating placement, and ad bench placement is allowed. Types of seating include:
    - Premium bench (minimum of 25 boardings per day)
    - Ad bench and Simme seat (minimum of 12 boardings per day)
- Trash cans – Trash cans are only provided at sheltered bus stops.
- Lighting – TriMet has set a goal to provide 1.5 to 2 foot-candles of light around a bus stop area.

Park-and-Ride Facilities

Park-and-ride facilities provide parking for people who wish to transfer from their personal vehicle to public transportation or carpools/vanpools. Park-and-rides are frequently located near major intersections, at commercial centers, or on express and commuter bus routes. It is Oregon state policy to encourage the development and use of park-and-ride facilities at appropriate urban and rural locations adjacent to or within the highway right-of-way. Park-and-ride facilities can provide an efficient method to provide transit service to low density areas, connecting people to jobs, and providing an alternate mode to complete long-distance commutes.

Park-and-ride facilities may be either shared-use, such as at a school or shopping center, or exclusive-use. Shared-use facilities are generally designated and maintained through agreements reached between the local public transit agency or rideshare program operator and the property owner. Shared lots can save the expense of building a new parking lot, increase the utilization of existing spaces, and avoid utilization of developable land for surface parking. In the case of shopping centers, the presence of a shared-use park-and-ride has frequently been shown to be mutually beneficial, as park-and-riders tend to patronize the businesses in the center.

Other Solutions

The Regional High Capacity Transit (HCT) Plan identifies several HCT corridors within the Gladstone area. While most of the corridors are conceptual at this time, there are several things the City can do to prepare for HCT. Per discussions with TriMet, the primary solutions for Gladstone include:

- Modify the development code to allow for higher densities within the City
- Coordinate with Clackamas County on priorities for HCT for the 2018 RTP update

TriMet Stop (Before)

TriMet Stop (After)

Improvements

New or Re-routed Fixed-Route Service

The following streets are being considered for new or re-routed fixed-route service to address the need for additional service coverage within the surrounding area:

- Portland Avenue from Abernathy Lane to Jennings Avenue – Portland Avenue currently does not connect to Jennings Avenue
- Jennings Avenue from OR 99E to Oatfield Road
- Cason Road from Webster Road to Strawberry Lane
- SE 82nd Drive from Oatfield Road to the north city limits

Stop Enhancements

The following bus stops are being considered for shelter installation due to adequate ridership volumes:

- Bus stop ID: 10323, OR 99E/Glen Echo Avenue,
- Bus stop ID: 10324, OR 99E/Gloucester Street,
- Bus stop ID: 10325, OR 99E/River Road, and
- Bus stop ID: 10327, OR 99E/Gloucester Street.

Park-and-Ride Facilities

The following locations have been identified as potential location for park-and-ride facilities:

- Gladstone Christian Church (could serve Lines 32, 34 and 79)
- Tri-City Baptist Temple (could serve Line 79)
- Oregon Conference of Seventh-day Adventists (could serve Lines 79 and 32)
- St Stephen Lutheran Church (could service Lines 33, 34, and 99)
- The Church of Jesus Christ of Latter-day Saints (could serve Lines 79 and 32)

The City should work with these churches to determine the potential for park-and-rides in their lots.

TriMet Service Enhancement Plans for the Southeast Region

The Service Enhancement Plans for the Southeast region include potential changes in the fixed-route services to Gladstone, including:

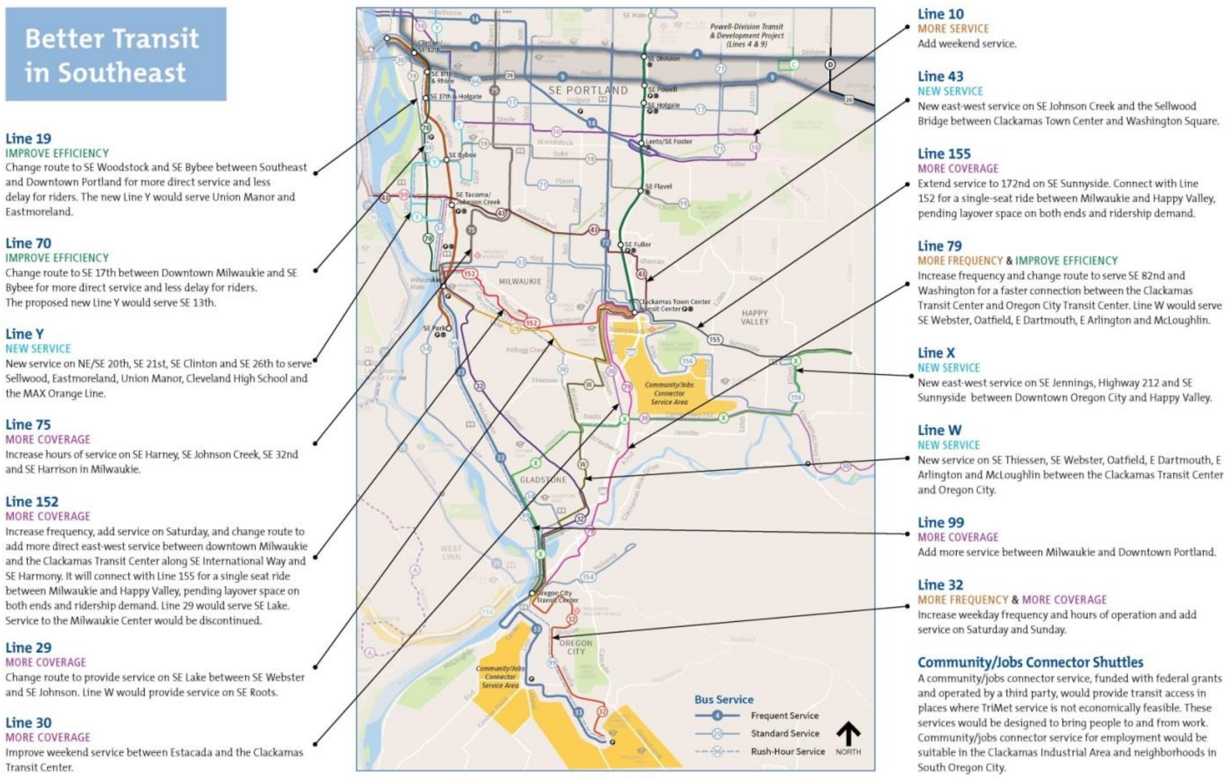
- Line 79, More Frequency and Improved Efficiency - Increase frequency and change route to serve SE 82nd Drive and Washington Street for a faster connection between the Clackamas Transit Center and Oregon City Transit Center. Line W (see below) would serve Webster Road, Oatfield Road, Dartmouth Street, Arlington Street, and OR 99E.
- Line X, New Service – New east-west along OR 99E, Jennings Avenue, Highway 212, and Sunnyside Road service between downtown Oregon City and Happy Valley.
- Line W, New Service – New service on Thiessen Road, Webster Road, Oatfield Road, Dartmouth Street, Arlington Street, and OR 99E between the Clackamas Transit Center and Oregon City.
- Line 99, More Coverage – Add more service coverage between Milwaukie and Downtown Portland.
- Line 32, More Frequency and More Coverage – Increase weekday frequency and hours of operation and add service on Saturday and Sunday.

TriMet's Service Enhancement Plans for the Southeast Region are illustrated in Exhibit 1.

Other Transit Improvements

- Relocate the transit stop at the northwest corner of the OR 99E Arlington Street intersection to the southwest corner of the intersections with a dedicated bus pull out
- Install a no-parking/bus zone sign along the west side of Webster Road adjacent to Walter L Krawberger Middle School.
- Install a no-parking/bus zone sign along the west side of Webster Road adjacent to the Webster Ridge Apartments.

Exhibit 1: TriMet's Service Enhancement Plans for the Southeast Region



Better Transit in Southeast

Line 19
IMPROVE EFFICIENCY
Change route to SE Woodstock and SE Bybee between Southeast and Downtown Portland for more direct service and less delay for riders. The new Line Y would serve Union Manor and Eastmoreland.

Line 70
IMPROVE EFFICIENCY
Change route to SE 17th between Downtown Milwaukie and SE Bybee for more direct service and less delay for riders. The proposed new Line Y would serve SE 13th.

Line Y
NEW SERVICE
New service on NE/SE 20th, SE 21st, SE Clinton and SE 26th to serve Sellwood, Eastmoreland, Union Manor, Cleveland High School and the MAX Orange Line.

Line 75
MORE COVERAGE
Increase hours of service on SE Harney, SE Johnson Creek, SE 32nd and SE Harrison in Milwaukie.

Line 152
MORE COVERAGE
Increase frequency, add service on Saturday, and change route to add more direct east-west service between downtown Milwaukie and the Clackamas Transit Center along SE International Way and SE Harmony. It will connect with Line 155 for a single seat ride between Milwaukie and Happy Valley, pending layover space on both ends and ridership demand. Line 29 would serve SE Lake. Service to the Milwaukie Center would be discontinued.

Line 29
MORE COVERAGE
Change route to provide service on SE Lake between SE Webster and SE Johnson. Line W would provide service on SE Roots.

Line 30
MORE COVERAGE
Improve weekend service between Estacada and the Clackamas Transit Center.

Line 10
MORE SERVICE
Add weekend service.

Line 43
NEW SERVICE
New east-west service on SE Johnson Creek and the Sellwood Bridge between Clackamas Town Center and Washington Square.

Line 155
MORE COVERAGE
Extend service to 172nd on SE Sunnyside. Connect with Line 152 for a single-seat ride between Milwaukie and Happy Valley, pending layover space on both ends and ridership demand.

Line 79
MORE FREQUENCY & IMPROVE EFFICIENCY
Increase frequency and change route to serve SE 82nd and Washington for a faster connection between the Clackamas Transit Center and Oregon City Transit Center. Line W would serve SE Webster, Oatfield, E Dartmouth, E Arlington and McLoughlin.

Line X
NEW SERVICE
New east-west service on SE Jennings, Highway 212 and SE Sunnyside between Downtown Oregon City and Happy Valley.

Line W
NEW SERVICE
New service on SE Thiessen, SE Webster, Oatfield, E Dartmouth, E Arlington and McLoughlin between the Clackamas Transit Center and Oregon City.

Line 99
MORE COVERAGE
Add more service between Milwaukie and Downtown Portland.

Line 32
MORE FREQUENCY & MORE COVERAGE
Increase weekday frequency and hours of operation and add service on Saturday and Sunday.

Community/Jobs Connector Shuttles
A community/jobs connector service, funded with federal grants and operated by a third party, would provide transit access in places where TriMet service is not economically feasible. These services would be designed to bring people to and from work. Community/jobs connector service for employment would be suitable in the Clackamas Industrial Area and neighborhoods in South Oregon City.

MOTOR VEHICLE SYSTEM

Streets serve a majority of all trips within Gladstone across all travel modes. In addition to motorists, pedestrians, bicyclists, and public transit riders use streets to access areas locally and regionally.

Solutions

This section summarizes the solutions considered for implementation within the City of Gladstone to address existing gaps and deficiencies in the motor vehicle system and future needs.

Street System Connectivity Solutions

Although the southern portion of Gladstone is largely built on a grid system, much of the residential neighborhood development in the northern portion has resulted in a network of cul-de-sacs and stubs streets due to topography. These streets can be desirable to residents because they can limit traffic speeds and volumes on local streets, but cul-de-sacs and stub streets result in longer trip distances, increased reliance on arterials for local trips, and limited options for people to walk and bike to the places they want to go.

The future street system needs to balance the benefits of providing a well-connected grid system with the topographical challenges in the city. Incremental improvements to the street system can be planned carefully to provide route choices for motorists, cyclists, and pedestrians while accounting for potential neighborhood impacts. In addition, the quality of the transportation system can be improved by making connectivity improvements to the pedestrian and bicycle system separate from street connectivity, as discussed through solutions presented in the previous sections.

The following are potential connectivity solutions that can be applied in the City of Gladstone.

- Re-designate a roadway with a higher *or lower* functional classification to improve the order and function of the roadway
- Construct a new roadway or extend an existing roadway to improve connectivity within an area of the city

Freight Mobility and Reliability Solutions

No specific solutions have been identified to address freight mobility and reliability within the City, with the exception of the TSMO solutions identified above for truck signal priority and the capacity based solutions identified below at several key intersections along OR 99E and SE 82nd Drive.

Capacity Based Solutions

Turn Lanes

Separate left- and right-turn lanes, as well as two-way left-turn lanes (TWLTL) can provide separation between slowed or stopped vehicles waiting to turn and through vehicles. The design of turn lanes is largely determined based on a traffic study that identifies the storage length needed to accommodate vehicle queues. Turn lanes are commonly used at intersections where the turning volumes warrant the need for separation.

Traffic Signals

Traffic signals allow opposing streams of traffic to proceed in an alternating pattern. National and state guidance indicates when it is appropriate to install traffic signals at intersections. When used, traffic signals can effectively manage high traffic volumes and provide dedicated times in which pedestrians and cyclists can cross roadways. Because they continuously draw from a power source and must be periodically re-timed, signals typically have higher maintenance costs than other types of intersection control. Signals can improve safety at intersections where signal warrants are met, however, they may result in an increase in rear-end crashes compared to other solutions. Signals have a significant range in costs depending on the number of approaches, how many through and turn lanes each approach has, and, if it is located in an urban or rural area. The cost of a new traffic signal ranges from approximately $250,000 in rural areas to $350,000 in urban areas.

Signal Timing/Phasing Modifications

Signal retiming and optimization offers a relatively low cost option to increase system efficiency. Retiming and optimization refers to updating timing plans to better match prevailing traffic conditions and coordinating signals. Timing optimization can be applied to existing systems or may include upgrading signal technology, such as signal communication infrastructure, signal controllers, or cabinets. Signal retiming can reduce travel times and be especially beneficial to improving travel time reliability. In high pedestrian or desired pedestrian areas, signal retiming can facilitate pedestrian movements through intersections by increasing minimum green times to give pedestrians time to cross during each cycle. Signals can also facilitate bicycle movements with the inclusion of bicycle detectors.

Signal upgrades often come at a higher cost than signal timing and phasing modifications and usually require further coordination between jurisdictions. However, upgrading signals provides the opportunity to incorporate advanced signal systems to further improve the efficiency of a transportation network. Strategies include coordinated signal operations across jurisdictions, centralized control of traffic signals, adaptive or active signal control, and transit or freight signal priority as described above. These advanced signal systems can reduce delay, travel time and the number of stops for transit, freight, and other vehicles. In addition, these systems may help reduce vehicle emissions and improve travel time reliability.

Roundabouts

Roundabouts are circular intersections where entering vehicles yield to vehicles already in the circle. They are designed to slow vehicle speeds to 20 to 30 mph or less before they enter the intersection, which promotes a more comfortable environment for pedestrians, bicyclists, and other non-motorized users. Roundabouts have fewer conflict-points and have been shown to reduce the severity of crashes, as compared to signalized intersections. Roundabouts can be more costly to design and install when compared to other intersection control types, but they have a lower operating and maintenance cost than traffic signals. Topography must be carefully evaluated in considering a roundabout, given that slope characteristics at an intersection may render a roundabout infeasible. The cost of a new roundabouts ranges from approximately $1 million to $2 million depending upon the number of lanes and the slope conditions.

Traffic Signal

Roundabout

Improvements

The following improvements have been organized into connectivity improvements, freight mobility and reliability improvements, and capacity based improvements. Where there are multiple improvements, the improvements shown in **bold text** were identified as the preferred improvement based on an evaluation of environmental, engineering, land use "fatal flaws" and anticipated funding capacity as well as discussions with the project team, advisory committees, and the general public.

Connectivity Improvements

The following identifies potential connectivity improvements, including potential changes to the city's functional classification plan and new street connections. Given that there are limited opportunities for new arterial or collector streets within the City, the new street connections are limited to an extension of an existing street and two new local street connections.

- Re-designate Portland Avenue as a collector street
- Re-designate Dartmouth Street as local street
- Extend Portland Avenue north to Jennings Avenue
- Extend Tyron Court southeast to connect with Nelson Lane as part of future development (on private property)
- Connect two segments of E Kenmore Street to create one segment from Harvard Avenue to Cornell Avenue as part of future development (on private property)

Freight Mobility and Reliability Improvements

No specific improvements have been identified to address freight mobility and reliability within the City, with the exception of the TSMO improvements identified above for truck signal priority and the capacity based improvements identified below at several key intersections along OR 99E and 82d Drive.

Capacity Based Improvements

OR 99E/Arlington Street

The OR 99E/Arlington Street intersection is forecast to exceed ODOT's mobility target under year 2040 conditions. Although each approach has a movement that is overcapacity, the eastbound right-turn and northbound left-turn movements are forecast to experience average delays greater than 350 seconds per vehicle. Therefore, the following improvements are being considered at the intersection:

- Install a second separate right-turn lane on the eastbound approach and a second separate left-turn-lane on the northbound approach and update the northbound and southbound left-turn movements to protected phasing and the eastbound right-turn movement to protected and overlap phasing.
- **Restrict eastbound movements at the intersection, making the block of River Road west of OR 99E a one-way street, and install a second separate through lane on the southbound**

approach. The northbound left-turn, southbound right-turn, and westbound through movements will still be allowed. In addition to capacity changes, signal timing and phasing will be optimized as necessary. It is important to note that this solution would have an impact on upstream signals due to drivers re-routing to parallel routes.

- Restrict all movements to and from River Road by creating a stub street that does not connect to OR 99E. In addition to capacity changes, signal timing and phasing will be optimized as necessary. It is important to note that this solution would have an impact on upstream signals due to drivers re-routing to parallel routes.

Solution	V/C	Delay (seconds)	LOS
Turn lanes and signal phasing updates	1.10	63.2	E
Restricted eastbound movements	0.98	33.3	C
Restrict all movements to and from River Road	1.09	40.6	D

OR 99E/Glen Echo Avenue

The OR 99E/Glen Echo Avenue intersection is forecast to not meet ODOT's operating standard of a v/c less than 0.99 under future 2040 conditions. Although the northbound and southbound movements are forecast to operate at acceptable levels, the eastbound and westbound movements are expected to experience excessive average delays. Therefore, the following improvements are being considered at the intersection:

- **Install a separate right-turn lane on the westbound approach. Signal timing updates are not necessary based on the forecasted volumes but this improvement would provide an opportunity to complete signal retiming at this intersection.**
- In addition to the added westbound right-turn lane, reconfigure the eastbound approach to have a separate left-turn lane and a shared through-right turn lane.

As part of the investigation of the OR 99E solution, OR 99E/Glen Echo was further analyzed with additional northbound right-turn volumes and additional eastbound right-turn volumes based on half of the driver rerouting along OR 99E through the Glen Echo intersection and half the drivers rerouting through the Gloucester intersection.

Solution	V/C	Delay (seconds)	LOS
Westbound turn lane	0.95	36.9	D
Reconfigure eastbound approach	0.88	23.1	C

I-205 Southbound Ramp Terminal/SE 82nd Drive

The I-205 Southbound Ramp Terminal/SE 82nd Drive intersection is forecast to not meet ODOT's operating standard of a v/c less than 0.85 under future 2040 conditions. The critical westbound left-turn movement is forecast to experience average delays greater than 150 seconds per vehicle. Therefore, the following improvements are being considered at the intersection:

- Increase the cycle length from 75 to 150 seconds and optimize the signal timing. The expectation is that both I-205 ramp terminals will have increased cycle lengths and continue to operate in coordination.
- **Install a second separate left-turn lane on the westbound approach. Signal timing updates are not necessary based on the forecasted volumes but this improvement would provide an opportunity to complete signal retiming at this intersection. This solution will require widening of the bridge of I-205 in between the ramp terminals and the southbound on-ramp**.
- Reconfigure the intersection to restrict westbound left-turn movements by constructing a channelized right-turn cloverleaf-style on-ramp for the westbound right-turn movement. The westbound vehicles entering the freeway will transition from the current left-turn movement to a free-flow right-turn movement
- Acquire right-of-way and install a multi-lane roundabout, including a shared left-through lane and separate right-turn lane on both the north and west legs and a separate left-turn lane and shared through-right lane on the east leg. The separate right-turn lanes for eastbound and southbound traffic will provided with an additional receiving lane to allow for a free-flow movement.

Solution	V/C	Delay (seconds)	LOS
Signal retiming	0.88	36.9	D
Westbound turn lane	0.72	28.8	C
On-ramp reconfiguration	0.58	6.9	A
Roundabout	-	35.0	D

I-205 Northbound Ramp Terminal/SE 82nd Drive

The I-205 Northbound Ramp Terminal/SE 82nd Drive intersection is forecast to not meet ODOT's operating standard of a v/c less than 0.85 under future 2040 conditions. The critical westbound through movement is forecast to experience average delays greater than 50 seconds per vehicle. Therefore, the following improvements are being considered at the intersection:

- Increase the cycle length from 75 to 150 seconds, update the westbound left-turn movement to permitted phasing, and optimize the signal timing. The expectation is that both I-205 ramp terminals will have increased cycle lengths and continue to operate in coordination.
- **Install a second separate through lane on the westbound approach, convert the westbound left-turn phasing to permitted, and update the signal timing. This solution will require widening of the bridge of I-205 in between the ramp terminals.**
- Acquire right-of-way and install a multi-lane roundabout, including a shared left-through lane and a shared through-right lane on the east leg, a shared left-through lane and a separate right-turn lane on the south leg, and a shared lane on the west leg. Operations can be improved by providing an additional receiving lane to allow the northbound right-turn to function as a free-flow movement but this option would create further right-of-way implications.

Solution	V/C	Delay (seconds)	LOS
Signal retiming	0.89	39.8	D
Westbound through lane	0.69	21.4	C
Roundabout	-	31.4	D

Attachment B contains the traffic conditions worksheets for the motor vehicle Improvements.

Oatfield Road/Dartmouth Street

While the Oatfield Road/Dartmouth Street intersection was not evaluated as part of the TSP update, anecdotal evidence suggests that the left-turn movements to/from Oatfield Road can be a challenge during peak time periods. In addition, some motorists use Dartmouth Street to bypass Arlington Street, which contributes to relatively high travel speeds along the roadway. Therefore, the following improvements are being considered at the intersection:

- Install a median along Oatfield Road to restrict left-turn movements to/from Dartmouth Street. Note: many local residents as well as the local transit agency (TriMet) currently use Dartmouth Street to access Oatfield Road; therefore, this restriction should be explored further with their input.

Other Motor Vehicle Improvements

- Install No Parking signs along the north side of Gloucester Street from OR 99E to 50-feet to the east OR paint the curb yellow similar to the west side of OR 99E

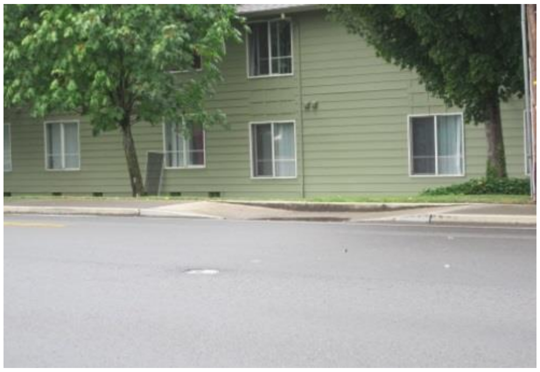
Attachment A Pedestrian and Bicycle Crossing Treatments

PEDESTRIAN CROSSING TREATMENTS

Pedestrian crossing facilities enable pedestrians to safely cross streets, railroad tracks, and other transportation facilities. Planning for appropriate pedestrian crossings requires the community to balance vehicular mobility needs with providing crossing locations that the desired routes of walkers.

Unmarked Crosswalks

Under Oregon law, pedestrians have the right-of-way at all unsignalized intersections. On narrow, low-speed streets unmarked crosswalks are generally sufficient for pedestrians to cross the street safely, as the low-speed environment makes drivers more responsive to the presence of pedestrians. However, drivers are less likely to yield to pedestrians at unmarked crosswalks on high-speed and/or high-volume roadways, even when the pedestrian has stepped onto the roadway. In these situations, enhanced pedestrian crossing facilities are needed to remind drivers that they must yield when pedestrians are present.



Marked Crosswalks

Marked crosswalks are painted roadway markings that indicate the location of a crosswalk to motorists. Marked crosswalks can be accompanied by signs, curb extensions and/or median refuge islands, and may occur at intersections or at mid-block locations. Research has shown that marked crosswalks in certain situations do not improve pedestrian safety and can even make it worse. Recent research indicates that on multi-lane roadways (more than two lanes), marked crosswalks should not be installed without accompanying treatments, such as Rectangular Rapid Flash Beacons (RRFBs) or Pedestrian Hybrid beacons.

Rectangular Rapid Flashing Beacon (RRFB)

RRFBs are user-actuated amber lights that have an irregular flash pattern similar to emergency flashers on police vehicles. These supplemental warning lights are used at unsignalized intersections or mid-block crosswalks to improve safety for pedestrians using a crosswalk. RRFBs could be used at any unsignalized intersection or mid-block crossing where warrants require a higher level of crosswalk protection.

Pedestrian Hybrid Beacon

A Pedestrian Hybrid Beacon (sometimes called a HAWK signal) is a user-actuated signal that is unlit when not in use. It begins with a yellow light alerting drivers to slow, and then displays a solid red light requiring drivers to remain stopped while pedestrians cross the street. The beacon then shifts to flashing red lights to signal that motorists may proceed, after stopping, and after pedestrians have completed their crossing. A Pedestrian Hybrid Beacon can be used at mid-block crossings or, in some cases, at unsignalized intersections (the MUTCD suggests that the beacons be located at least 100-feet from an intersection). Pedestrian Hybrid Beacons could be used at any unsignalized intersection or mid-block crossing where warrants require a higher level of crosswalk protection.

Pedestrian Signal

Pedestrian Signals provide pedestrians with a signal-controlled crossing at a mid-block location or, in some cases at a previously stop-controlled intersection where pedestrian volumes warrant full signalization (the MUTCD no longer allows half signals at intersections). The signal remains green for the mainline traffic movements until actuated by a pushbutton to call a red signal for traffic. They are typically located at midblock crossings with high pedestrian or bicycle demand and/or high traffic volumes, such as where multi-use paths intersect with roadways.

Pedestrian Countdown Heads

Pedestrian Countdown heads inform pedestrians of the time remaining to cross the street with a countdown timer at the signalized crossing. The countdown should include enough time for a pedestrian to cross the full length of the street, or in rare cases, reach a refuge island. The 2009 Manual on Uniform Traffic Control Devices (MUTCD) requires all new pedestrian signals, and any retrofitted signals to include pedestrian countdown signals.

Leading Pedestrian Interval (LPI)

Leading pedestrian intervals allow pedestrians to start crossing the street at a signalized intersections five to seven seconds before conflicting vehicles are given a green light and allowed to enter the intersection. They are most commonly used at signalized intersections where left- or right-turning vehicles interfere with pedestrian crossing movements. LPI could be applied at all existing or potential future traffic signals to improve crossing conditions for pedestrians.

Geometric Considerations

There are a number of geometric enhancements that can be considered at pedestrian crossings that may be implemented in conjunction with previously discuss treatments.

Curb Extensions

Curb extensions create additional space for pedestrians at crosswalks and allow pedestrians and vehicles to better see each other. Curb extensions are typically installed at intersections and midblock crossings located along roadways with on-street parking to help reduce crossing distances and the amount of exposure pedestrians have to vehicle traffic. Curb extensions can narrow the vehicle path, slow down traffic, and prohibit fast turns. Curb extensions could be applied along any street where on-street parking is allowed or where there is sufficient shoulder width so the curb extension does not conflict with on-street bike lanes.

Raised Median Island

Raised median islands provide a protected area in the middle of the roadway where pedestrians can stop while crossing the street. Raised median islands allow pedestrians to complete two-stage crossings if needed. Raised median islands can narrow the vehicle path and slow down traffic along the roadway. Raised median islands could be applied along any street where they would not interfere with turning movements at driveways and intersecting roadways.

Other Considerations

Street Furniture and Lighting

Street furniture includes pedestrian seating, information / wayfinding structures, and trash cans. Street furniture and lighting can be used to enhance the pedestrian experience and encourage pedestrian activity on a street.

Bicycle Crossing Treatments

Pavement Markings Through Intersections

Pavement markings can be extended through the intersection for bicyclists. Green paint can be used in "conflict zones" where vehicles and bicycles may cross paths in intersections, at driveways, or at right-turn pockets. These pavement marking are typically used at signalized intersections to emphasize a connection in a larger bicycle network. They could be used along at all signalized intersections and in other select "conflict zones".

Bike Box

Bicycle boxes are designated spaces at signalized intersections, placed between a set-back stop bar and the pedestrian crosswalk, that allow bicyclists to queue in front of motor vehicles at red lights. Bike boxes are typically used at signalized intersections to facilitate turn movements as well as other movements for cyclists.

Two-Stage Left-Turn Bike Box

Two-stage left-turn bike boxes allow bicyclists to safely and comfortably make left-turns at multilane intersections from a right-side bicycle lane or cycle track. Bicyclists arriving on a green light travel into the intersection and pull out into the two-stage turn queue box away from through-moving bicycles and in front of cross street traffic, where they can wait to proceed through on the side-street green signal. Two-stage left-turn bike boxes can be applied at signalized intersections to improve bicycle crossing conditions.

Bike only signal

Bicycle-only signals can be used at intersections to provide a separate signal phase that is dedicated to bicyclists. At this stage, the MUTCD does not allow bicycle signal to operation concurrent with permissive vehicle phases.

Bicycle Detection

Many traffic signals along are actuated, meaning that green indication is given to a movement when a vehicle is detected. However, actuating a signal as a cyclist can be difficult. Bicycle detection allows cyclists to actuate the traffic signal from the bicycle lane with a detector that is calibrated to recognize a bicycle. Pavement markings could be added to show cyclists where to stand to actuate a signal. Bicycle detection is typically applied at signalized intersections that accommodate bicycles and can be used at all of the signalized intersection to improve bicycle crossing conditions.

Other Considerations

Bicycle Parking

Bicycle parking facilities provide safe and secure places for people to park their bicycles. The most common bicycle parking facility is the “staple”, which provides space for up to two bicycles and is typically located along the side of the road in a commercial area or near the main entrance to a building. Bicycle parking could be applied along streets located adjacent to commercial properties.

Wayfinding Signs

Wayfinding signs are signs located along roadways or at intersections that direct bicyclists towards destinations in the area and/or to define a bicycle route. They typically include distances and average walk/cycle times. Wayfinding signs are generally used on primary bicycle routes and multiuse paths.

Attachment B Motor Vehicle Improvements Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱↱		↰↑	↱	↰↰	↑↑	↱	↰	↑↱	
Traffic Volume (vph)	6	65	680	175	62	61	448	1677	237	53	2176	12
Future Volume (vph)	6	65	680	175	62	61	448	1677	237	53	2176	12
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	4.8	4.8	4.0	4.8	
Lane Util. Factor		1.00	0.88		1.00	1.00	0.97	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	1.00		1.00	0.98	1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1892	2760		1739	1565	3467	3505	1511	1770	3502	
Flt Permitted		0.97	1.00		0.73	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1850	2760		1320	1565	3467	3505	1511	1770	3502	
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)	6	68	716	184	65	64	472	1765	249	56	2291	13
RTOR Reduction (vph)	0	0	34	0	0	51	0	0	84	0	0	0
Lane Group Flow (vph)	0	74	682	0	249	13	472	1765	165	56	2304	0
Confl. Peds. (#/hr)	7		13	13		7	4		3	3		4
Confl. Bikes (#/hr)						1			2			
Heavy Vehicles (%)	0%	0%	3%	6%	0%	1%	1%	3%	4%	2%	3%	0%
Turn Type	Perm	NA	pt+ov	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		4	4 5		8		5	2		1	6	
Permitted Phases	4			8		8			2			
Actuated Green, G (s)		24.7	43.5		24.7	24.7	14.8	75.0	75.0	7.5	67.7	
Effective Green, g (s)		24.7	43.5		24.7	24.7	14.8	75.0	75.0	7.5	67.7	
Actuated g/C Ratio		0.21	0.36		0.21	0.21	0.12	0.62	0.62	0.06	0.56	
Clearance Time (s)		4.0			4.0	4.0	4.0	4.8	4.8	4.0	4.8	
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)		380	1000		271	322	427	2190	944	110	1975	
v/s Ratio Prot			0.25				c0.14	0.50		0.03	c0.66	
v/s Ratio Perm		0.04			c0.19	0.01			0.11			
v/c Ratio		0.19	0.68		0.92	0.04	1.11	0.81	0.18	0.51	1.17	
Uniform Delay, d1		39.4	32.4		46.7	38.2	52.6	17.0	9.5	54.5	26.1	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.10	0.75	
Incremental Delay, d2		0.2	1.8		33.5	0.0	75.3	3.3	0.4	0.9	77.6	
Delay (s)		39.6	34.2		80.2	38.2	127.9	20.3	9.9	60.8	97.3	
Level of Service		D	C		F	D	F	C	A	E	F	
Approach Delay (s)		34.7			71.6			39.7			96.4	
Approach LOS		C			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	63.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	113.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

1: OR-99E & W Arlington St

Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰	↱	↰↰	↑↑	↱	↰	↑↑↱	
Traffic Volume (vph)	0	0	0	175	62	61	448	1677	237	53	2856	12
Future Volume (vph)	0	0	0	175	62	61	448	1677	237	53	2856	12
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	4.8	4.8	4.0	4.8	
Lane Util. Factor					1.00	1.00	0.97	0.95	1.00	1.00	0.91	
Frpb, ped/bikes					1.00	0.98	1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes					1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt					1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected					0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)					1755	1564	3467	3505	1511	1770	5033	
Flt Permitted					0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)					1755	1564	3467	3505	1511	1770	5033	
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)	0	0	0	184	65	64	472	1765	249	56	3006	13
RTOR Reduction (vph)	0	0	0	0	0	53	0	0	77	0	0	0
Lane Group Flow (vph)	0	0	0	0	249	11	472	1765	172	56	3019	0
Confl. Peds. (#/hr)	7		13	13		7	4		3	3		4
Confl. Bikes (#/hr)						1			2			
Heavy Vehicles (%)	0%	0%	3%	6%	0%	1%	1%	3%	4%	2%	3%	0%
Turn Type				Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)					21.1	21.1	14.8	78.6	78.6	7.5	71.3	
Effective Green, g (s)					21.1	21.1	14.8	78.6	78.6	7.5	71.3	
Actuated g/C Ratio					0.18	0.18	0.12	0.65	0.65	0.06	0.59	
Clearance Time (s)					4.0	4.0	4.0	4.8	4.8	4.0	4.8	
Vehicle Extension (s)					2.5	2.5	2.3	4.7	4.7	2.3	4.7	
Lane Grp Cap (vph)					308	275	427	2295	989	110	2990	
v/s Ratio Prot					c0.14		c0.14	0.50		0.03	c0.60	
v/s Ratio Perm						0.01			0.11			
v/c Ratio					0.81	0.04	1.11	0.77	0.17	0.51	1.01	
Uniform Delay, d1					47.5	41.1	52.6	14.4	8.1	54.5	24.4	
Progression Factor					1.00	1.00	1.00	1.00	1.00	1.05	0.81	
Incremental Delay, d2					14.0	0.0	75.3	2.5	0.4	0.2	7.6	
Delay (s)					61.5	41.1	127.9	16.9	8.4	57.6	27.2	
Level of Service					E	D	F	B	A	E	C	
Approach Delay (s)		0.0			57.3			37.2			27.7	
Approach LOS		A			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

1: OR-99E & W Arlington St

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑↑	↱	↰	↑↑
Traffic Volume (vph)	175	61	2125	237	53	2856
Future Volume (vph)	175	61	2125	237	53	2856
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.8	4.8	4.0	4.8
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
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)	1703	1599	3505	1511	1770	3505
Flt Permitted	0.95	1.00	1.00	1.00	0.04	1.00
Satd. Flow (perm)	1703	1599	3505	1511	81	3505
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	184	64	2237	249	56	3006
RTOR Reduction (vph)	0	56	0	67	0	0
Lane Group Flow (vph)	184	8	2237	182	56	3006
Confl. Peds. (#/hr)	13	7		3	3	
Confl. Bikes (#/hr)		1		2		
Heavy Vehicles (%)	6%	1%	3%	4%	2%	3%
Turn Type	Prot	Prot	NA	Perm	pm+pt	NA
Protected Phases	3	3	2		1	6
Permitted Phases				2	6	
Actuated Green, G (s)	15.0	15.0	87.7	87.7	95.7	95.7
Effective Green, g (s)	15.0	15.0	87.7	87.7	95.7	95.7
Actuated g/C Ratio	0.12	0.12	0.73	0.73	0.80	0.80
Clearance Time (s)	4.5	4.5	4.8	4.8	4.0	4.8
Vehicle Extension (s)	3.0	3.0	4.7	4.7	2.3	4.7
Lane Grp Cap (vph)	212	199	2561	1104	120	2795
v/s Ratio Prot	c0.11	0.01	0.64		0.02	c0.86
v/s Ratio Perm				0.12	0.35	
v/c Ratio	0.87	0.04	0.87	0.16	0.47	1.08
Uniform Delay, d1	51.5	46.2	12.0	4.9	22.4	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.08	2.01
Incremental Delay, d2	29.1	0.1	4.5	0.3	0.2	34.8
Delay (s)	80.6	46.3	16.5	5.3	24.2	59.2
Level of Service	F	D	B	A	C	E
Approach Delay (s)	71.7		15.4			58.6
Approach LOS	E		B			E

Intersection Summary			
HCM 2000 Control Delay	40.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑	↱	↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (vph)	206	81	76	47	52	199	47	1577	56	114	1867	185
Future Volume (vph)	206	81	76	47	52	199	47	1577	56	114	1867	185
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	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		1.00	0.98	1.00	1.00	0.95	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00		0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1810	1528		1809	1573	1736	3505	1525	1805	3505	1548
Flt Permitted		0.65	1.00		0.28	1.00	0.05	1.00	1.00	0.07	1.00	1.00
Satd. Flow (perm)		1215	1528		510	1573	94	3505	1525	140	3505	1548
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)	219	86	81	50	55	212	50	1678	60	121	1986	197
RTOR Reduction (vph)	0	0	44	0	0	172	0	0	16	0	0	33
Lane Group Flow (vph)	0	305	37	0	105	40	50	1678	44	121	1986	164
Confl. Peds. (#/hr)	3		4	4		3	4		8	8		4
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	4%	3%	2%	1%	4%	3%	1%	0%	3%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		21.0	21.0		21.0	21.0	82.3	77.5	77.5	90.1	81.4	81.4
Effective Green, g (s)		21.0	21.0		21.0	21.0	82.3	77.5	77.5	90.1	81.4	81.4
Actuated g/C Ratio		0.18	0.18		0.18	0.18	0.69	0.65	0.65	0.75	0.68	0.68
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		212	267		89	275	130	2263	984	225	2377	1050
v/s Ratio Prot							0.02	0.48		c0.04	c0.57	
v/s Ratio Perm		c0.25	0.02		0.21	0.03	0.25		0.03	0.36		0.11
v/c Ratio		1.44	0.14		1.18	0.15	0.38	0.74	0.04	0.54	0.84	0.16
Uniform Delay, d1		49.5	41.9		49.5	41.9	16.9	14.4	7.8	15.9	14.3	6.9
Progression Factor		1.00	1.00		1.00	1.00	1.73	0.68	1.49	1.00	1.00	1.00
Incremental Delay, d2		222.1	0.2		151.7	0.2	0.8	1.6	0.1	1.6	3.7	0.3
Delay (s)		271.6	42.0		201.2	42.1	29.9	11.4	11.6	17.6	18.0	7.3
Level of Service		F	D		F	D	C	B	B	B	B	A
Approach Delay (s)		223.5			94.8			12.0			17.1	
Approach LOS		F			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			↰	↱	↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (vph)	206	81	76	47	52	199	47	1577	56	114	1867	185
Future Volume (vph)	206	81	76	47	52	199	47	1577	56	114	1867	185
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	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99			1.00	0.98	1.00	1.00	0.95	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1800	1681			1809	1573	1736	3505	1525	1805	3505	1548
Flt Permitted	0.62	1.00			0.66	1.00	0.05	1.00	1.00	0.07	1.00	1.00
Satd. Flow (perm)	1174	1681			1218	1573	94	3505	1525	140	3505	1548
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)	219	86	81	50	55	212	50	1678	60	121	1986	197
RTOR Reduction (vph)	0	28	0	0	0	172	0	0	16	0	0	33
Lane Group Flow (vph)	219	139	0	0	105	40	50	1678	44	121	1986	164
Confl. Peds. (#/hr)	3		4	4		3	4		8	8		4
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	4%	3%	2%	1%	4%	3%	1%	0%	3%	1%
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	21.0	21.0			21.0	21.0	82.3	77.5	77.5	90.1	81.4	81.4
Effective Green, g (s)	21.0	21.0			21.0	21.0	82.3	77.5	77.5	90.1	81.4	81.4
Actuated g/C Ratio	0.18	0.18			0.18	0.18	0.69	0.65	0.65	0.75	0.68	0.68
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)	2.5	2.5			2.5	2.5	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	205	294			213	275	130	2263	984	225	2377	1050
v/s Ratio Prot		0.08					0.02	0.48		c0.04	c0.57	
v/s Ratio Perm	c0.19				0.09	0.03	0.25		0.03	0.36		0.11
v/c Ratio	1.07	0.47			0.49	0.15	0.38	0.74	0.04	0.54	0.84	0.16
Uniform Delay, d1	49.5	44.5			44.7	41.9	16.9	14.4	7.8	15.9	14.3	6.9
Progression Factor	1.00	1.00			1.00	1.00	1.73	0.68	1.49	1.00	1.00	1.00
Incremental Delay, d2	82.1	0.9			1.3	0.2	0.8	1.6	0.1	1.6	3.7	0.3
Delay (s)	131.6	45.4			46.0	42.1	29.9	11.4	11.6	17.6	18.0	7.3
Level of Service	F	D			D	D	C	B	B	B	B	A
Approach Delay (s)		94.3			43.4			12.0			17.1	
Approach LOS		F			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱	↰	↑						↰	↱
Traffic Volume (vph)	0	547	655	768	649	0	0	0	0	16	4	321
Future Volume (vph)	0	547	655	768	649	0	0	0	0	16	4	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5						5.5	5.5
Lane Util. Factor		1.00	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
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1827	1568	1687	1863						1730	1599
Flt Permitted		1.00	1.00	0.20	1.00						0.96	1.00
Satd. Flow (perm)		1827	1568	348	1863						1730	1599
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)	0	564	675	792	669	0	0	0	0	16	4	331
RTOR Reduction (vph)	0	0	220	0	0	0	0	0	0	0	0	302
Lane Group Flow (vph)	0	564	455	792	669	0	0	0	0	0	20	29
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	3%	7%	2%	0%	0%	0%	0%	7%	0%	1%
Turn Type		NA	Perm	pm+pt	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			2	6								
Actuated Green, G (s)		60.0	60.0	127.0	127.0						13.0	13.0
Effective Green, g (s)		60.0	60.0	127.0	127.0						13.0	13.0
Actuated g/C Ratio		0.40	0.40	0.85	0.85						0.09	0.09
Clearance Time (s)		4.5	4.5	4.5	4.5						5.5	5.5
Vehicle Extension (s)		4.2	4.2	2.3	0.2						6.0	6.0
Lane Grp Cap (vph)		730	627	852	1577						149	138
v/s Ratio Prot		0.31		c0.39	0.36						0.01	c0.02
v/s Ratio Perm			0.29	c0.40								
v/c Ratio		0.77	0.73	0.93	0.42						0.13	0.21
Uniform Delay, d1		39.1	38.1	27.8	2.8						63.3	63.7
Progression Factor		1.00	1.00	1.07	1.03						1.00	1.00
Incremental Delay, d2		7.8	7.2	8.7	0.4						1.2	2.1
Delay (s)		46.9	45.3	38.5	3.2						64.5	65.8
Level of Service		D	D	D	A						E	E
Approach Delay (s)		46.0			22.3			0.0			65.7	
Approach LOS		D			C			A			E	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱	↰↰	↑						↰	↱
Traffic Volume (vph)	0	547	655	768	649	0	0	0	0	16	4	321
Future Volume (vph)	0	547	655	768	649	0	0	0	0	16	4	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5						5.5	5.5
Lane Util. Factor		1.00	1.00	0.97	1.00						1.00	1.00
Frpb, ped/bikes		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
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1827	1568	3273	1863						1730	1599
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		1827	1568	3273	1863						1730	1599
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)	0	564	675	792	669	0	0	0	0	16	4	331
RTOR Reduction (vph)	0	0	187	0	0	0	0	0	0	0	0	293
Lane Group Flow (vph)	0	564	488	792	669	0	0	0	0	0	20	38
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	3%	7%	2%	0%	0%	0%	0%	7%	0%	1%
Turn Type		NA	Perm	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			2									
Actuated Green, G (s)		25.5	25.5	26.5	56.5						8.5	8.5
Effective Green, g (s)		25.5	25.5	26.5	56.5						8.5	8.5
Actuated g/C Ratio		0.34	0.34	0.35	0.75						0.11	0.11
Clearance Time (s)		4.5	4.5	4.5	4.5						5.5	5.5
Vehicle Extension (s)		4.2	4.2	2.3	0.2						6.0	6.0
Lane Grp Cap (vph)		621	533	1156	1403						196	181
v/s Ratio Prot		0.31		c0.24	0.36						0.01	c0.02
v/s Ratio Perm			c0.31									
v/c Ratio		0.91	0.92	0.69	0.48						0.10	0.21
Uniform Delay, d1		23.6	23.7	20.7	3.6						29.8	30.2
Progression Factor		1.00	1.00	1.07	0.75						1.00	1.00
Incremental Delay, d2		19.5	22.9	1.2	0.9						0.6	1.6
Delay (s)		43.1	46.6	23.4	3.6						30.5	31.8
Level of Service		D	D	C	A						C	C
Approach Delay (s)		45.0			14.3			0.0			31.7	
Approach LOS		D			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	28.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

7: I-205 SB Ramps & 82nd Dr

Weekday PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↑	↱					↰	↱
Traffic Volume (vph)	0	547	655	0	649	768	0	0	0	16	4	321
Future Volume (vph)	0	547	655	0	649	768	0	0	0	16	4	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.0					5.5	5.5
Lane Util. Factor		1.00	1.00		1.00	1.00					1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	0.98					1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00					1.00	1.00
Frt		1.00	0.85		1.00	0.85					1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00					0.96	1.00
Satd. Flow (prot)		1827	1568		1863	1582					1730	1599
Flt Permitted		1.00	1.00		1.00	1.00					0.96	1.00
Satd. Flow (perm)		1827	1568		1863	1582					1730	1599
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)	0	564	675	0	669	792	0	0	0	16	4	331
RTOR Reduction (vph)	0	0	167	0	0	0	0	0	0	0	0	293
Lane Group Flow (vph)	0	564	509	0	669	792	0	0	0	0	20	38
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	3%	7%	2%	0%	0%	0%	0%	7%	0%	1%
Turn Type		NA	Perm		NA	Free				Split	NA	Prot
Protected Phases		2			6					4	4	4
Permitted Phases			2			Free						
Actuated Green, G (s)		56.5	56.5		56.5	75.0					8.5	8.5
Effective Green, g (s)		56.5	56.5		56.5	75.0					8.5	8.5
Actuated g/C Ratio		0.75	0.75		0.75	1.00					0.11	0.11
Clearance Time (s)		4.5	4.5		4.5						5.5	5.5
Vehicle Extension (s)		4.2	4.2		0.2						6.0	6.0
Lane Grp Cap (vph)		1376	1181		1403	1582					196	181
v/s Ratio Prot		0.31			0.36						0.01	0.02
v/s Ratio Perm			0.32			c0.50						
v/c Ratio		0.41	0.43		0.48	0.50					0.10	0.21
Uniform Delay, d1		3.3	3.4		3.6	0.0					29.8	30.2
Progression Factor		1.00	1.00		1.70	1.00					1.00	1.00
Incremental Delay, d2		0.9	1.1		0.4	0.4					0.6	1.6
Delay (s)		4.2	4.5		6.4	0.4					30.5	31.8
Level of Service		A	A		A	A					C	C
Approach Delay (s)		4.4			3.2			0.0			31.7	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection 7: I-205 Southbound Ramp Terminal/SE 82nd Drive	Approach															
Parameter	EB (West Leg): 82nd Dr				WB (East Leg): 82nd Dr				NB (South Leg): I-205 SB Ramps				SB (North Leg): I-205 SB Ramps			
INPUTS																
Lane Configuration																
Entry Lane(s) Configuration	LT, R				L, TR				LTR				LT, R			
(Note: This assumes 4 legs.)	Case:	2			Case:	3			Case:	1			Case:	2		
RT bypass configuration			Add Lane				None				None				Add Lane	
(Note: This is in addition to the entry lane(s))			Case:	3			Case:	1			Case:	1			Case:	3
Number of conflicting circ lanes	1	1			1	1				1			2	2		
Number of conflicting exit lanes for bypass lane (if used)																
Vehicular Volumes	U (v1U)	L (v1)	T (v2)	R (v3)	U (v4U)	L (v4)	T (v5)	R (v6)	U (v7U)	L (v7)	T (v8)	R (v9)	U (v10U)	L (v10)	T (v11)	R (v12)
Flow (veh/h)		0	547	655		768	649	0		0	0	0		16	4	321
% HV		0	4	3		7	2	0		0	0	0		7	0	1
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	0.97	0.97	0.97	0.97
Pedestrian Volumes (crossing leg)																
n_p	0				0				0				2			
Constants																
Time period, T (h)	0.25															
PCE for HV	2															
Default Values																
Lane volume assignment																
Case 4: LT, TR (bias to right lane)																
% Volume in left lane, right lane	0.47	0.53			0.47	0.53			0.47	0.53			0.47	0.53		
Case 5: L, LTR (bias to left lane)																
% volume in left lane, right lane	0.53	0.47			0.53	0.47			0.53	0.47			0.53	0.47		
Case 6: LTR, R (bias to right lane)																
% volume in left lane, right lane	0.47	0.53			0.47	0.53			0.47	0.53			0.47	0.53		
Capacity models																
Case 1: 1 confl lane																
Calibration parameters																
A (intercept)	1130	1130			1130	1130			1130	1130			1130	1130		
B (coefficient)	0.001	0.001			0.001	0.001			0.001	0.001			0.001	0.001		
Case 2: 2 confl lanes																
Calibration parameters																
A (intercept)	1130	1130			1130	1130			1130	1130			1130	1130		
B (coefficient)	0.00075	0.0007			0.00075	0.0007			0.00075	0.0007			0.00075	0.0007		
RT bypass, 1 confl lane (assumed same as Case 1 above)																
Calibration parameters																
A (intercept)	1130				1130				1130				1130			
B (coefficient)	0.001				0.001				0.001				0.001			
RT bypass, 2 confl lanes (assumed right lane, Case 2 above)																
Calibration parameters																
A (intercept)	1130				1130				1130				1130			
B (coefficient)	0.0007				0.0007				0.0007				0.0007			
SUMMARY																
Entry lane volume (veh/h)	567	0	675		809	651	N/A		N/A	0	N/A		21	0	331	
Entry lane capacity (veh/h)	458	458	N/A		1079	1079	N/A		N/A	618	N/A		355	382	N/A	
x (v/c ratio)	1.24	0.00	N/A		0.75	0.60	N/A		N/A	0.00	N/A		0.06	0.00	N/A	
Lane control delay (s/veh)	151.7	7.9	0.0		16.3	11.3	N/A		N/A	5.8	N/A		11.1	9.4	0.0	
Lane LOS	F	A	N/A		C	B	N/A		N/A	A	N/A		B	A	N/A	
Approach control delay (s/veh)	69.3				14.1				0.0				0.7			
Approach LOS	F				B				N/A				A			
Intersection control delay (s/veh)	35.0															
Intersection LOS	D															
95th percentile queue (veh)	22.9	0.0	N/A		7.4	4.2	N/A		N/A	0.0	N/A		0.2	0.0	N/A	

8: I-205 NB Ramps & 82nd Dr

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (vph)	347	247	15	1038	404	682
Future Volume (vph)	347	247	15	1038	404	682
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	5.5	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1810	1568	1805	1845	1752	1482
Flt Permitted	1.00	1.00	0.50	1.00	0.95	1.00
Satd. Flow (perm)	1810	1568	951	1845	1752	1482
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	365	260	16	1093	425	718
RTOR Reduction (vph)	0	48	0	0	0	391
Lane Group Flow (vph)	365	212	16	1093	425	327
Heavy Vehicles (%)	5%	3%	0%	3%	3%	9%
Turn Type	NA	Perm	Perm	NA	Prot	Prot
Protected Phases	2			6	8	8
Permitted Phases		2	6			
Actuated Green, G (s)	100.8	100.8	100.8	100.8	39.2	39.2
Effective Green, g (s)	100.8	100.8	100.8	100.8	39.2	39.2
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.26	0.26
Clearance Time (s)	4.5	4.5	4.5	4.5	5.5	5.5
Vehicle Extension (s)	0.2	0.2	4.2	4.2	2.3	2.3
Lane Grp Cap (vph)	1216	1053	639	1239	457	387
v/s Ratio Prot	0.20			c0.59	c0.24	0.22
v/s Ratio Perm		0.14	0.02			
v/c Ratio	0.30	0.20	0.03	0.88	0.93	0.84
Uniform Delay, d1	10.1	9.3	8.2	19.8	54.1	52.5
Progression Factor	0.07	0.01	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.3	0.1	9.3	25.2	15.0
Delay (s)	1.1	0.4	8.3	29.1	79.2	67.5
Level of Service	A	A	A	C	E	E
Approach Delay (s)	0.8			28.8	71.9	
Approach LOS	A			C	E	

Intersection Summary			
HCM 2000 Control Delay	39.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑↑	↰	↱
Traffic Volume (vph)	347	247	15	1038	404	682
Future Volume (vph)	347	247	15	1038	404	682
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.0	4.5	5.5	5.5
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1810	1568	1805	3505	1752	1482
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1810	1568	1805	3505	1752	1482
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	365	260	16	1093	425	718
RTOR Reduction (vph)	0	76	0	0	0	349
Lane Group Flow (vph)	365	184	16	1093	425	369
Heavy Vehicles (%)	5%	3%	0%	3%	3%	9%
Turn Type	NA	Perm	Prot	NA	Prot	Prot
Protected Phases	2		1	6	8	8
Permitted Phases		2				
Actuated Green, G (s)	37.3	37.3	1.4	42.7	22.3	22.3
Effective Green, g (s)	37.3	37.3	1.4	42.7	22.3	22.3
Actuated g/C Ratio	0.50	0.50	0.02	0.57	0.30	0.30
Clearance Time (s)	4.5	4.5	4.0	4.5	5.5	5.5
Vehicle Extension (s)	0.2	0.2	2.3	4.2	2.3	2.3
Lane Grp Cap (vph)	900	779	33	1995	520	440
v/s Ratio Prot	0.20		0.01	c0.31	0.24	c0.25
v/s Ratio Perm		0.12				
v/c Ratio	0.41	0.24	0.48	0.55	0.82	0.84
Uniform Delay, d1	11.9	10.7	36.4	10.1	24.5	24.7
Progression Factor	0.93	1.13	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.4	6.4	1.1	9.3	12.7
Delay (s)	11.8	12.5	42.8	11.2	33.8	37.4
Level of Service	B	B	D	B	C	D
Approach Delay (s)	12.1			11.7	36.0	
Approach LOS	B			B	D	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection 8: I-205 Northbound Ramp Terminal/SE 82nd Drive	Approach															
Parameter	EB (West Leg): 82nd Dr				WB (East Leg): 82nd Dr				NB (South Leg): I-205 NB Ramps				SB (North Leg): I-205 NB Ramps			
INPUTS																
Lane Configuration																
Entry Lane(s) Configuration	LTR				LT, TR				LT, R				LTR			
(Note: This assumes 4 legs.)	Case:	1			Case:	4			Case:	2			Case:	1		
RT bypass configuration			None				None				None				None	
(Note: This is in addition to the entry lane(s))			Case:	1			Case:	1			Case:	1			Case:	1
Number of conflicting circ lanes		1			1	1			1	1				2		
Number of conflicting exit lanes for bypass lane (if used)																
Vehicular Volumes	U (v1U)	L (v1)	T (v2)	R (v3)	U (v4U)	L (v4)	T (v5)	R (v6)	U (v7U)	L (v7)	T (v8)	R (v9)	U (v10U)	L (v10)	T (v11)	R (v12)
Flow (veh/h)		0	347	247		15	1038	1		404	0	682		0	0	0
% HV		0	5	3		0	3	0		3	0	9		0	0	0
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	0.94	0.94	0.94	0.94
Pedestrian Volumes (crossing leg)																
n_p	0				1				0				0			
Constants																
Time period, T (h)	0.25															
PCE for HV	2															
Default Values																
Lane volume assignment																
Case 4: LT, TR (bias to right lane)																
% Volume in left lane, right lane	0.47	0.53			0.47	0.53			0.47	0.53			0.47	0.53		
Case 5: L, LTR (bias to left lane)																
% volume in left lane, right lane	0.53	0.47			0.53	0.47			0.53	0.47			0.53	0.47		
Case 6: LTR, R (bias to right lane)																
% volume in left lane, right lane	0.47	0.53			0.47	0.53			0.47	0.53			0.47	0.53		
Capacity models																
Case 1: 1 confl lane																
Calibration parameters																
A (intercept)	1130	1130			1130	1130			1130	1130			1130	1130		
B (coefficient)	0.001	0.001			0.001	0.001			0.001	0.001			0.001	0.001		
Case 2: 2 confl lanes																
Calibration parameters																
A (intercept)	1130	1130			1130	1130			1130	1130			1130	1130		
B (coefficient)	0.00075	0.0007			0.00075	0.0007			0.00075	0.0007			0.00075	0.0007		
RT bypass, 1 confl lane (assumed same as Case 1 above)																
Calibration parameters																
A (intercept)	1130				1130				1130				1130			
B (coefficient)	0.001				0.001				0.001				0.001			
RT bypass, 2 confl lanes (assumed right lane, Case 2 above)																
Calibration parameters																
A (intercept)	1130				1130				1130				1130			
B (coefficient)	0.0007				0.0007				0.0007				0.0007			
SUMMARY																
Entry lane volume (veh/h)	N/A	627	N/A		526	594	N/A		430	768	N/A		N/A	0	N/A	
Entry lane capacity (veh/h)	N/A	1059	N/A		705	705	N/A		745	745	N/A		N/A	370	N/A	
x (v/c ratio)	N/A	0.59	N/A		0.75	0.84	N/A		0.58	1.03	N/A		N/A	0.00	N/A	
Lane control delay (s/veh)	N/A	11.2	N/A		22.3	30.4	N/A		14.1	64.8	N/A		N/A	9.7	N/A	
Lane LOS	N/A	B	N/A		C	D	N/A		B	F	N/A		N/A	A	N/A	
Approach control delay (s/veh)	11.2				26.6				46.6				0.0			
Approach LOS	B				D				E				N/A			
Intersection control delay (s/veh)	31.4															
Intersection LOS	D															
95th percentile queue (veh)	N/A	4.0	N/A		6.8	9.5	N/A		3.7	18.5	N/A		N/A	0.0	N/A	

APPENDIX I TECH MEMO #9: PLANNED AND FINANCIALLY CONSTRAINED TRANSPORTATION SYSTEM

KITTELSON & ASSOCIATES
610 SW ALDER STREET, SUITE 700
PORTLAND, OR 97205
P 503.228.5230 F 503.273.8169

TECHNICAL MEMORANDUM

Date:	July 21, 2017	Project #: 19890.6
To:	Jim Whynot and Jacque Betz, City of Gladstone Gail Curtis, Oregon Department of Transportation, Region 1	
From:	Matt Bell and Molly McCormick, Kittelson and Associates, Inc.	
Project:	Gladstone Transportation System Plan (TSP) Update	
Subject:	Final Tech Memo 9: Planned and Financially Constrained Transportation Systems (Subtask 6.6)	

The purpose of this memorandum is to identify the projects included in the planned and financially constrained transportation systems for the Gladstone Transportation System Plan (TSP) update. Previous technical memorandums documented existing and future transportation system needs, see *Tech Memo 6: Needs Analysis*, and potential solutions to address the needs, see *Tech Memo 8: TSP Solutions*. The consultant team combined the information provided in these and other technical memorandums to develop projects for the planned transportation system and identify priorities for the financially constrained transportation system based on the TSP goals and objectives and evaluation criteria, see *Tech Memo 2: Project Goals and Objectives and Evaluation Criteria*. The information provided in this memorandum was revised based on input from the project team and the general public. The projects identified in this memorandum for the planned and financially constrained transportation systems will be incorporated in the Gladstone TSP update.

PROJECT EVALUATION CRITERIA AND PRIORITIZATION

The project evaluation criteria were used to evaluate projects included in the planned transportation system and identify priorities for the financially constrained transportation system. The projects were identified as high, medium, and low priority projects based on how well they address the goals of the TSP update. The goals are documented in *Tech Memo 2* and summarized below.

- **Goal I: Safety** – Provide a safe and efficient multimodal transportation system that accommodates all members of the community.
- **Goal II: Mobility** – Provide a multimodal transportation system that is in a good state of repair and meets applicable state, regional, and local performance standards and targets.
- **Goal III: Accessibility** – Provide a multimodal transportation system that is accessible to all members of the community and minimizes out of direction travel.
- **Goal IV: Connectivity** – Provide a multimodal transportation system that increases connections to all areas of the City and works to overcome barriers to regional connectivity.

- **Goal V: Health** – Develop a transportation system that encourages active transportation and supports healthy and active choices for the community.
- **Goal VI: Coordination** – Develop a transportation system that is consistent with other state, regional, and local plans.
- **Goal VII: Financial Responsibility** – Invest in financially feasible infrastructure projects that will serve the city for years to come.

The evaluation criteria are included in Attachment A. Attachment A also indicates how the evaluation criteria were used to evaluate and prioritize the projects. A summary of the evaluations for the pedestrian, bicycle, and motor vehicle plan projects is included in Attachment B.

PLANNING LEVEL COST ESTIMATES

Planning level cost estimates were developed for the projects based on average unit costs for similar projects within the Pacific Northwest. The cost estimates help provide a realistic plan that reflects the City's financial forecast. The financially constrained plan was developed by identifying forecasted transportation funding (documented in *Tech Memo 3: TSP Financial Forecast*) and selecting higher priority projects from the planned system that can be funded with forecasted funds.

TRANSPORTATION FUNDING

The TSP will include a planned transportation system, which identifies all of the projects and programs needed to address all of the transportation needs within the city and a financially constrained transportation system, which identifies the projects and programs the City anticipates being able to fund over the next 23 years. The amount of local funds available for capital projects in the TSP is estimated to be approximately $3.4 million or roughly $150,000 per year.[1]

PLANNED TRANSPORTATION SYSTEM COST SUMMARY

Table 1 provides a summary of the full cost of the planned and financially constrained transportation systems. As shown, the full cost of the planned system is approximately $9.7 million over the 23 year period, including $3.3 million in high priority projects, 3.5 million in medium priority projects, and 2.9 million in low priority projects. Based on the anticipated funds available for capital improvement projects, **the financially constrained plan includes all of the high priority projects.** This leaves approximately $0.1 million in funding for the City to complete medium and low priority projects over the 23 year period.

---

[1] This number does not include potential additional funding from state and federal grants such as the Statewide Transportation Improvement Program (STIP) and Metro Regional Flexible Funds. While it is likely that these funds will be used to fund some transportation improvements within the city over the next 23 years, because of the uncertainty in acquiring grant funds, these funding sources are not accounted for in the City's revenue forecast.

Table 1: Planned Transportation System Cost Summary

Project Type	High Priority (Financially Constrained Plan Projects) (0-5 years)	Medium Priority (5-10 years)	Low Priority (10-23 years)	Total
Planned Transportation System				
TSMO[1]	$25,000	$25,000	$65,000	**$115,000**
TDM[1]	$50,000	$50,000	$165,000	**$265,000**
Land Use	$0	$75,000	$0	**$75,000**
Access Management	$0	$0	$75,000	**$75,000**
Safety	$50,000	$50,000	$0	**$100,000**
Pedestrian	$1,600,000	$2,410,000	$2,585,000	**$6,595,000**
Bicycle	$1,610,000	$150,000	$45,000	**$1,805,000**
Transit	$0	$85,000	$0	**$85,000**
Motor Vehicle	$5,000	$625,000	$0	**$630,000**
Total	**$3,340,000**	**$3,470,000**	**$2,935,000**	**$9,745,000**
Available Funding				
Total	$750,000	$750,000	$1,950,000	$3,450,000

TSMO: Transportation System Management and Operations
TDM: Travel Demand Management
1: Includes annual costs occurred every year.

TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS (TSMO) PLAN

Transportation System Management and Operations (TSMO) is a set of integrated transportation solutions intended to improve the performance of existing transportation infrastructure. Transportation Demand Management (TDM) and Transportation System Management (TSM) strategies are two complementary approaches to managing transportation and maximizing the efficiency of the existing system. TDM addresses the *demand* on the system: the number of vehicles traveling on the roadways each day. TDM measures include any method intended to shift travel demand from single occupant vehicles to non-auto modes or carpooling, travel at less congested times of the day, etc. TSM addresses the *supply* of the system: using strategies to improve the system efficiency without increasing roadway widths or building new roads. TSM measures are focused on improving operations by enhancing capacity during peak times, typically with advanced technologies to improve traffic operations.

Transportation System Management (TSM)

Transportation System Management (TSM) focuses on low cost strategies that can be implemented within the existing transportation infrastructure to enhance operational performance. Finding ways to better manage transportation while maximizing urban mobility and treating all modes of travel as a coordinated system is a priority. TSM strategies include traffic signal timing and phasing, traffic signal coordination, traffic calming, access management, local street connectivity and intelligent transportation systems (ITS). Traffic signal coordination and ITS typically provide the most significant tangible benefits to the traveling public. The primary focus of TSM measures are region-wide improvements, however there are a number of TSM measures that could be used in a smaller scale environment such as within the City of Gladstone. The following sections identify the TSM measures that could be implemented within the City of Gladstone. Table 2 summarizes the strategies that best meet the goals and objectives of the TSP update.

Table 2: Transportation System Management Projects and Programs

Project/Program Number	Name	Description	Priority	Cost Estimate
TSM1	Signal Retiming and Optimization	Update signal timing plans and coordinate signals to better match prevailing traffic conditions	High/Medium/Low	$5,000/year
TSM2	Transit Signal Priority	Work with ODOT to implement transit signal priority on OR 99E and SE 82nd Drive as needed	Medium	TBD
TSM3	Truck signal priority	Work with ODOT to implement truck signal priority on OR 99E and SE 82nd Drive as needed	Low	TBD
			TOTAL High Priority Costs	**$25,000**
			TOTAL Medium Priority Costs	**$25,000**
			TOTAL Low Priority Costs	**$65,000**
			TOTAL Program Costs (23 years)	**$115,000**

Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is a policy tool as well as a general term used to describe any action that removes single occupant vehicle trips from the roadway during peak travel demand periods. As growth in the City of Gladstone occurs, the number of vehicle trips and travel demand in the area will also increase. The ability to change a user's travel behavior and provide alternative mode choices will help accommodate this potential growth in trips.

Tech Memo 8 identifies several policies and programs that may be effective for managing transportation demand in the City of Gladstone, especially within the next 10 to 20 years. Table 3 summarizes the strategies that best meet the goals and objectives of the TSP update. As with all new public and private investments, the implementation of TDM strategies is sure to draw opposition from some. Given Gladstone's lack of experience with TDM strategies, it is important that decision-makers understand their long-term costs and benefits and are able evaluate these along-side arguments from opponents in achieving outcomes that best reflect the City's vision and goals while effectively reducing travel demand.

Table 3: Transportation Demand Management Program Strategies

Program/Project Number	Name	Description	Priority	Cost Estimate
TDM1	Carpool Match Services Service	Work with Metro to coordinate a rideshare/carpool program that regional commuters can use to find other commuters with similar routes to work	High/Medium/Low	$5,000/year
TDM2	Collaborative Marketing	Work with nearby cities, employers, transit service providers, and developers to collaborate on marketing for transportation options that provide an alternative to single-occupancy vehicles	High/Medium/Low	$5,000/year
TDM3	Limited and/or Flexible parking Requirements	Refine the City's current parking policy to include strategies that encourage multi-modal transportation	Low	$25,000

TDM4	Parking Management	Modify the City's current parking policy to impose time limits in commercial areas and allow for the potential to charge for parking	Low	$10,000
			TOTAL High Priority Costs	**$50,000**
			TOTAL Medium Priority Costs	**$50,000**
			TOTAL Low Priority Costs	**$100,000**
			TOTAL Program Costs (23 years)	**$265,000**

Other potential TDM projects include:

- Support continued efforts by TriMet, Metro, ODOT, and Clackamas County to develop productive TDM measures that reduce commuter vehicle miles and peak hour trips.
- Encourage the development of high speed communication in all part of the city (fiber optic, digital cable, DSL, etc). The objective would be to allow employers and residents the maximum opportunity to rely upon other systems for conducting business and activities than the transportation system during peak periods.
- Encourage developments that effectively mix land uses to reduce vehicle trip generation. These plans may include development linkages (particularly non-auto) that support greater use of alternative modes.

Land Use

The types and intensities of land uses are closely correlated with travel demand. Land use patterns in many areas of the city are suburban in nature with low densities in the northern part of the city and more moderate densities in the southern part of the city near OR 99E. In the future the city will continue to have a mixture of housing densities as well as areas of mixed use development (i.e., a mix of residential, retail, commercial and/or office uses). Tech Memo 8 identifies several land use strategies that could be implemented in Gladstone. Table 4 summarizes the strategies that best meet the goals and objectives of the TSP update.

Table 4: Land Use Projects

Project Number	Name	Description	Priority	Cost Estimate
LU1	Commercial Nodes	Revise existing zoning map to include more commercial nodes in residential areas	Medium	$25,000
LU2	Mixed Use Development	Modify city policies and/or development code to encourage mixed use developments in commercial areas and/or future town centers	Medium	$25,000
LU3	Alternative Mobility Standards	Work with ODOT to develop alternative mobility standards on OR 99E and at the I-205 interchanges ramps in order to accommodate higher density development patterns along the corridors	Medium	$25,000
			TOTAL Medium Priority Costs	**$75,000**
			TOTAL Program Costs (23 years)	**$75,000**

Neighborhood Traffic Management (NTM)

Neighborhood Traffic Management (NTM) is a term that has been used to describe traffic control devices typically used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic. NTM is commonly referred to as traffic calming because of its ability to reduce travel speeds and improve neighborhood livability. The City of Gladstone has implemented NTM in locations throughout the city; however, there they do not have a formal process for implementation.

The City has an established traffic safety committee that meets on a monthly basis to discuss traffic safety issues within the city. The City could work with the committee to establish a formal process for NTM implementation that starts with the identification of a concern by citizens, after which the committee could review the situation and conduct a speed/volume survey if warranted to obtain necessary data. Once the concern has been identified and classified, the committee could recommend appropriate follow-up action. There are many different NTM options available to the committee, including various education, enforcement, and engineering solutions. If it is determined that an engineering solution is required, the committee could forward their information to engineering staff for follow-up and budgeting as appropriate. The implementation of the selected NTM solution may be funded by the city and/or the concerned citizens.

While no specific NTM projects are identified for the TSP update, they are an important part of the City’s ongoing effort to improve livability. Any future NTM projects should include coordination with emergency agency staff to ensure public safety is not compromised. NTM engineering solutions are limited to local streets. Implementation of NTM solutions that limit traffic on collector and arterial streets is counterproductive and can lead to cut through traffic onto local streets. NTM is also restricted on collector and arterial street to avoid conflicts with emergency access/public safety as well as conflicts with public transit.

ACCESS MANAGEMENT PLAN

Access management is a set of measures regulating access to streets, roads, and highways, from public roads and private driveways. Access management is a policy tool which seeks to balance mobility, the need to provide efficient, safe and timely travel with the ability to allow access to individual properties. Proper implementation of access management techniques should guarantee reduced congestion, reduced accident rates, less need for roadway widening, conservation of energy, and reduced air pollution. Measures may include but are not limited to restrictions on the type and amount of access to roadways, and use of physical controls, such as signals and channelization including raised medians, to reduce impacts of approach road traffic on the main facility.

The City’s current access management policy is limited; however, maintains and enhances the integrity (capacity, safety, and level of service) of city streets. Numerous driveways or street intersections increase the number of conflicts and potential for collisions and decrease mobility and traffic flow. The City of Gladstone, as with every city, needs a balance of streets that provide access with streets that serve mobility. *Tech Memo 8* identifies a number of potential access management techniques and strategies that help to preserve transportation system investments and guard against deteriorations in safety and increased congestion. Table 5 summarizes the projects that best meet the goals and objectives of the TSP update.

Table 5: Access Management Projects

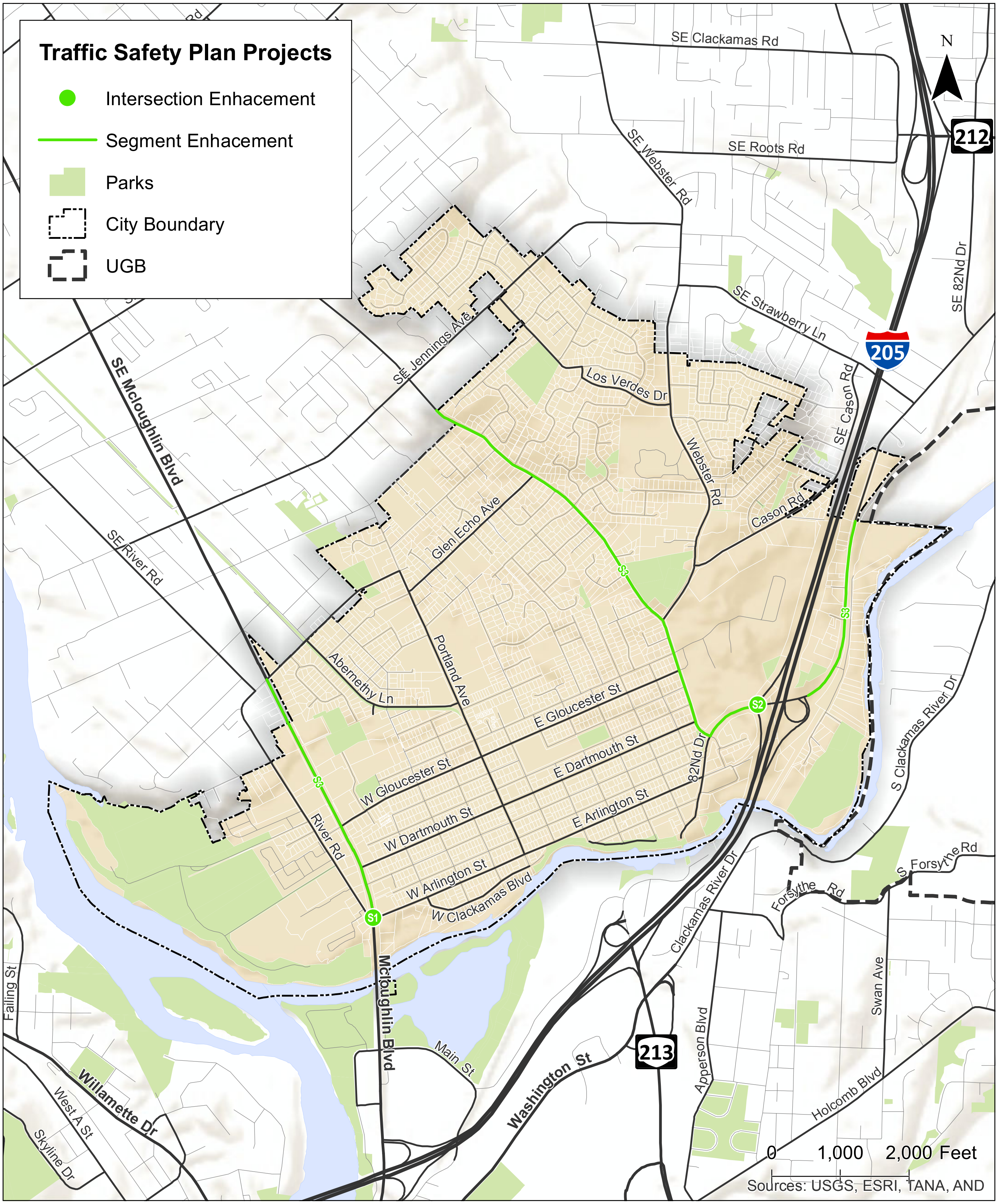
Project Number	Name	Description	Priority	Cost Estimate
AM1	Access Spacing Standard Modification	Modify city-wide access spacing standards according to a roadway's jurisdiction and functional classification	Low	$25,000
AM2	Access Variance Process	Define a variance process for when the standard cannot be met	Low	$25,000
AM3	Access Consolidation	Establish an approach for access consolidation over time	Low	$25,000
			TOTAL Low Priority Costs	**$75,000**
			TOTAL Program Costs (23 years)	**$75,000**

TRAFFIC SAFETY PLAN

Traffic safety has a significant impact on how people use the transportation system within Gladstone, particularly in areas where real or perceived safety risks prevent people from using more active travel modes, such as walking, biking, and taking transit. The traffic safety solutions identified in *Tech Memo 8* are largely focused on systemic issues that occur along roadways and at intersections throughout the city. While projects that address these issues have not been identified for the TSP update, a toolkit that includes a variety of potential treatments the city can implement will be developed for the TSP update. Table 6 identifies the traffic safety projects that will be included in the Gladstone TSP update. Additional safety projects and improvements are identified as part of the pedestrian, bicycle, transit, and motor vehicle plans later in this memorandum. Figure 1 illustrates the traffic safety plan projects.

Table 6: Traffic Safety Plan Projects

Project Number	Location	Description	Priority	Cost Estimate
S1	OR 99E/Arlington Street	Reconfigure the westbound approach to include a separate left-turn lane with protected phasing and a shared through-right-turn lane and reconfigure the eastbound approach to restrict the left-turn movement.	High	$40,000
S2	I-205 Southbound Ramp Terminal/SE 82nd Drive	Reconfigure the southbound approach to the intersection to improve sight distance for the southbound right-turn movement – Coordinate with Project M3	High	$10,000
S3	City-wide	Evaluate traffic safety along OR 99E, Oatfield Road, and SE 82nd Drive to identify appropriate countermeasures	Medium	$50,000
			TOTAL High Priority Costs	**$50,000**
			TOTAL Medium Priority Costs	**$50,000**
			TOTAL Program Costs (23 years)	**$100,000**



H:\19\19890 - Gladstone TSP Update\gis\TM901 Traffic Safety Plan.mxd - mbell - 11:26 AM 7/21/2017

Traffic Safety Plan Projects
Gladstone, Oregon

Figure
1

KITTELSON & ASSOCIATES

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

PEDESTRIAN PLAN

A majority of city streets currently have sidewalks on both sides of the roadway, with a few exceptions. Therefore, the pedestrian plan includes several projects to fill-in the gaps in the sidewalks along the city's arterial and collector streets and a few local streets that provide access to essential destinations such as schools, parks, churches, etc. The pedestrian plan also includes several enhanced pedestrian crossings as well as multi-use paths, trails, and accessways that augment and support the pedestrian system.

Table 7 identifies the pedestrian plan projects for the Gladstone TSP update. As shown, the projects are separated into projects on arterials, collectors, and local streets as well as projects at intersections and in other locations throughout the city. The priorities shown in Table 7 are based on the project evaluation criteria as well as input from the project team and the general public. The cost estimates are based on average unit costs for roadway improvements. Figure 2 illustrates the location of the pedestrian plan projects.

Table 7: Pedestrian Plan Projects

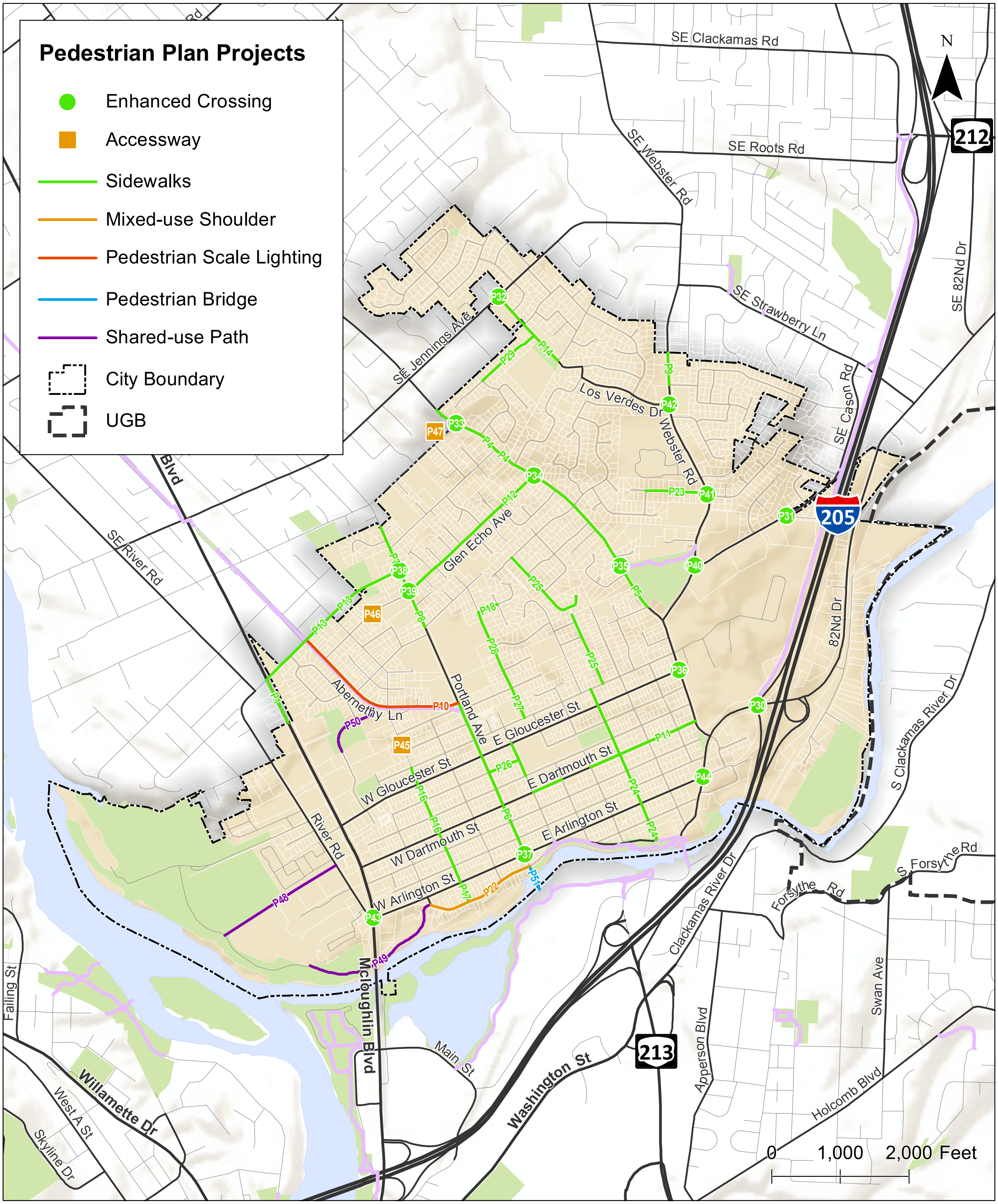
Location		Type	Project	Priority	Cost Estimate
Arterials					
P1	OR 99E	Sidewalks - Fill in gaps	Fill in the gap on the west side of the roadway, south of Glen Echo Avenue	Medium	$50,000
P2[1]	OR 99E	Landscaping	Plant street trees on both sides of OR 99E within the existing landscape strips. (Note: ODOT Permits are required for street trees)	Medium	$95,000
P3[1]	OR 99E	Speed reduction	Reduce the posted speed limit to 35 mph, subject to ODOT approval	Medium	$5,000
P4	Oatfield Road	Sidewalks - Fill in gaps	Fill in the gaps on the north side of the roadway from Park Way to the north city limits	High	$130,000
P5	Oatfield Road	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from Kenmore Street to the north city limits	Medium	$485,000
P6	Portland Avenue	Widen Sidewalks	Widen the sidewalks on both sides of the roadway from Arlington Street to Abernathy Lane	High	0[1]
P7	Portland Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the east side of the roadway from Nelson Lane to north city limits	Low	$235,000
P8	Portland Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the west side of the roadway from Nelson Lane and north city limits	Low	$50,000
P9	Webster Road	Sidewalks - Fill in gaps	Fill in the gaps on the east side of the roadway from Charolais Drive to the north city limits	Low	$55,000
Collectors					
P10	Abernathy Lane	Lighting	Install pedestrian-scale lighting on the shared-use path	Low	$175,000
P11	Dartmouth Street	Sidewalks - Fill in gaps	Fill in the gaps on the north side of the roadway from Chicago Avenue to Harvard Street and from Yale Avenue to Oatfield Road	Low	$260,000
P12	Glen Echo Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the north side of the roadway from OR 99E to Oatfield Road	Low	$515,000
P13	Glen Echo Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from OR 99E to Oatfield Road	Low	$460,000

Location		Type	Project	Priority	Cost Estimate
P14	Los Verdes Drive/Valley View Road	Sidewalks - Fill in gaps	Fill in the gaps on the north side of the roadway from Valley View Road to Jennings Avenue	Low	$120,000
P15	Los Verdes Drive/Valley View Road	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from Valley View Road to Jennings Avenue	Low	$15,000
Local Streets					
P16	Beatrice Avenue	New sidewalks	Install sidewalks on the east side of the roadway from Clackamas Boulevard to Ipswich Street	Medium	$240,000
P17	Beatrice Avenue	New sidewalks	Install sidewalks on the west side of the roadway from Clackamas Boulevard to Ipswich Street	Medium	$215,000
P18	Beverly Lane	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from Harvard Avenue to Beverly Drive	Low	$35,000
P19	Chicago Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the east side of the roadway from Hereford Street and Exeter Street	Medium	$60,000
P20	Chicago Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the west side of the roadway from Hereford Street and Exeter Street	Medium	$95,000
P22	Clackamas Boulevard	Mixed-use Shoulder	Install a mixed-use shoulder on the south side of the roadway from Portland Avenue to Arlington Street	Low	$310,000
P23	Clayton Way	Sidewalks - Fill in gaps	Fill in the gaps on both sides of the roadway from roadway terminus to Webster Road	Low	$135,000
P24	Cornell Avenue	New sidewalks	Install new sidewalks on the east side of the roadway from Clackamas Boulevard to Collins Crest Street	Medium	$390,000
P25	Cornell Avenue	New sidewalks	Install new sidewalks on the west side of the roadway from Clackamas Boulevard to Collins Crest Street	Medium	$455,000
P26	Fairfield Street	Sidewalks - Fill in gaps	Fill in the gaps on the south side of the roadway from Portland Avenue and Chicago Avenue	Low	$50,000
P27	Harvard Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the east side of the roadway from Hereford Street and Beverly Lane and adjacent to Gladstone High School	Medium	$145,000
P28	Harvard Avenue	Sidewalks - Fill in gaps	Fill in the gaps on the west side of the roadway from Hereford Street and Beverly Lane and adjacent to Gladstone High School	Medium	$175,000
P29	Oakridge Drive	Sidewalks - Fill in gaps	Fill in gaps on both sides of the roadway from Quail Court to Valley View Road	Low	$70,000
Intersections					
P30	SE 82nd Drive/ I-205 SB Ramp Terminal	Enhanced crossing	Install an enhanced pedestrian crossing in the southwest corner of the intersection with high visibility pavement markings and signs and RRFBs or traffic signal	High	$85,000
P31	Cason Road/ Ohlson Road	Enhanced crossing	Install an enhanced pedestrian crossing	High	$25,000
P32	Jennings Avenue/ Valley View Road	Enhanced crossing	Install an enhanced pedestrian crossing	High	$25,000
P33	Oatfield Road/ Hull Road	Enhanced Crossing	Install an enhanced pedestrian crossing with high visibility pavement markings and signs and RRFBs – Coordinate with Project P47	High	$65,000
P34	Oatfield Road/ Glen Echo Avenue	Enhanced crossing	Install an enhanced pedestrian crossing with raised median islands, high visibility pavement markings and signs, and RRFBs	High	$85,000

Location		Type	Project	Priority	Cost Estimate
P35	Oatfield Road/ Shared-use Path	Enhanced crossing	Install an enhanced pedestrian crossing with raised median islands, high visibility pavement markings and signs, and RRFBs	High	$85,000
P36	Oatfield Road/ Gloucester Street	Enhanced crossing	Install an enhanced pedestrian crossing with high visibility pavement markings and signs and RRFBs	High	$65,000
P37	Portland Avenue/ Arlington Street	Enhanced crossing	Install an enhanced pedestrian crossing	High	$25,000
P38	Portland Avenue/Glen Echo Avenue (North)	Enhanced crossing	Install an enhanced pedestrian crossing – Coordinate with Project B37	High	$25,000
P39	Portland Ave/ Glen Echo Ave (South)	Enhanced crossing	Install an enhanced pedestrian crossing – Coordinate with Project B38	High	$25,000
P40	Webster Road/ Cason Road	Enhanced crossing	Install an enhanced pedestrian crossing with raised median islands, high visibility pavement markings and signs, and RRFBs. Also, reduce curb radii in the northeast corner of the intersection	High	$85,000
P41	Webster Road/ Clayton Way	Enhanced crossing	Install an enhanced pedestrian crossing with high visibility pavement markings and signs and RRFBs	High	$65,000
P42	Webster Road/ Los Verdes Drive	Enhanced crossing	Install an enhanced pedestrian crossing with high visibility pavement markings and signs and RRFBs	High	$65,000
P43	SE 82nd Drive/ Arlington Street	Enhanced crossing	Install an enhanced pedestrian crossing with raised median islands, high visibility pavement markings and signs, and RRFBs	High	$85,000
P44	OR 99E/ Arlington Street	Enhanced crossing	Modify the signal timing to provide leading pedestrian intervals at all protected approaches	High	$15,000
P45[1]	Portland Ave	Enhanced crossing	Install curb extensions along Portland Avenue at every major intersection and mid-block between Arlington Street and Nelson Lane (up to 15 locations)	High	$375,000
Off-street Improvements					
P45	Beatrice Avenue Accessway	Accessway	Install a new accessway that connects Beatrice Avenue from Ipswich Street to W Jersey Street	Low	$25,000
P46	Duniway Avenue Accessway	Accessway	Install a new accessway that connects Duniway Avenue (east) and Duniway Avenue (west)	Low	$25,000
P47	Hull Avenue Accessway	Accessway	Install a new accessway that connects Hull Road to Oatfield Road – Coordinate with Project P34	Low	$50,000
P48	Jenson Road Shared-use Path	Shared-use Path	Maintain the shared-use path on the Jenson Road right-of-way and install wayfinding signs and pedestrian scale lighting	High	$5,000
P49	Shared-use Path under OR 99E	Shared-use Path	Install a shared-use path from Clackamas Boulevard to Dahl Park Road	High	$150,000
P50	Olson Wetlands Shared-use Path	Shared-use Path	Install a shared-use path from Abernathy Court to Risley Avenue.	High	$115,000
P51	Trolley Trail Bridge	Bridge	Install a pedestrian bridge across the Clackamas River to Oregon City – Coordinate with City of Oregon City on design and development of Bridge	High	$0[2]

Location	Type	Project	Priority	Cost Estimate
TOTAL High Priority Costs				**$1,600,000**
TOTAL Medium Priority Costs				**$2,410,000**
TOTAL Low Priority Costs				**$2,585,000**
TOTAL Program Costs (23 years)				**$6,595,000**

1. Project not shown on Pedestrian Plan Map
2. Project to be funded by others



Pedestrian Plan Projects
Gladstone, Oregon

Figure
2

H:\19\19890 - Gladstone TSP Update\gis\TM9\02 Pedestrian Plan Projects.mxd - mbell - 11:06 AM 7/21/2017

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

BICYCLE PLAN

On-street bike lanes and other bicycle facilities are currently provided on a few major roadways within the city. Therefore, the bicycle plan includes several projects along the city's arterial and collector streets and a few local streets that provide direct access to essential destinations. The bicycle plans also includes several enhanced bicycle crossings as well as other off-street amenities that augment and support the bicycle system.

Table 8 identifies the bicycle plan projects for the Gladstone TSP update. As shown, the projects are separated into projects on arterials, collectors, and local streets as well as projects at intersections and in other locations throughout the city. The priorities shown in Table 8 are based on the project evaluation criteria as well as input from the project team and the general public. The cost estimates are based on average unit costs for roadway improvements. Figure 3 illustrates the location of the bicycle plan projects.

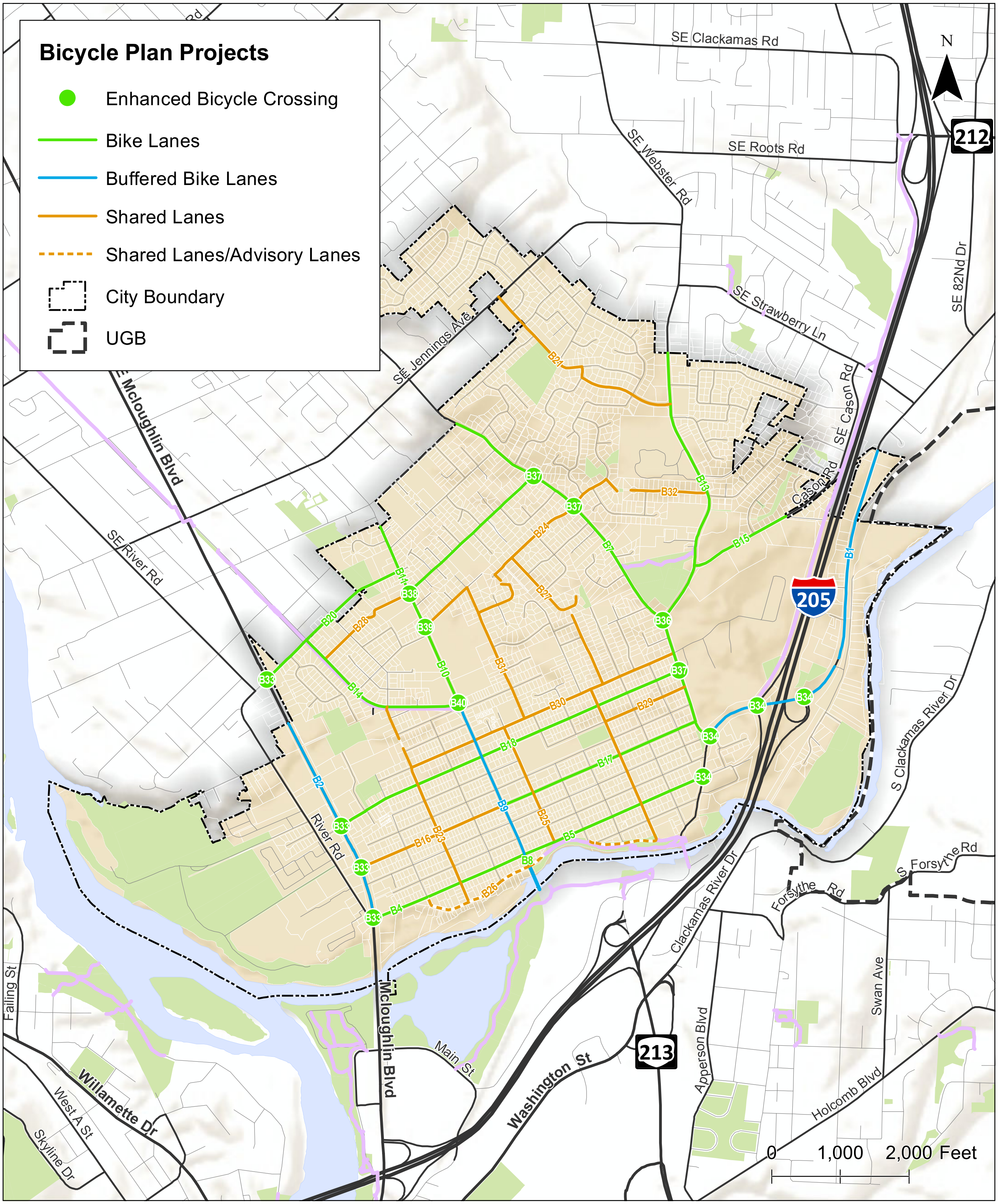
Table 8: Bicycle Plan Projects

Location		Type	Project	Priority	Cost Estimate
Arterials					
B1	SE 82nd Drive	Buffered Bike lanes	Reduce the travel lane width and install buffered bike lanes on both sides of the roadway from Oatfield Road to the north city limits	High	$105,000
B2	OR 99E	Buffered Bike lanes	Reduce the travel lane width and install buffered bike lanes on both sides of the roadway	High	$70,000
B3[1]	Arlington Street	Alternative route	Establish an alternative route along Clackamas Boulevard with wayfinding signs and pavement markings – this project is an interim improvement until implementation of Project B4 is	High	$5,000
B4	Arlington Street	Bike lanes	Remove parking from both sides of the roadway from OR 99E to Clackamas Boulevard and install on-street bike lanes	Medium	$10,000
B5	Arlington Street	Bike lanes	Widen the roadway OR remove on-street parking and install on-street bike lanes on both sides of the roadway from Clackamas Boulevard to SE 82nd Drive	Medium	$50,000[2]
B6[1]	Oatfield Road	Speed reduction	Reduce the posted speed limit to 30 mph	Medium	$5,000
B7	Oatfield Road	Bike lanes	Reduce the travel lane width and install wider bike lanes on both sides of the roadway	High	$75,000
B8	Portland Avenue	Bike lanes	Remove the center two-way left-turn lane and install on-street bike lanes on both sides of the roadway from Clackamas Boulevard to Arlington Street	High	$5,000
B9	Portland Avenue	Buffered Bike lanes	Remove the center two-way left-turn lane and install on-street buffered bike lanes on both sides of the roadway from Arlington Street to Abernathy Lane	High	$5,000
B10	Portland Avenue	Bike lanes	Remove the center two-way left-turn lane and install on-street bike lanes on both sides of the roadway from Abernathy Lane to Nelson Lane	High	$15,000
B11	Portland Avenue	Bike lanes	Widen the roadway and install on-street bike lanes on both sides of the roadway from Nelson Lane to the north city limits	High	$265,000
B12[1]	Webster Road	Speed reduction	Reduce the posted speed limit to 30 mph	Medium	$5,000
B13	Webster Road	Bike lanes	Reduce the travel lane width and install wider bike lanes on both sides of the roadway	High	$55,000

Location		Type	Project	Priority	Cost Estimate
Collectors					
B14	Abernathy Lane	Bike lanes	Install bike lanes on the north side of the roadway adjacent to the parking lane	High	$25,000
B15	Cason Road	Bike lanes	Restripe the on-street bike lanes at the east leg of the Webster Road/Cason Road intersection and install bike symbols	High	$5,000
B16	Dartmouth Street	Shared lane	Install shared lane pavement marking and signs from OR 99E to Portland Avenue	Low	$20,000
B17	Dartmouth Street	Bike lanes	Install on-street bike lanes from Portland Avenue to Oatfield Road	High	$55,000
B18	Gloucester Street	Bike lanes	Widen the roadway OR remove on-street parking and install on-street bike lanes on both sides of the roadway	High	$70,000[2]
B19[1]	Glen Echo Avenue	Speed reduction	Reduce the posted speed limit to 25 mph	Medium	$5,000
B20	Glen Echo Avenue	Bike lanes	Widen the roadway and/or remove on-street parking and install on-street bike lanes on both sides of the roadway	High	$650,000[2]
B21	Los Verdes Drive/Valley View Road	Shared lane	Install shared lane pavement markings and signs from Webster Road to Jennings Avenue	Low	$20,000
B22[1]	River Road	Signage	Install a “Bike Lane Ends” sign at the south-eastbound approach to OR 99E	Medium	$5,000
Local Streets					
B23	Beatrice Avenue	Shared lane	Install shared lane pavement markings and signs from Abernathy Lane to Clackamas Boulevard – Coordinate with Project P43	High	$20,000
B24	Beverly Lane/Collins Crest	Shared lane	Install shared lane pavement markings and signs from Harvard Avenue to Oatfield Road	Medium	$5,000
B25	Chicago Avenue	Shared lane	Install shared lane pavement markings and signs from Hereford Street to Arlington Street	Medium	$15,000
B26	Clackamas Boulevard	Shared lane/ Advisory Lane	Install shared lane pavement markings and signs OR advisory lanes from Arlington Road to 82nd Drive	High	$15,000
B27	Cornell Avenue	Shared lane	Install shared lane markings and signs from Clackamas Boulevard to Collins Crest	High	$35,000
B28	Duniway Avenue	Shared lane	Install shared lane markings and signs from Abernathy Lane to Portland Avenue – Coordinate with Project P42	High	$5,000
B29	Fairfield Street	Shared lane	Install shared lane markings and signs from Cornell Avenue to Oatfield Road	Low	$5,000
B30	Hereford Street	Shared lane	Install shared lane markings and signs from Beatrice Avenue to Oatfield Road	Medium	$25,000
B31	Nelson Lane/Harvard Avenue	Shared lane	Install shared lane markings and signs from Portland Avenue to Hereford Street	Medium	$15,000
B32	Ridgegate Drive/Penny Court/Clayton Way	Shared lane	Install shared lane markings and signs from Oatfield Road to Webster Road	Medium	$10,000
Intersections					
B33	OR 99E	Enhanced crossing	Install skip striping along OR 99E through all major intersections with green paint in all conflict areas	High	$15,000
B34	SE 82nd Drive	Enhanced crossing	Install skip striping along 82nd Drive through all major intersections with green paint in all conflict areas	High	$20,000

Location		Type	Project	Priority	Cost Estimate
B36	Oatfield Road/ Webster Road	Enhanced crossing	Reconfigure the intersection to facilitate bicycle turning movements. Also, reduce the curb radii in the northeast corner of the intersection.	High	$35,000
B37	Oatfield Road	Enhanced crossing	Install skip striping along Oatfield Road through all major intersections with green paint in all conflict areas	High	$15,000
B37	Portland Ave/ Glen Echo Ave (North)	Enhanced crossing	Install an enhanced bicycle crossing to facilitate travel along Glen Echo Avenue across Portland Avenue	High	$15,000
B38	Portland Ave/ Glen Echo Ave (South)	Enhanced crossing	Install an enhanced bicycle crossing to facilitate travel along Glen Echo Avenue across Portland Avenue	High	$15,000
B39	Portland Ave/ Abernathy Ln	Enhanced crossing	Install an enhanced bicycle crossing to facilitate travel to/from the Trolley Trail along Abernathy Lane	High	$15,000
				TOTAL High Priority Costs	**$1,610,000**
				TOTAL Medium Priority Costs	**$150,000**
				TOTAL Low Priority Costs	**$45,000**
				TOTAL Program Costs (23 years)	**$1,805,000**

1. Project not shown on Bicycle Plan Map
2. Cost estimate assumes removal of on-street parking



Bicycle Plan Projects
Gladstone, Oregon

Figure
3

KITTELSON & ASSOCIATES

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

TRANSIT PLAN

Public transit can provide important connections to destinations for people that do not drive or bike and can provide an additional option for all transportation system users. Public transit complements walking, bicycling, or driving trips: users can walk to and from transit stops and their homes, shopping or work places, people can drive to park-and-ride locations to access a bus, or people can bring their bikes on transit vehicles and bicycle from a transit stop to their final destination.

Providing transit service in smaller cities is generally led by a local or regional transit agency, and relies on appropriate land uses and densities that can support transit service. The city can plan for transit-supportive land use patterns and support future transit viability by designing and building streets that will comfortably accommodate transit stops and include the right-of-way that could allow for transit stops to be located as close as possible to important destinations in the city. At a minimum, a transit stop should be well-signed and have a comfortable space to wait. Benches and shelter from the weather can improve user comfort, and including bike parking near bus stops allows people to leave their bike at one trip-end instead of taking it with them on the bus.

The City of Gladstone can support improved transit service by providing easy and safe walking and bicycling connections between key roadways, neighborhoods, and local destinations by providing amenities, such as shelters and benches, at transit stops, by encouraging an appropriate mix and density of uses that support public transit, and by providing and planning for park-and-ride locations. Table 9 summarizes the transit plan identified for Gladstone.

Table 9: Transit Plan

Project Number	Location	Agency Responsible	Description	Priority	Cost Estimate
T1	City-wide	City/TriMet	Coordinate with TriMet on new and re-routed fixed-route service identified in the TriMet Service Enhancement Plan for Southeast	Medium	$0[1]
T2	City-wide	City/TriMet	Coordinate with TriMet to install shelter and other amenities at bus stops consistent with TriMet Bus Stop Guidelines	Medium	$25,000
T3	City-wide	City/TriMet	Identify a location for a new park-and-ride facility	Medium	$50,000
T4	OR 99E/Arlington Street	City/TriMet	Relocate the southbound transit stop to the far side of the intersection	Medium	<$5,000
T5	Webster Road/Clayton Way	City/TriMet	Install a no-parking/bus zone sign along the west side of Webster Road	Medium	<$5,000
				TOTAL Medium Priority Costs	**$85,000**
				TOTAL Program Costs (23 years)	**$85,000**

1. Project to be funded by others.

MOTOR VEHICLE PLAN

The street system within Gladstone is largely built-out and there are few opportunities to construct new roadways. There are also few operational issues under existing and projected future traffic conditions. Therefore, the Motor Vehicle Plan includes projects to increase the efficiency of the transportation system through changes in the functional classification of roadways, development of roadways standards and standard cross sections, improvements to street system connectivity, and improvements to the capacity of key intersections.

Functional Classification

The proposed changes to the functional classification of roadways within Gladstone were determined based on a review of the existing Gladstone TSP and other regional plans as well as direction provided by City staff. Several of the changes have been proposed to better align the classifications with the intended use of the roadways. These changes primarily lower the roadway's classification from arterial to collector or from collector to local. Figure 4 and Table 10 summarize the proposed changes in functional classification.

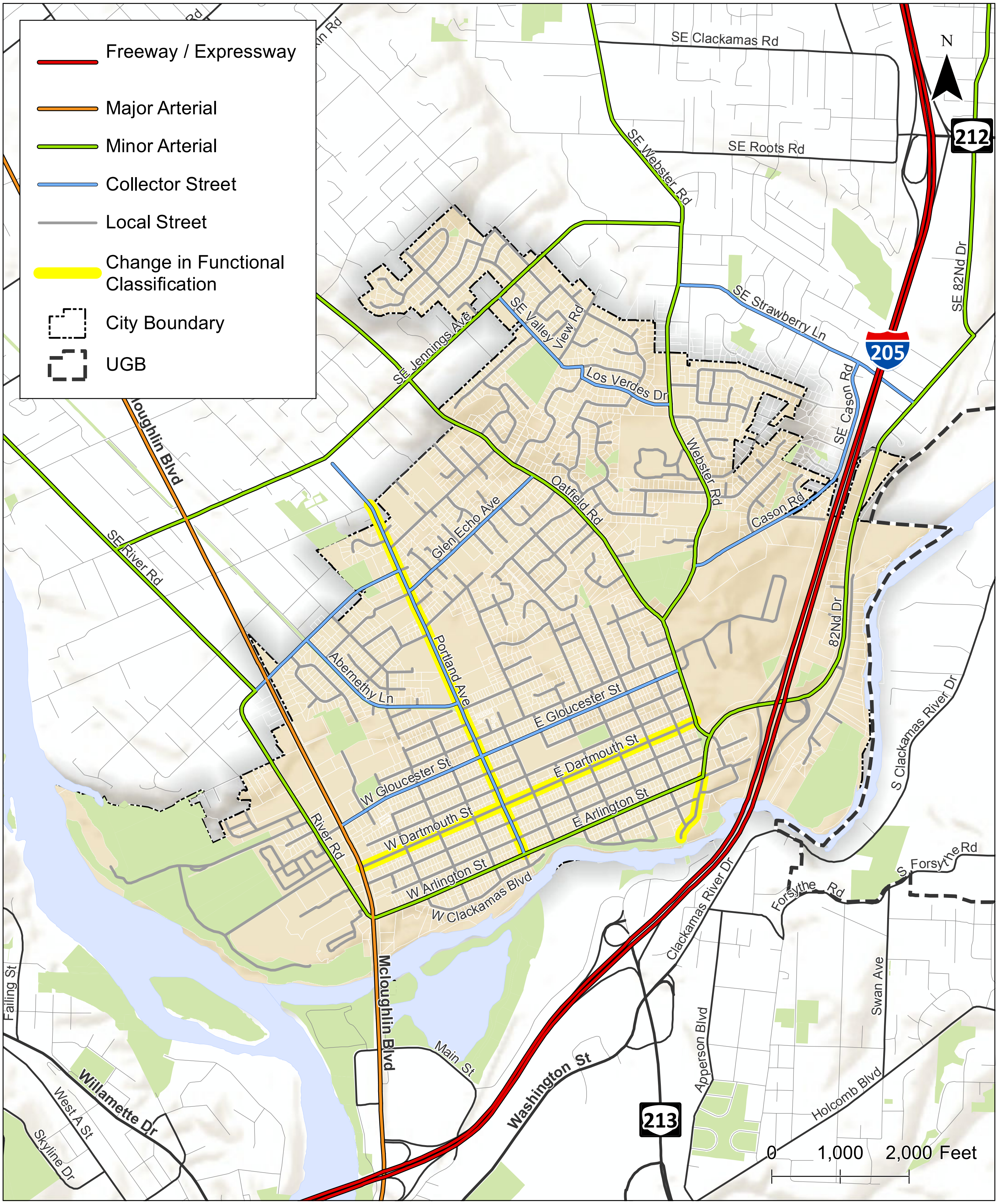
Table 10: Proposed Changes in Functional Classification

Street	Segment	Existing Classification	Future Classification
Portland Avenue	Arlington Street to north City limits	Arterial	Collector
SE 82nd Drive	Arlington Street to southern terminus	Arterial	Local
Dartmouth Street	OR 99E to Oatfield Road	Collector	Local

The proposed changes in functional classification shown in Figure 4 and Table 10 will impact the design and function of the roadways as well as the types of treatments that can be considered to manage traffic. The proposed changes in functional classification will be evaluated further by the project team and the general community prior to inclusion in the TSP update.

Roadway Cross Section Standards

Roadway cross section standards were developed for the Gladstone TSP update based on the characteristics of existing roadways within the city. While the actual design of roadways can (and will) vary from street to street and segment to segment due to adjacent land uses and demand, the roadway cross section standards are intended to define a system that allows standardization of key characteristics to provide consistency, but also to provide criteria for application that provides some flexibility while meeting the design standards. Table 11 outlines the roadway cross section standards for city streets. Exhibits 1 through 3 illustrate the cross section standards for each functional classification.



Functional Classification Plan Updates
Gladstone, Oregon

Figure
4

H:\19\19890 - Gladstone TSP Update\gis\TM9\04 Functional Classification Plan Updates.mxd - mbell - 11:21 AM 7/21/2017

KITTELSON & ASSOCIATES

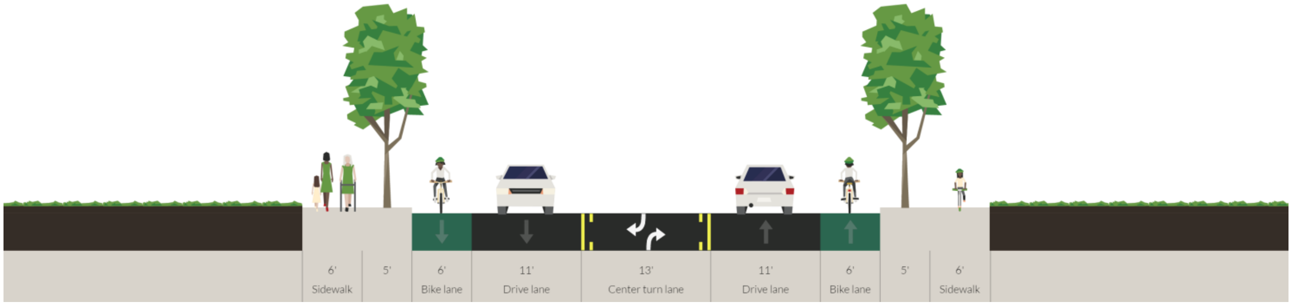
Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Portland Metro Data Resource Center

Unless prohibited by significant topographic or environmental constraint, newly constructed streets shall meet the maximum standards indicated in the cross sections. When widening an existing street, the City may use lesser standards than the maximum to accommodate physical and existing development constraints where determined to be appropriate by the Public Works Director. Examples of constrained street cross sections are shown for minor arterial and collector streets. These constrained cases may be applied where future daily volumes do not require center left-turn pockets or raised medians. In some locations "green streets" (those that utilize vegetation or pervious material to manage drainage) may be appropriate due to design limitations or adjacent land use. Green street elements (as described in the notes for the cross section exhibits) may be used, where appropriate as determined by the Public Works Director.

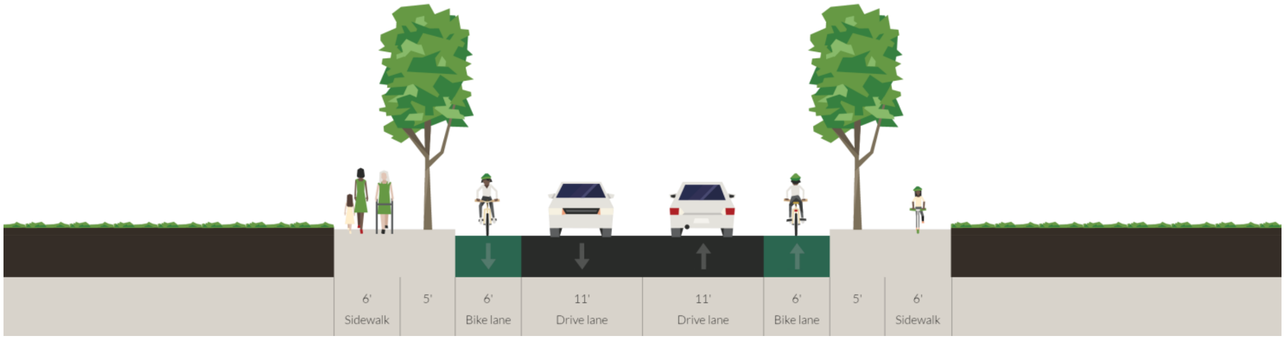
Table 11: Roadway Cross Section Standards

Street Element	Characteristic	Width/Options
Vehicle Lane Widths (Typical widths)	Arterial	11-12 feet
	Collector	10-12 feet
	Local	10-12 feet
On-Street Parking	Arterial	7-8 feet in Commercial Areas
	Collector	7-8 feet in Commercial Areas
	Local	7-8 feet
Bike Lanes	Arterial	6-7 feet
	Collector	5-6 feet
Sidewalks	Arterial	6 feet, 10-12 feet in commercial zones
	Collector	6 feet, 8-20 feet in commercial zones
	Local	6 feet
Landscape Strips	Can be included on all streets	5-6 feet typical
Raised Medians	5-Lane	Optional
	3-Lane	Optional
	2-Lane	Consider if appropriate
Neighborhood Traffic Management (NTM)	Arterial	Not Appropriate
	Collector	Only in special circumstances
	Local	At the discretion of the Public Works Director
Transit	Arterial	Appropriate
	Collector	Only in special circumstances
	Local	Not recommended

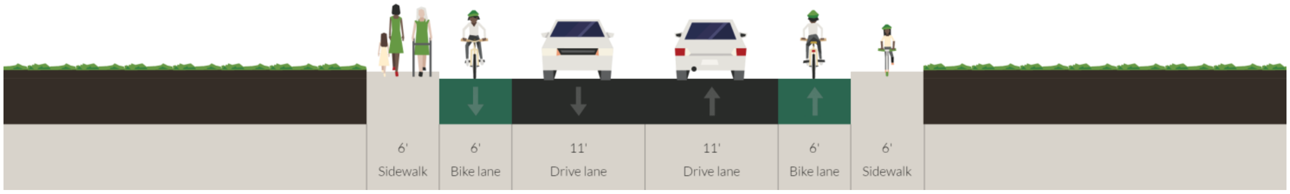
Exhibit 1: Arterial Cross Sections



Arterial with Median/Center Turn Lane



Arterial without Median/Center Turn Lane



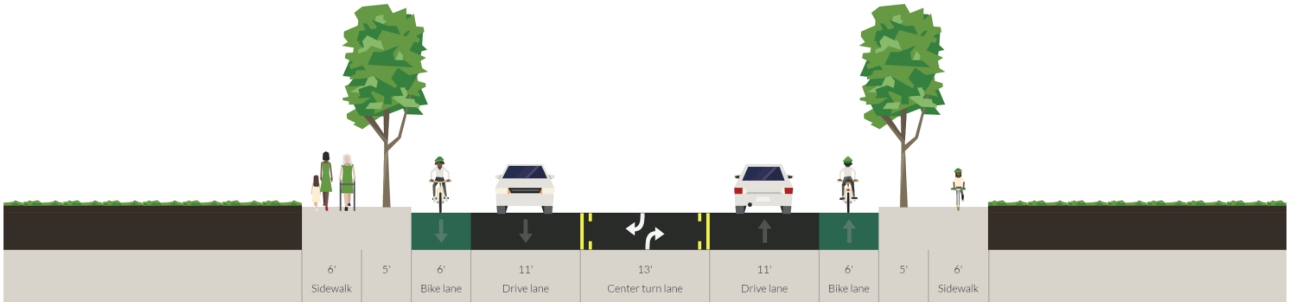
Arterial Constrained

Table 12: Arterial Cross Section Standards

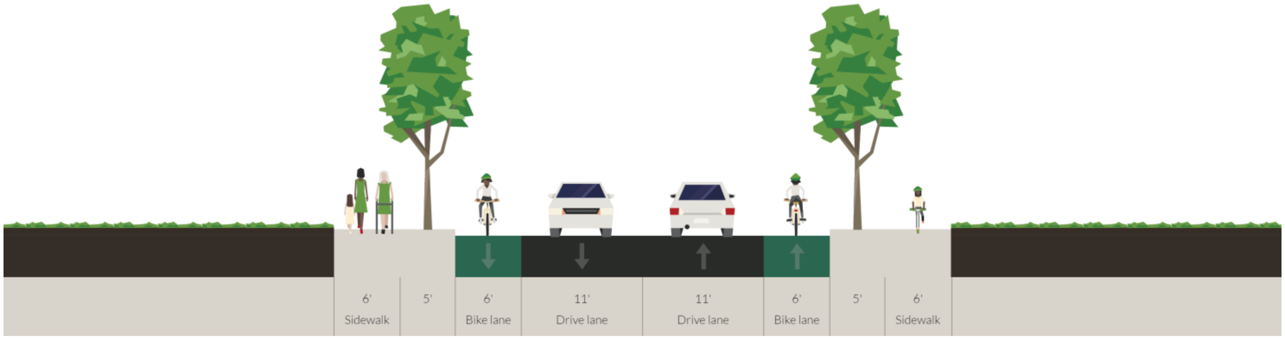
Standards	Arterial
Vehicle Lanes	11-12 feet
On-Street Parking	7-8 feet in Commercial Areas[1]
Bike Lanes	6-7 feet
Sidewalks	6 feet; 10-12 feet in commercial zones
Landscape Strips	5-6 feet[2, 3]
Median/Center Turn Lane	13-14 feet
Neighborhood Traffic Management	Not Appropriate

1. On-street parking shall be provided along arterials within commercial areas only and at the discretion of the Public Works Director.
2. Landscape strips may be reduced and/or removed at the discretion of the Public Works Director.
3. The Public Works Director may recommend green street variations of each cross section. These variations may include replacing the standard landscape strip with a rain garden or swale, using pervious material for the sidewalk/cycle track, and in some cases providing a sidewalk on only one side of the street.

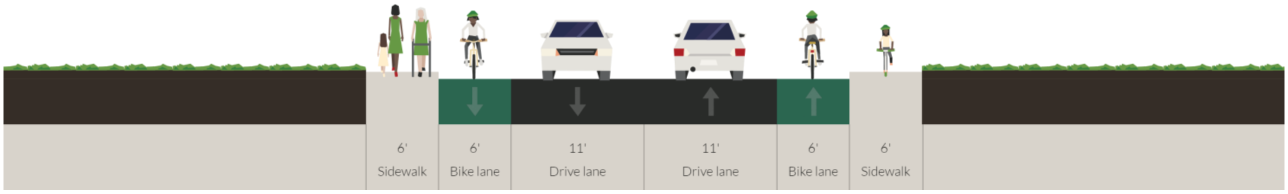
Exhibit 2: Collector Cross Sections



Collector with Median/Center Turn Lane



Collector without Median/Center Turn Lane



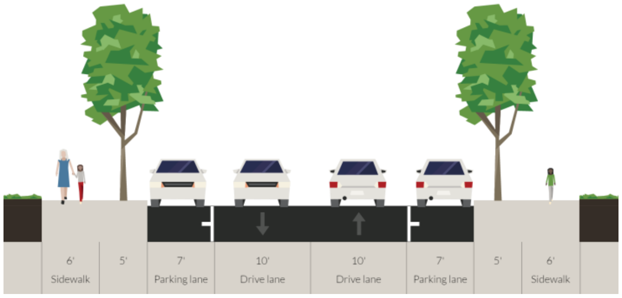
Collector Constrained

Table 13: Collector Cross Section Standards

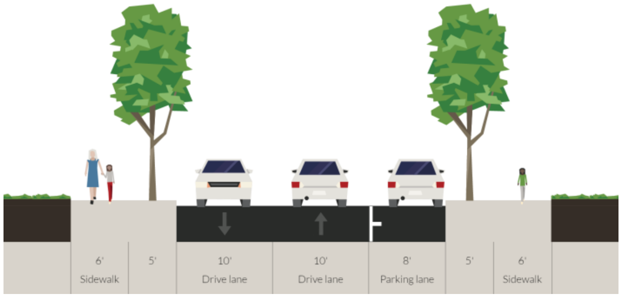
Standards	Arterial
Vehicle Lanes	10-12 feet
On-Street Parking	7-8 feet in Commercial Areas[1]
Bike Lanes	5-6 feet[2]
Sidewalks	6 feet; 8-20-feet in commercial zones
Landscape Strips	5-6 feet[3, 4]
Median/Center Turn Lane	13-14 feet
Neighborhood Traffic Management	Only in special circumstances

1. On -street parking shall be provided along collectors within commercial areas only and at the discretion of the Public Works Director..
2. Bike lanes required where future traffic volumes > 3,000 ADT. When < 3,000 ADT, 14-foot wide travel lanes will be provided.
3. Landscape strips may be reduced and/or removed at the discretion of the Public WorksDirector.
4. The Public Works Director may recommend green street variations of each cross section. These variations may include replacing the standard landscape strip with a rain garden or swale, using pervious material for the sidewalk/cycle track, and in some cases providing a sidewalk on only one side of the street.

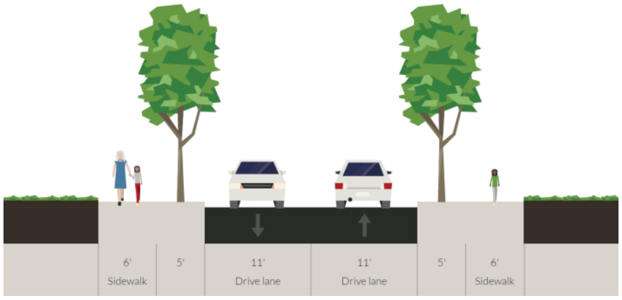
Exhibit 3: Local Street Cross Sections



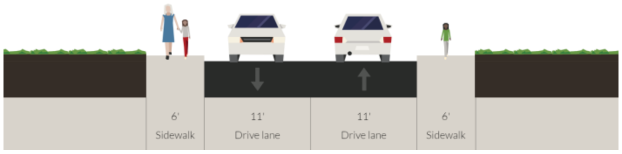
34-foot Local (Parking on Both Sides)



28-foot Local (Parking on One Side)



24-foot Local (No Parking)



Local Constrained

Table 14: Local Street Cross Section Standards

Standards[3]	Local Streets
Vehicle Lane Widths	10-12 feet
On-Street Parking	7-8 feet[1]
Sidewalks	6 feet
Landscape Strips	5-6 feet[2, 3]
Median/Turn Lane Widths	None
Neighborhood Traffic Management	At the discretion of the Public Works Director

1. On-street parking shall be provided along local streets and reflect the nature and intensity of adjacent development and physical constraints.
2. Landscape strips may be reduced and/or removed at the discretion of the Public Works Director.
3. The Public Works Director may recommend green street variations of each cross section. These variations may include replacing the standard landscape strip with a rain garden or swale, using pervious material for the sidewalk, and in some cases providing a sidewalk on only one side of the street.

Street System Connectivity

As indicated above, the street system within Gladstone is largely built-out. Therefore, there are limited opportunities for new arterial or collector streets. However, there are opportunities for new local streets in select areas throughout the city that could improve access and circulation for all travel modes.

Figure 5 illustrates the location of the local street connections identified for the Gladstone TSP update. Table 15 summarizes the connections and identifies their priority based on the project evaluation criteria. Costs are not provided for these projects as they are anticipated to be constructed by future development. Any local street connectivity projects that are desired to be city-initiated projects should be identified as a high priority and included in the cost-constrained plan.

Table 15: Street Connections by Priority

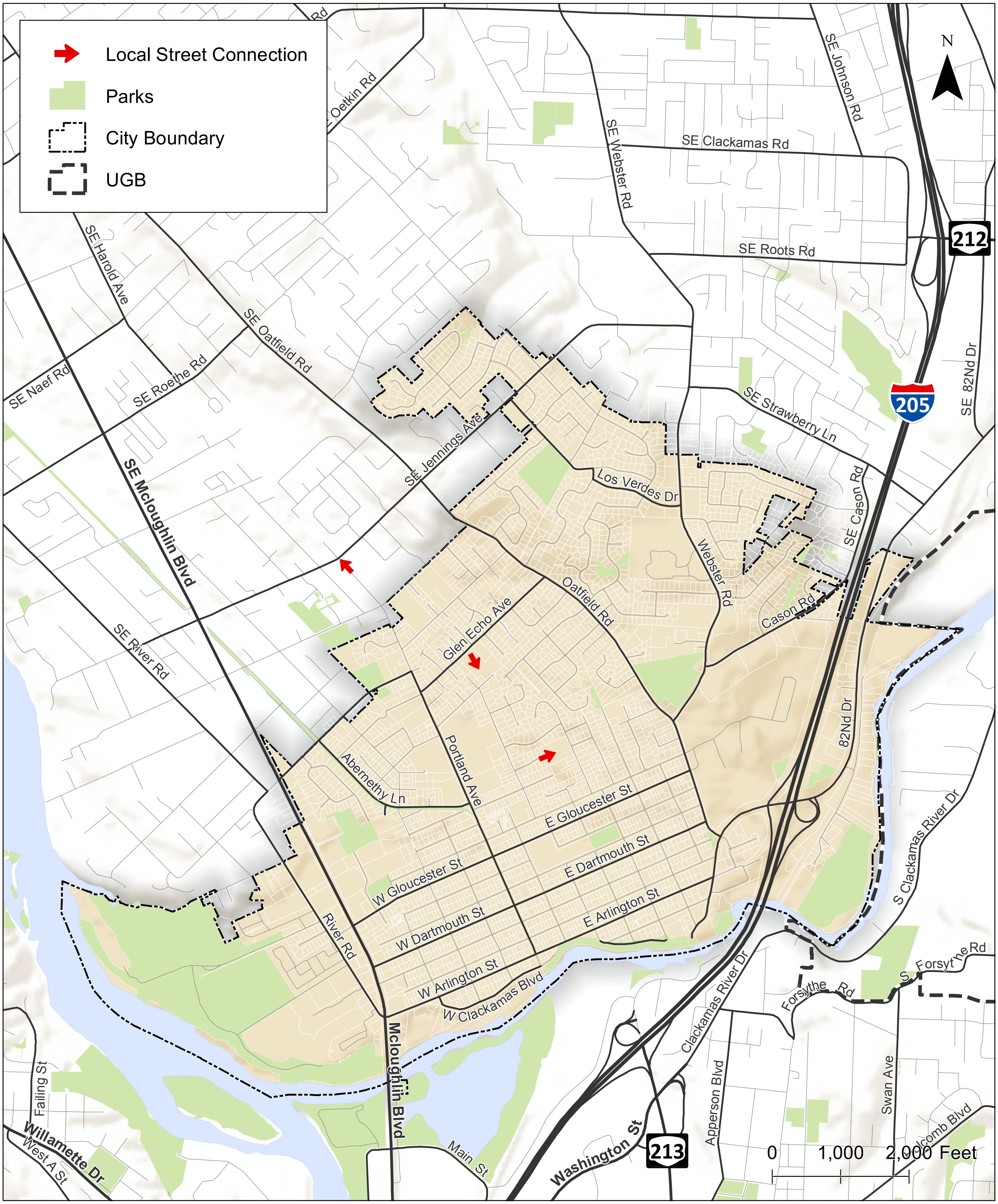
Project Number	Location	Description	Priority
SC1	Portland Avenue	Extend to Jennings Avenue	Low
SC2	Tyron Court	Extend to Nelson Lane	Low
SC3	Kenmore Street	Connect two segments	Low

Roadway Capacity

The roadway capacity projects developed for the Gladstone TSP update are summarized in Table 16 and shown in Figure 6. These projects are intended to address existing and projected future transportation system needs for motor vehicles as well as all other modes of transportation that depend on the roadway system for travel, such as pedestrians, bicyclists, transit users, and freight.

Table 16: Motor Vehicle Plan Projects

Project Number	Location	Description	Priority	Cost Estimate
M1	OR 99E/ E Arlington Street	Restrict eastbound movements at the intersection	Medium	$100,000
M2	OR 99E/ Glen Echo Avenue	Install a separate right-turn lane on the westbound approach	Medium	$5,000
M3	I-205 Ramp Terminals/ SE 82nd Drive	I-205 Interchange Refinement Plan	Medium	$20,000
M4	Oatfield Road/ Glen Echo Avenue	Install a traffic signal when warranted	Medium	$250,000
M5	Oatfield Road/ Gloucester Street	Install a traffic signal when warranted	Medium	$250,000
M6	Oatfield Road/ Dartmouth Street	Install a median along Oatfield Road to restrict left-turn movements to/from Dartmouth Street as well as other local street connections – this project will require coordination with TriMet.	Medium	$35,000
M7	SE 82nd Drive/Oatfield Road	Install skip striping through the intersection to define turning paths for vehicles	High	$5,000
			TOTAL High Priority Costs	**$5,000**
			TOTAL Medium Priority Costs	**$625,000**
			TOTAL Program Costs (23 years)	**$660,000**



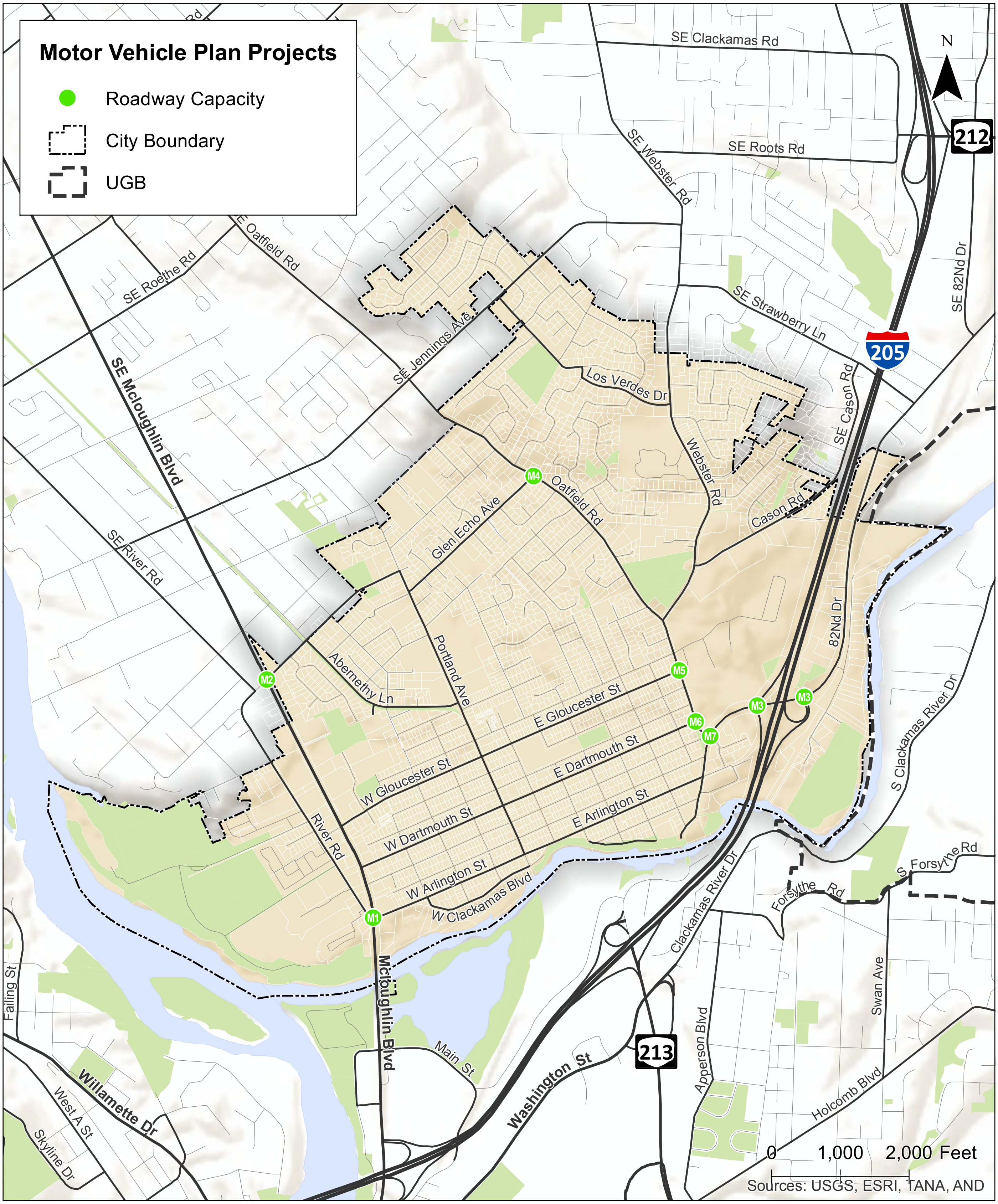
Local Street Connectivity Projects
Gladstone, Oregon

Figure
5

H:\19\19890 - Gladstone TSP Update\gis\TM9\05 Local Street Connectivity Projects.mxd - mbell - 11:21 AM 7/21/2017

KITTELSON & ASSOCIATES

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



Motor Vehicle Plan Projects
Gladstone, Oregon

Figure
6

H:\19\19890 - Gladstone TSP Update\gis\TM9\06 Motor Vehicle Plan Projects.mxd - mbell - 11:26 AM 7/21/2017

KITTELSON & ASSOCIATES

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

Attachment A Project Evaluation Criteria

PROJECT EVALUATION CRITERIA

The project evaluation criteria were used to evaluate projects included in the planned transportation system and identify priorities for the financially constrained transportation system. The projects were identified as high, medium, and low priority based on how well they address the goals for the transportation system. The evaluation criteria use a qualitative rating method of positive, neutral, and negative as described below.

- Positive: The project supports the intent of or has a positive impact on the related goal and objective. (+1)
- Neutral: The goal and objective does not apply to the project or the project has no impact on the goal and objective. (0)
- Negative: The project does not support the intent of or has a negative impact on the goal and objective. (-1)

Table A-1 presents the goals and objectives and related evaluation criteria that were used to evaluate the projects for the Gladstone TSP update.

Table A-1: Evaluation Criteria

Objective	Evaluation Criteria	Evaluation Score
Goal I: Safety – Provide a safe and efficient multimodal transportation system for all members of the community.		
Objective A. Address safety issues at locations with a history of fatal, serious injury, or frequent bicycle/pedestrian-related crashes	Project could reduce the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	+1
	Project would have no impact on the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	0
	Project could increase the potential for fatal, serious injury, or bicycle/pedestrian-related crashes	-1
Objective B. Implement strategies that reduce the potential for future conflicts between travel modes	Project could reduce potential for future conflicts between travel modes	+1
	Project would have no impact on the potential for future conflicts between travel modes	0
	Project could increase the potential for future conflicts between travel modes	-1
Goal II: Mobility – Provide a multimodal transportation system that is in a good state of repair and meets applicable State, regional, and local operational performance measures.		
Objective A. Maintain the transportation system in a good state of repair	Project could improve the state of the transportation system	+1
	Project would have no impact on the state of the transportation system	0
	Project could diminish the state of the transportation system	-1
Objective B. Meet applicable State, regional, and local operational performance measures	Project will meet applicable State, regional, and local operational performance measures	+1
	Project will not impact State, regional, and local operational performance measures	0
	Project will not meet State, regional, and local operational performance measures	-1
Goal III: Accessibility – Provide a multimodal transportation system that is accessible to all members of the community and minimizes out of direction travel.		
Objective A. Ensure adequate access for children, disabled, low-income, or elderly people	Project improves access in an area with a high concentration of children, disabled, low-income, or elderly people	+1
	Project does not improve access in an area with a high concentration of children, disabled, low-income, or elderly people	0

Objective	Evaluation Criteria	Evaluation Score
	Project impedes access in an area with a high concentration of children, disabled, low-income, or elderly people	-1
Objective B. Ensure adequate access for all members of the community to schools, parks, churches, and other essential destinations	Project improves access to schools, parks, churches, and other essential destinations	+1
	Project does not improve access to schools, parks, churches and other essential destinations	0
	Project impedes access schools, parks, churches, and other essential destinations	-1
Goal IV: Connectivity – Provide a multimodal transportation system that increases connections to all areas of the City and works to overcome existing barriers to regional connectivity		
Objective A. Improve existing connections between residential areas and local school, parks, churches and other essential destinations	Project will improve an existing connection	+1
	Project will not improve an existing connection	0
	Project will impede an existing connection	-1
Objective B. Create new connections between residential areas and local school, parks, churches, and other essential destinations	Project will create a new connection	+1
	Project will not create a new connection	0
	Project will impede the creation of a new connection	-1
Goal V: Health – Develop a transportation system that encourages active transportation and supports healthy and active choices for the community.		
Objective A. Increase the number of active transportation options available to all members of the community	Project could increase the number of active transportation options	+1
	Project would not increase the number of active transportation options	0
	Project could reduce the number of active transportation options	-1
Objective B. Integrate active transportation options with other modes of travel within the community	Project could integrate active transportation options with other modes of travel	+1
	Project would not integrate active transportation options with other modes of travel	0
	Project could impede integration of active transportation options with other modes of travel	-1
Goal VI: Coordination – Develop a transportation system that is consistent with other state, regional, and local plans.		
Objective A. Ensure consistency with State, regional, and local planning rules and regulations	Project will ensure consistency with State, regional, and local planning rules and regulations	+1
	Project will not ensure consistency with State, regional, and local planning rules and regulations	0
	Project will defy State, regional, and local planning rules and regulations	-1
Objective B. Coordinate land use, financial, and environmental planning to prioritize strategic transportation investments	Project will coordinate land use, financial, and environmental planning	+1
	Project will does require coordination between land use, financial, and environmental planning	0
	Project will disrupt coordination between land use, financial, and environmental planning	-1
Goal VII: Financial Responsibility – Invest in financially feasible infrastructure projects that will serve the city for years to come		
Objective A. Ensure adequate funding is available to fund further study or implementation of the planned transportation system	Adequate funding is currently available	+1
	Adequate funding is available through an existing grant program or other funding source	0
	Adequate funding is not available	-1
Objective B. Ensure there are no significant barriers to implementation of the planned transportation system	There are no significant barriers	+1
	There are barriers, but they can be overcome	0
	There are significant barriers	-1

Attachment B Project Evaluation Matrix

Project Number	Location	Solutions	Evaluation Criteria															Cost	Priority
			Safety		Mobility		Accessibility		Connectivity		Health		Coordination		Financial Responsibility				
			Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Total		
Bicycle System																			
Arterials																			
B1	82nd Drive	Reduce lane width and install buffered bike lanes	1	1	1	0	0	0	1	0	1	1	1	0	0	0	7	$ 955,000	High
B2	OR 99E (McLoughlin Boulevard)	Reduce lane width and install buffered bike lanes	1	1	1	0	1	0	1	0	1	1	1	0	-1	0	7	$ 965,000	High
B3	Arlington Street	Establish alternative route	0	0	0	0	1	0	0	1	1	1	0	0	1	0	5	$ 5,000	Low
B4	Arlington Street	Widen roadway and install bike lanes and parking	0	1	1	0	1	0	0	1	1	1	0	0	0	0	6	$ 90,000	Medium
B5	Arlington Street	Widen roadway and install bike lanes and parking	0	1	1	0	1	0	0	1	1	1	0	0	0	0	6	$ 460,000	Medium
B6	Oatfield Road	Reduce posted speed limit	1	0	0	-1	1	1	1	0	0	0	1	0	1	0	5	$ 5,000	Low
B7	Oatfield Road	Reduce lane width and widen bike lanes	1	1	1	0	1	1	1	0	1	1	1	0	0	0	9	$ 835,000	High
B8	Portland Avenue	Downtown Revitalization Plan	1	1	1	0	1	1	1	0	0	1	0	1	0	0	0	N/A	Low
B9	Portland Avenue from Clackamas Boulevard to Nelson Lane	Remove center turn lane and install bike lanes	1	1	1	0	1	1	0	1	1	1	1	0	0	0	9	$ 635,000	High
B10	Portland Avenue from Nelson Lane to Jennings Road	Widen roadway and install bike lanes and parking	0	1	1	0	1	1	0	1	1	1	0	0	0	0	7	$ 265,000	High
B11	Webster Road	Reduce posted speed limit	0	0	0	-1	1	1	1	0	0	0	1	0	1	0	4	$ 5,000	Low
B12	Webster Road	Reduce lane width and widen bike lanes	0	1	1	0	1	1	1	0	1	1	1	0	0	0	8	$ 560,000	High
Collectors																			
B13	Abernathy	Install bike lanes on one side	0	1	0	0	1	1	1	0	1	1	1	0	0	0	7	$ 290,000	High
B14	Cason Road	Install bike lane symbols	0	1	0	0	1	1	1	0	0	1	0	0	0	1	6	$ 10,000	Medium
B15	Cason Road	Restripe east leg of Webster Road/Cason Road intersection	0	1	1	0	1	1	1	0	0	1	0	0	0	1	7	$ 95,000	High
B16	Dartmouth Street	Install shared lane markings and signs	0	-1	0	0	1	1	0	1	1	1	0	0	0	0	4	$ 20,000	Low
B17	Dartmouth Street	Remove parking and install bike lanes	0	1	1	0	1	1	0	1	1	1	0	0	0	0	7	$ 515,000	High
B18	Gloucester Street	Widen roadway and install bike lanes and parking	0	1	1	0	1	1	0	1	1	1	1	0	0	0	8	$ 600,000	High
B19	Glen Echo Avenue	Reduce posted speed limit	0	0	0	-1	1	1	0	1	0	0	0	0	1	0	3	$ 5,000	Low
B20	Glen Echo Avenue	Widen roadway and install bike lanes and parking	0	1	1	0	1	1	0	1	1	1	0	0	0	0	7	$ 650,000	High
B21	Los Verdes Drive	Install shared lane markings and signs	0	-1	0	0	0	0	0	1	1	1	0	0	0	0	2	$ 20,000	Low
B22	River Road	Install "Bike Lane Ends" sign	0	0	0	0	1	0	1	0	0	1	1	0	1	1	6	$ 5,000	Medium
Local Streets																			
B23	Beatrice Avenue, from Abernathy Lane to Clackamas Boulevard	Install shared lane markings and signs	0	-1	0	0	1	1	0	1	1	1	0	0	0	0	4	$ 20,000	Low
B24	Beverly Lane/Collins Crest, from Harvard Avenue to Oatfield Road	Install shared lane markings and signs	0	-1	0	0	0	1	0	1	1	1	0	0	1	0	4	$ 5,000	Low
B25	Chicago Avenue, from Hereford Street to Arlington Street	Install shared lane markings and signs	0	-1	0	0	1	1	0	1	1	1	0	0	0	0	4	$ 15,000	Low
B26	Clackamas Boulevard, Arlington Road to 82nd Drive	Install shared lane markings and signs	0	-1	0	0	1	0	0	1	1	1	1	0	0	0	4	$ 15,000	Low
B27	Cornell Avenue, from Clackamas Boulevard to Collins Crest	Install shared lane markings and signs	0	-1	0	0	1	1	0	1	1	1	0	0	0	0	4	$ 35,000	Low
B28	Duniway Avenue, from Abernathy Lane Abernathy Lane to Portland Avenue	Install shared lane markings and signs	0	-1	0	0	1	0	0	1	1	1	0	0	1	0	4	$ 5,000	Low
B29	Fairfield Street, from Cornell Avenue to Oatfield Road	Install shared lane markings and signs	0	-1	0	0	1	1	0	1	1	1	0	0	1	0	5	$ 5,000	Low
B30	Hereford Street, from Beatrice Avenue to Oatfield Road	Install shared lane markings and signs	0	-1	0	0	1	1	0	1	1	1	0	0	0	0	4	$ 25,000	Low
B31	Nelson Lane/Harvard Avenue, from Portland Avenue to Hereford Street	Install shared lane markings and signs	0	-1	0	0	0	1	0	1	1	1	0	0	0	0	3	$ 15,000	Low
B32	Ridgegate Drive/Penny Court/Clayton Way, from Oatfield Road to Webster Road	Install shared lane markings and signs	0	-1	0	0	0	1	0	1	1	1	0	0	0	0	3	$ 10,000	Low
B33	Valley View Road/Los Verdes Drive	Install shared lane markings and signs	0	-1	0	0	0	1	0	1	1	1	0	0	0	0	3	$ 15,000	Low
Intersections																			
B34	OR 99E	Install skip striping and green paint at major intersections	1	1	0	0	1	0	1	0	1	1	1	0	0	0	7	$ 15,000	High
B35	82nd Drive	Install skip striping and green paint at major intersections	1	1	0	0	0	1	1	0	1	1	1	0	0	0	7	$ 20,000	High
B36	Oatfield Road/Webster Road	Reconfigure intersection	1	1	0	0	0	1	1	0	1	1	1	0	0	0	7	$ 15,000	High
B37	Oatfield Road	Install skip striping and green paint at major intersections	1	1	0	0	1	0	1	0	1	1	1	0	0	0	7	$ 15,000	High

Project			Evaluation Criteria																
			Safety		Mobility		Accessibility		Connectivity		Health		Coordination		Financial Responsibility				
Number	Location	Solutions	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Total	Cost	Priority
Pedesatrian System																			
Arterials																			
P1	OR 99E (McLoughlin Boulevard)	Fill in the gaps	1	1	0	0	1	0	0	1	1	0	0	0	-1	0	4	$ 50,000	Low
P2	OR 99E (McLoughlin Boulevard)	Fill in the gaps	1	1	0	0	1	0	0	1	1	0	0	0	-1	0	4	$ 115,000	Low
P3	OR 99E (McLoughlin Boulevard)	Reduce posted speed limits	1	0	0	0	1	0	1	0	1	0	0	1	1	-1	5	$ 5,000	Low
P4	Oatfield Road	Fill in the gaps	1	1	0	0	1	1	0	1	1	0	0	0	0	0	6	$ 130,000	Medium
P5	Oatfield Road	Fill in the gaps	1	1	0	0	1	1	0	1	1	0	0	0	0	0	6	$ 485,000	Medium
P6	Portland Avenue	Downtown Revitalization Plan	1	1	1	0	1	1	1	0	0	1	0	1	0	0	8	N/A	High
P7	Portland Avenue	Fill in the gaps	0	1	0	0	1	1	0	1	1	0	0	0	0	0	5	$ 235,000	Low
P8	Portland Avenue	Fill in the gaps	0	1	0	0	1	1	0	1	1	0	0	0	0	0	5	$ 50,000	Low
P9	Webster Road	Fill in the gaps	0	1	0	0	1	1	0	1	1	0	0	0	0	0	5	$ 55,000	Low
Collectors																			
P10	Abernathy	Install street lighting	0	0	1	0	1	1	1	0	0	0	0	0	0	0	4	$ 175,000	Low
P11	Cason Road	Fill in the gaps	0	1	1	0	1	1	1	0	1	0	0	0	0	0	6	$ 40,000	Medium
P12	Dartmouth Street	Fill in the gaps	0	1	0	0	1	1	0	1	1	0	0	0	0	0	5	$ 260,000	Low
P13	Glen Echo Avenue	Fill in the gaps	0	1	0	0	1	1	0	1	1	0	0	0	0	0	5	$ 515,000	Low
P14	Glen Echo Avenue	Fill in the gaps	0	1	0	0	1	1	0	1	1	0	0	0	0	0	5	$ 460,000	Low
P15	Los Verdes Drive/Valley View Road	Fill in the gaps	0	1	0	0	0	0	0	1	1	0	0	0	0	0	3	$ 120,000	Low
P16	Los Verdes Drive/Valley View Road	Fill in the gaps	0	1	0	0	0	0	0	1	1	0	0	0	0	0	3	$ 15,000	Low
Local Streets																			
P17	Beatrice Avenue	Install new sidewalks	0	1	1	0	1	1	0	1	1	0	0	0	0	0	6	$ 240,000	Medium
P18	Beatrice Avenue	Install new sidewalks	0	1	1	0	1	1	0	1	1	0	0	0	0	0	6	$ 215,000	Medium
P19	Beverly Lane	Fill in the gaps	0	1	1	0	0	1	1	0	1	0	0	0	0	0	5	$ 35,000	Low
P20	Chicago Avenue	Fill in the gaps	0	1	1	0	1	1	1	0	1	0	0	0	0	0	6	$ 60,000	Medium
P21	Chicago Avenue	Fill in the gaps	0	1	1	0	1	1	1	0	1	0	0	0	0	0	6	$ 95,000	Medium
P22	Clackamas Boulevard	Install mixed-use shoulder	0	1	1	0	1	0	0	1	1	0	0	0	0	0	5	$ 310,000	Low
P23	Clackamas Boulevard	Install mixed-use shoulder	0	1	1	0	1	0	0	1	1	0	0	0	0	0	5	$ 310,000	Low
P24	Clayton Way	Fill in the gaps	0	1	0	0	0	0	0	1	1	0	0	0	0	0	3	$ 135,000	Low
P25	Cornell Avenue	Install new sidewalks	0	1	1	0	1	1	0	1	1	0	0	0	0	0	6	$ 390,000	Medium
P26	Cornell Avenue	Install new sidewalks	0	1	1	0	1	1	0	1	1	0	0	0	0	0	6	$ 455,000	Medium
P27	Fairfield Street	Fill in the gaps on one side	0	1	0	0	1	1	0	1	1	0	0	0	0	0	5	$ 50,000	Low
P28	Harvard Avenue	Fill in the gaps	0	1	1	0	1	1	1	0	1	0	0	0	0	0	6	$ 145,000	Medium
P29	Harvard Avenue	Fill in the gaps	0	1	1	0	1	1	1	0	1	0	0	0	0	0	6	$ 175,000	Medium
P30	Oakridge Drive	Fill in the gaps	0	1	1	0	1	0	1	0	1	0	0	0	0	0	5	$ 70,000	Low
Intersections																			
P31	82nd Drive/I-205 Southbound Ramp Terminal	Signalized pedestrian crossing	1	1	1	1	0	0	1	0	1	1	0	0	-1	0	6	$ 65,000	Medium
P32	Cason Road/Ohlson Road	Install enhanced pedestrian crossing	0	1	1	0	0	1	1	0	1	1	0	0	1	0	7	$ 65,000	High
P33	Jennings Avenue/Valley View Road	Install enhanced pedestrian crossing	1	1	1	0	0	0	1	0	1	1	0	0	1	0	7	$ 65,000	High
P34	Oatfield Road/Glen Echo Avenue	Install enhanced pedestrian crossing	1	1	1	0	0	0	1	0	1	1	0	0	1	0	7	$ 65,000	High
P35	Oatfield Road/Gloucester Street	Install enhanced pedestrian crossing	1	1	1	0	1	0	1	0	1	1	0	0	1	0	8	$ 65,000	High
P36	Portland Avenue/Arlington Street	Install enhanced pedestrian crossing	0	1	1	0	1	0	1	0	1	1	0	0	1	0	7	$ 65,000	High
P37	Portland Avenue/Glen Echo Avenue (North)	Install enhanced pedestrian crossing	0	1	1	0	1	0	1	0	1	1	0	0	1	0	7	$ 65,000	High
P38	Portland Avenue/Glen Echo Avenue (South)	Install enhanced pedestrian crossing	0	1	1	0	1	0	1	0	1	1	0	0	1	0	7	$ 65,000	High
P39	Webster Road/Cason Road	Install enhanced pedestrian crossing	0	1	1	0	0	1	1	0	1	1	0	0	1	0	7	$ 65,000	High
P40	Portland Avenue	Curb extensions	0	1	1	0	1	0	1	0	1	1	0	0	1	0	7	$ 225,000	High
P41	Arlington Street	Curb extensions	0	1	1	0	1	0	1	0	1	1	0	0	1	0	7	$ 150,000	High
Off-street Improvements																			
P42	Duniway Avenue Accessway	Accessway	0	1	0	0	1	0	0	1	1	0	0	1	1	-1	4	$ 5,000	Low
P43	Beatrice Avenue Accessway	Accessway	0	1	0	0	1	1	0	1	1	0	0	1	0	-1	5	$ 15,000	Low
P44	Jenson Road Shared-use Path	Path	0	1	0	0	0	1	1	0	1	1	0	0	1	1	7	$ 5,000	High
P45	Shared-use Path under OR 99E	Path	1	1	0	0	0	1	0	1	1	1	0	1	0	-1	6	$ 45,000	Medium
P46	Ohlson Wetlands Shared-use Path	Path	0	1	0	0	1	1	0	1	1	1	0	1	0	-1	6	$ 115,000	Medium
P47	Trolley Trail Bridge	Bridge	0	1	0	0	0	0	0	1	1	1	0	1	1	-1	6	$ 7,500,000	Medium

			Evaluation Criteria																
Project			Safety		Mobility		Accessibility		Connectivity		Health		Coordination		Financial Responsibility				
Number	Location	Solutions	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Objective A	Objective B	Total	Cost	Priority
Motor Vehicle System																			
Connectivity																			
M1	Portland Avenue	Designate as a collector street	0	0	0	0	1	1	0	0	1	1	-1	1	1	0	5	$ -	Low
M2	Dartmouth Street	Designate as a local street	0	0	0	0	1	1	0	0	1	1	-1	1	1	0	5	$ -	Low
M3	Portland Avenue	Extend to Jennings Avenue	0	0	0	0	0	0	0	1	1	0	0	1	0	0	3	$ 135,000	Low
M4	Tyron Court	Extend to Nelson Lane	0	0	0	0	0	1	0	1	1	1	0	1	0	-1	4	$ 315,000	Low
M5	Kenmore Street	Connect two segments	0	0	0	0	0	0	0	1	1	1	0	1	0	-1	3	$ 280,000	Low
Capacity																			
M6	OR 99E/E Arlington Street	Restricted eastbound movements	1	1	0	1	1	0	1	0	1	1	0	1	-1	0	7	$ 100,000	High
M7	OR 99E/Glen Echo Avenue	Westbound turn lane	1	0	0	1	1	0	1	0	0	0	0	0	-1	1	4	$ 5,000	Low
M8	I-205 Ramp Terminals/SE 82nd Drive	Interchange Refinement Plan	1	0	1	1	0	0	1	0	0	0	1	1	-1	0	5	$ 20,000	Low
M9	Oatfield Road/Dartmouth Street	Install median to restrict left-turn movements	1	1	0	0	0	0	1	0	0	0	0	0	0	0	3	$ 35,000	Low