City of Gladstone

TRANSPORTATION SYSTEM PLAN UPDATE

Volume 1: Transportation System Plan

Prepared for:

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City of Gladstone Oregon

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Gladstone, Oregon

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December 2017

ACKNOWLEDGEMENTS

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

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- Councilor Linda Neace
- Councilor Matt Tracy
- Councilor Neal Reisner
- Councilor Patrick McMahon
- Councilor Thomas Mersereau
- *Former Councilor Kim Sieckmann*
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- Laura Terway, *Oregon City*

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- 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.

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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

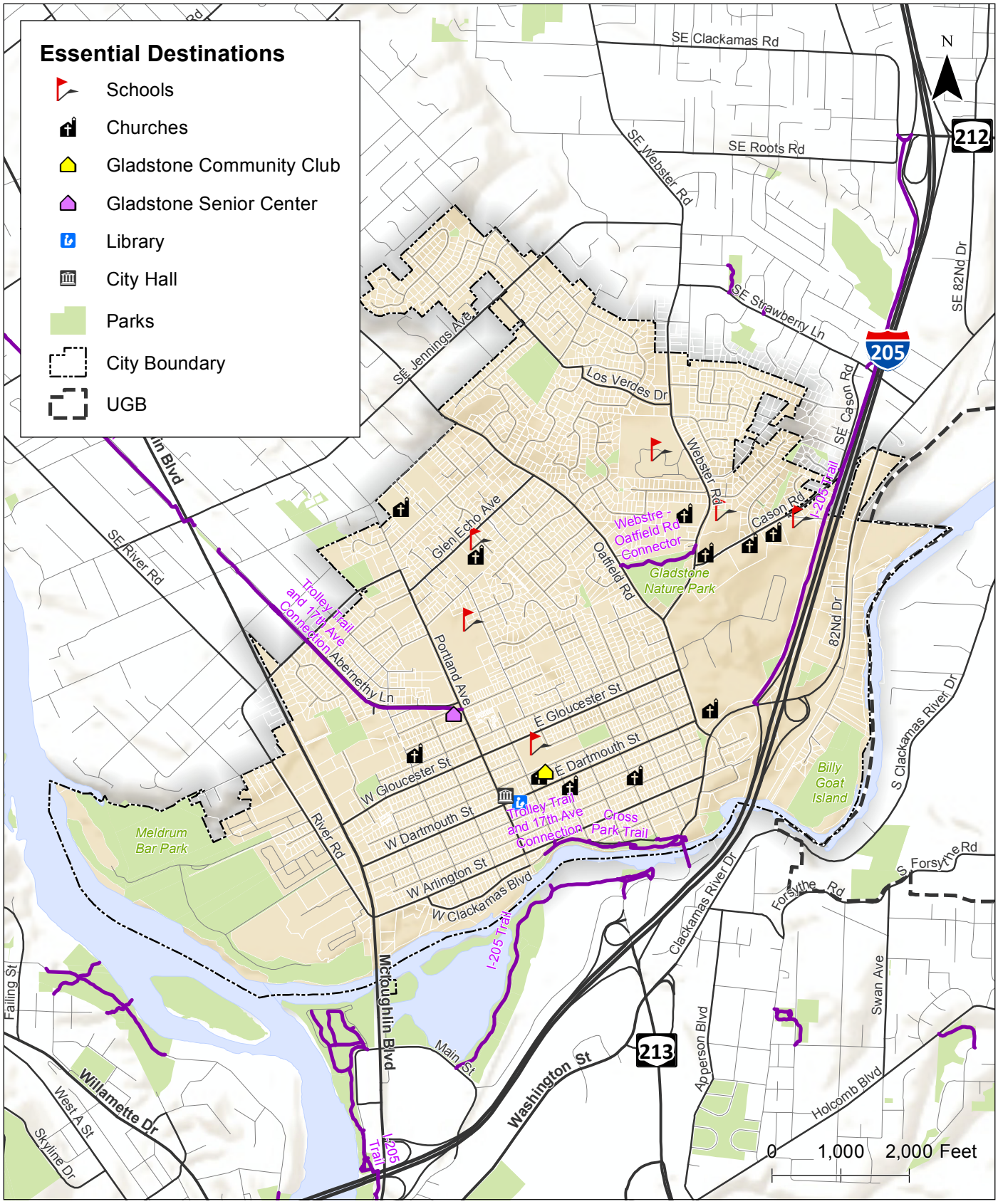
Land use plays an important role in developing a comprehensive transportation system. The amount of land that is planned to be developed, the type of land uses, and how the land uses are mixed together have a direct impact on how the transportation system will be used in the future. Understanding land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

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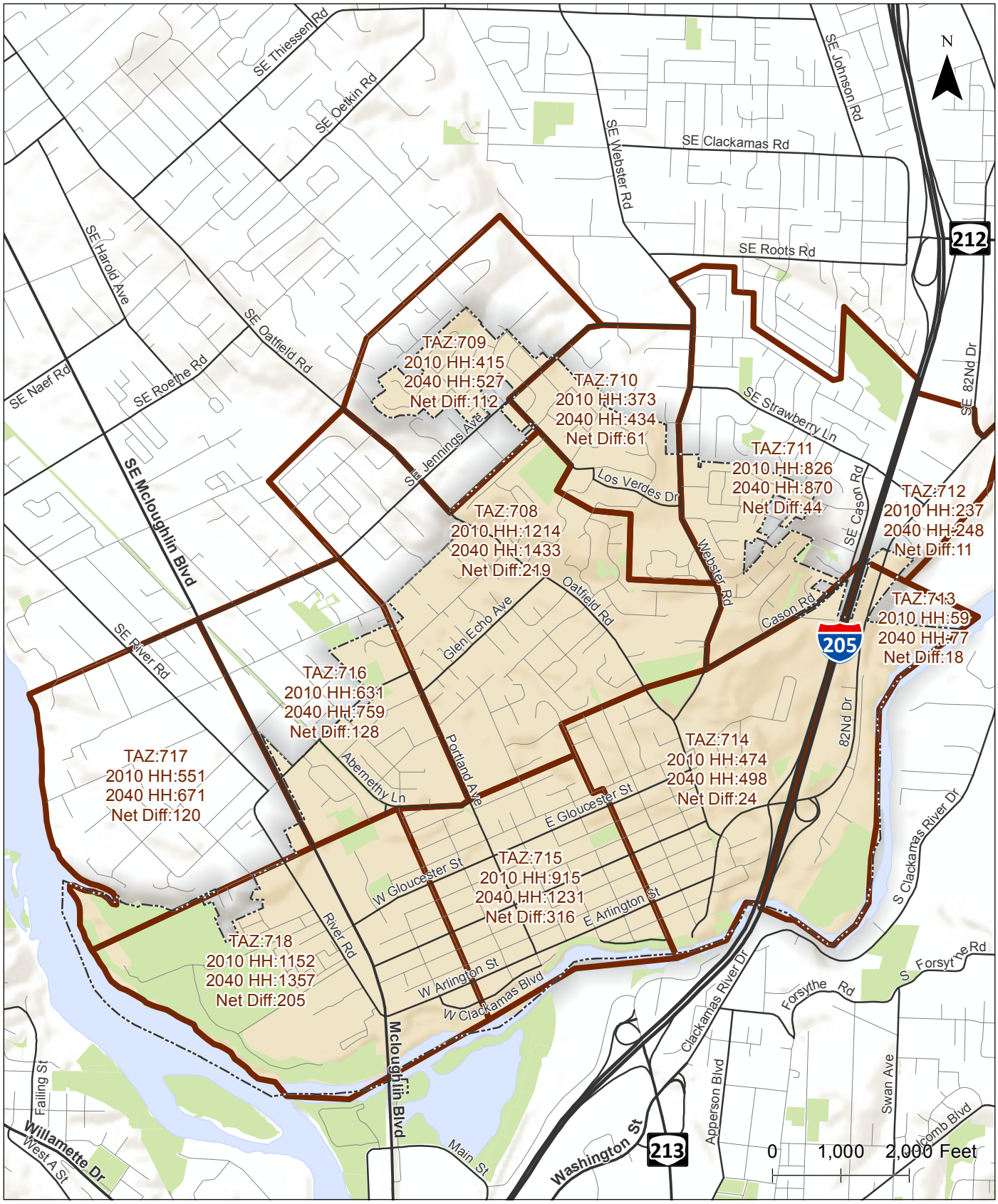

Net Difference in Households by TAZ (2010 to 2040)
Gladstone, Oregon

Figure **2**

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

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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

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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.

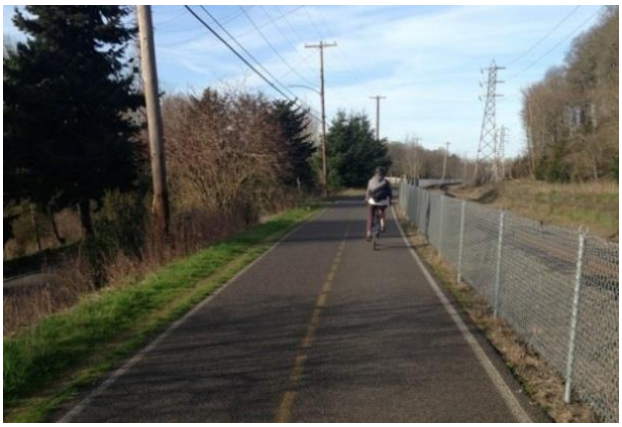
Sidewalk in Need of Improvement

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.

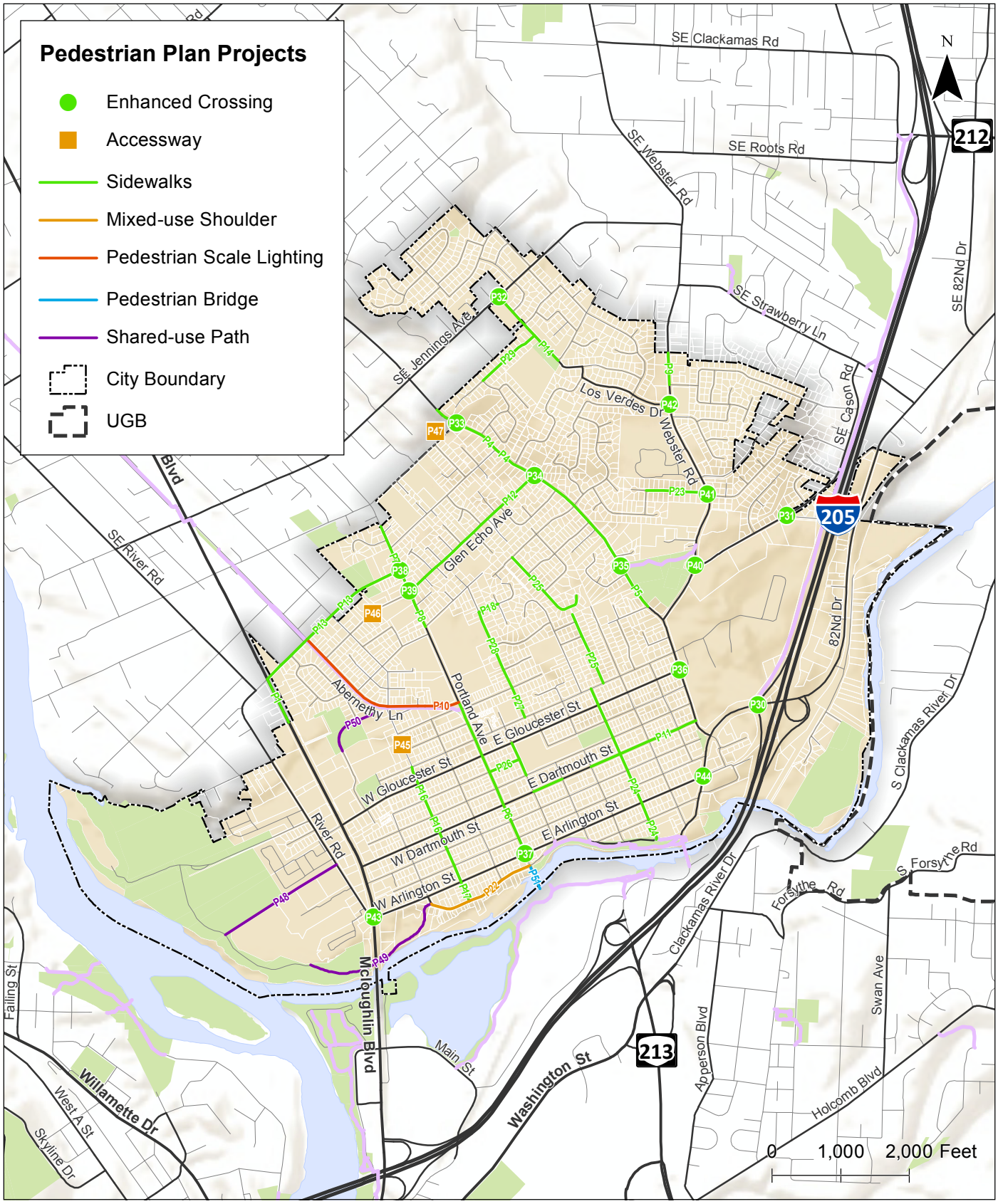
Table 3: Pedestrian Plan Improvement Projects

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

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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.

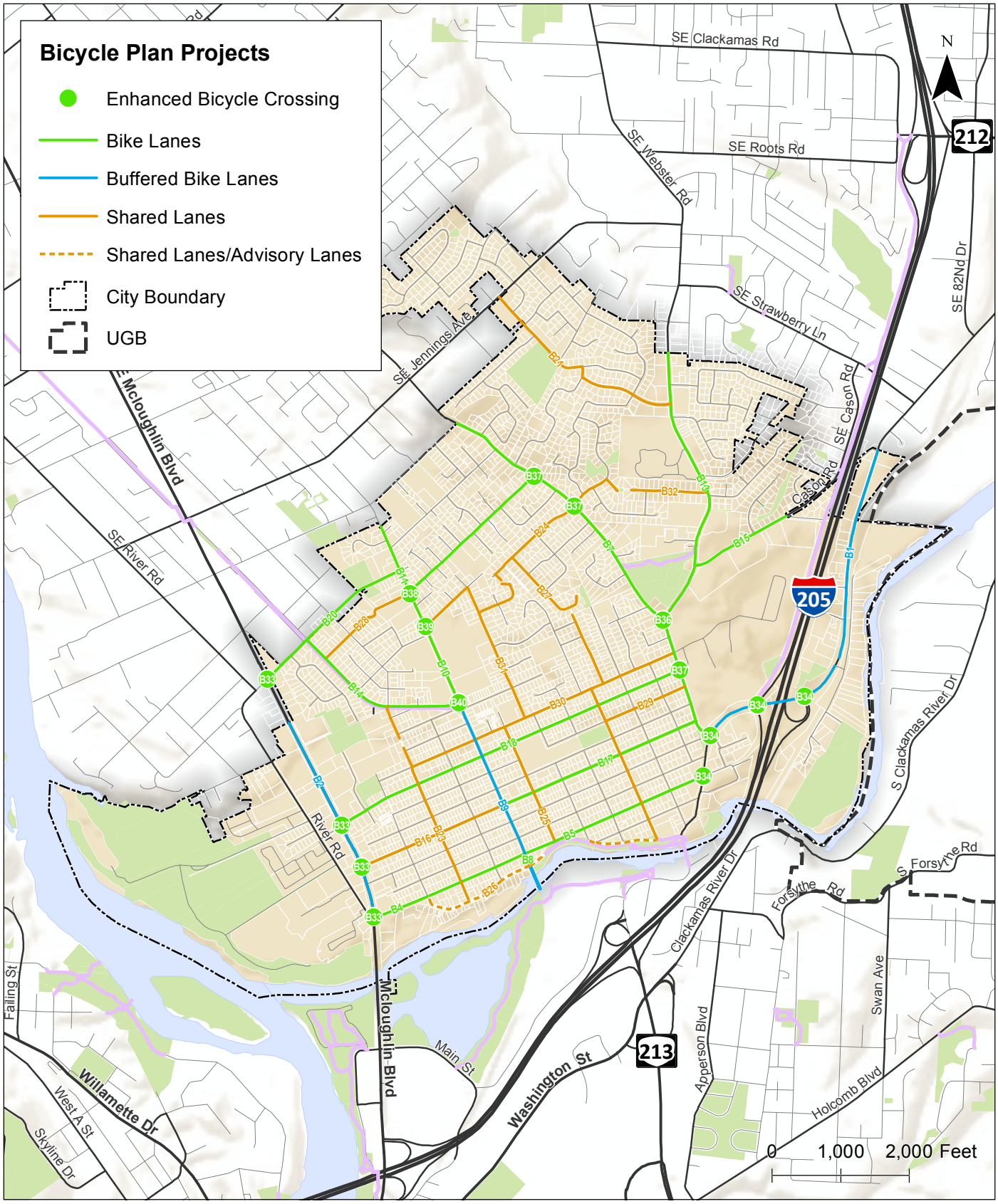
Table 4: Bicycle Plan Improvement Projects

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

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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

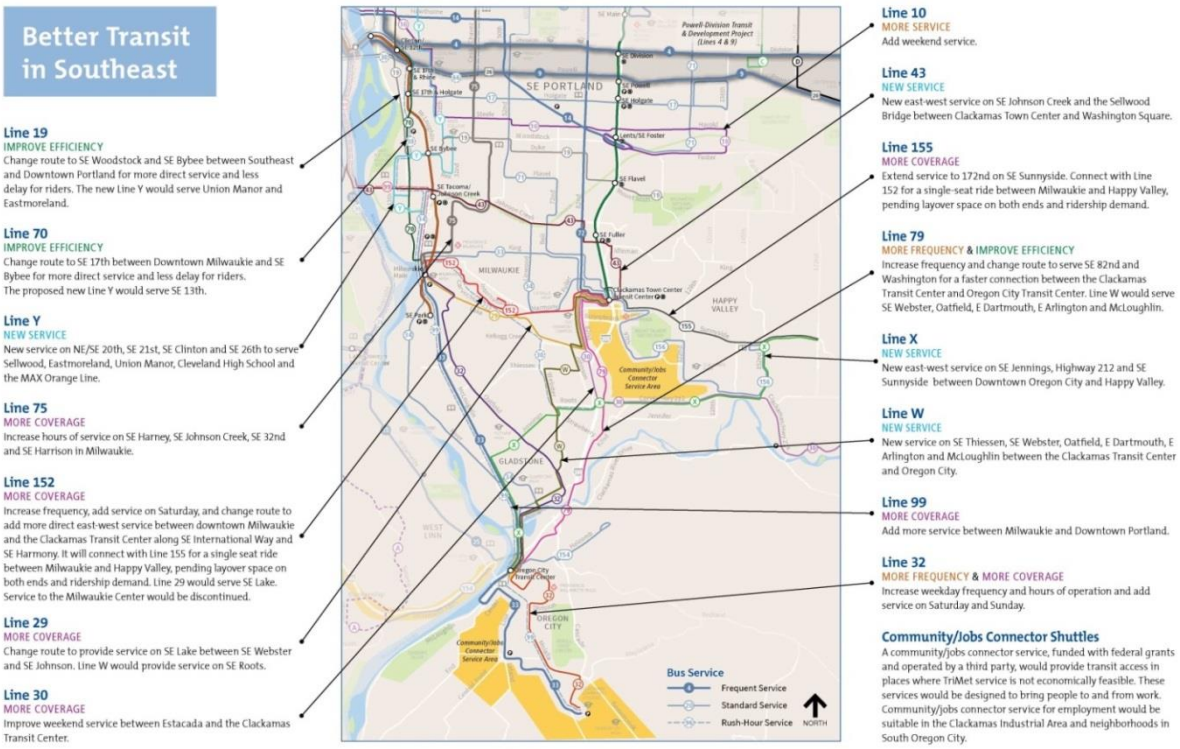
Transit facilities are the elements of the transportation system that enable people to travel safely and efficiently throughout the city and the region by transit. These include fixed-route facilities and services, transit stops, and park-and-rides. This section summarizes the solutions that are integrated 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



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

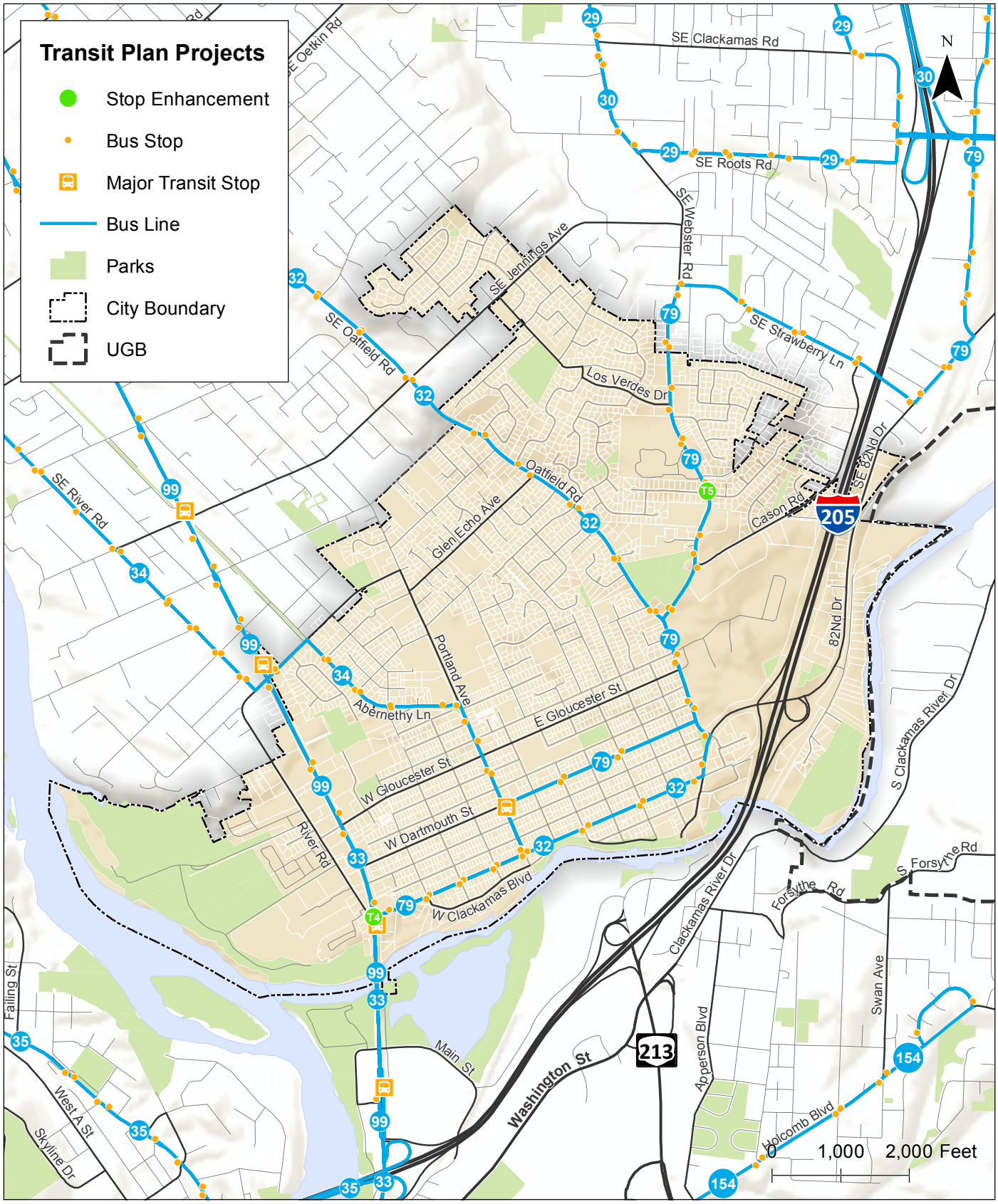
TRANSIT PLAN

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

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

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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

Functional Classification	Mixed-use or Residential			Commercial or Industrial		
	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.

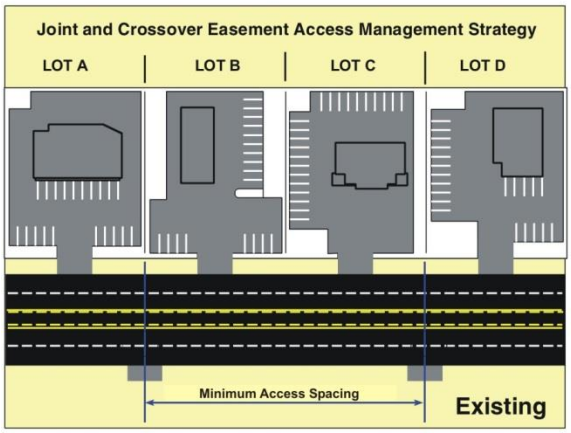
Exhibit 1 illustrates the application of cross-over easements and conditional access permits over time to achieve access management objectives. The individual steps are described in Table 12. As illustrated in the exhibit and supporting table, by using these guidelines, all driveways along the highways 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

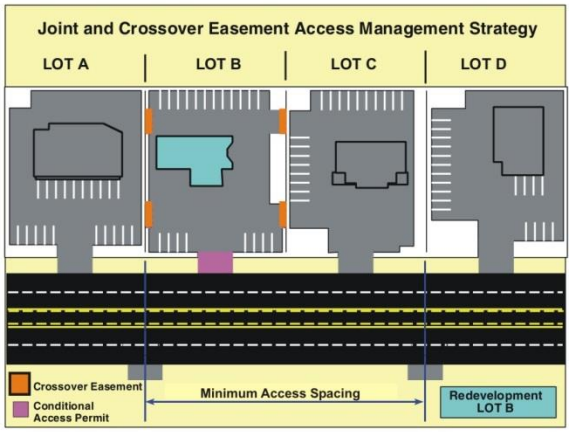
Step	Process
1	EXISTING – Currently Lots A, B, C, and D have site-access driveways that neither meet the access spacing criteria of 500 feet nor align with driveways or access points on the opposite side of the highway. Under these conditions motorists are into situations of potential conflict (conflicting 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

Proposed Access Management Strategy



Step 1



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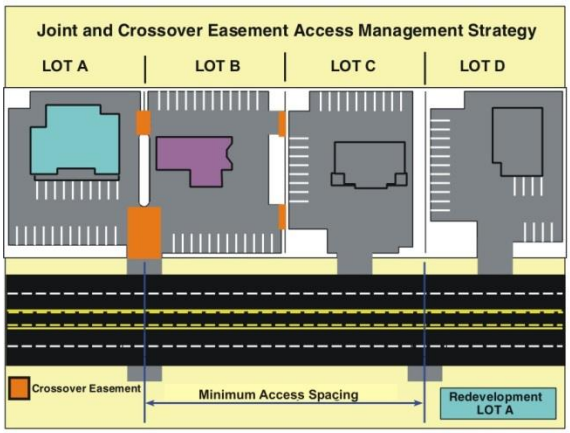

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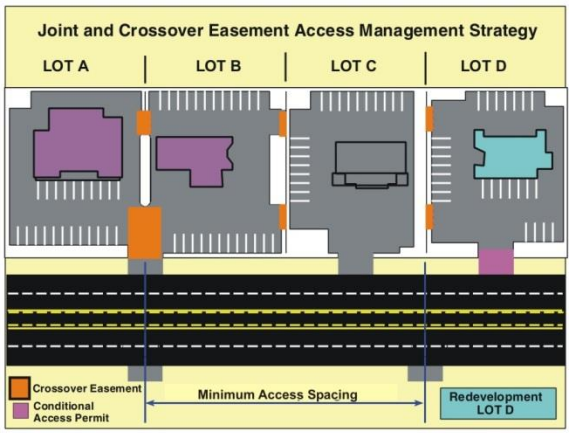

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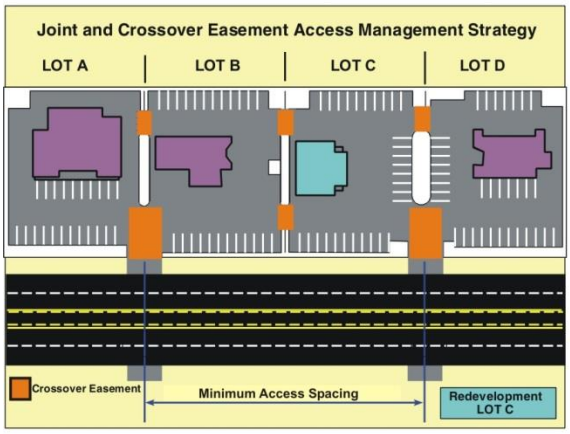
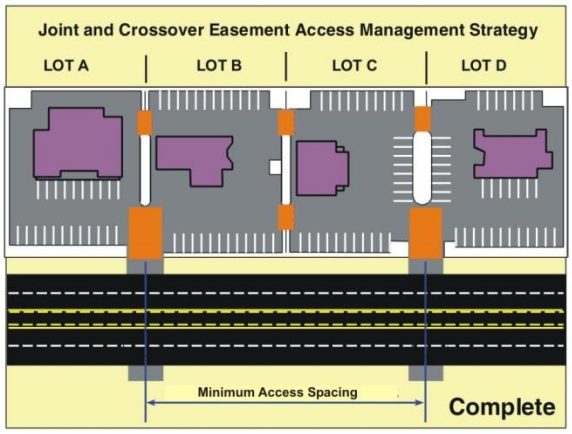


Step 5



Step 6

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**

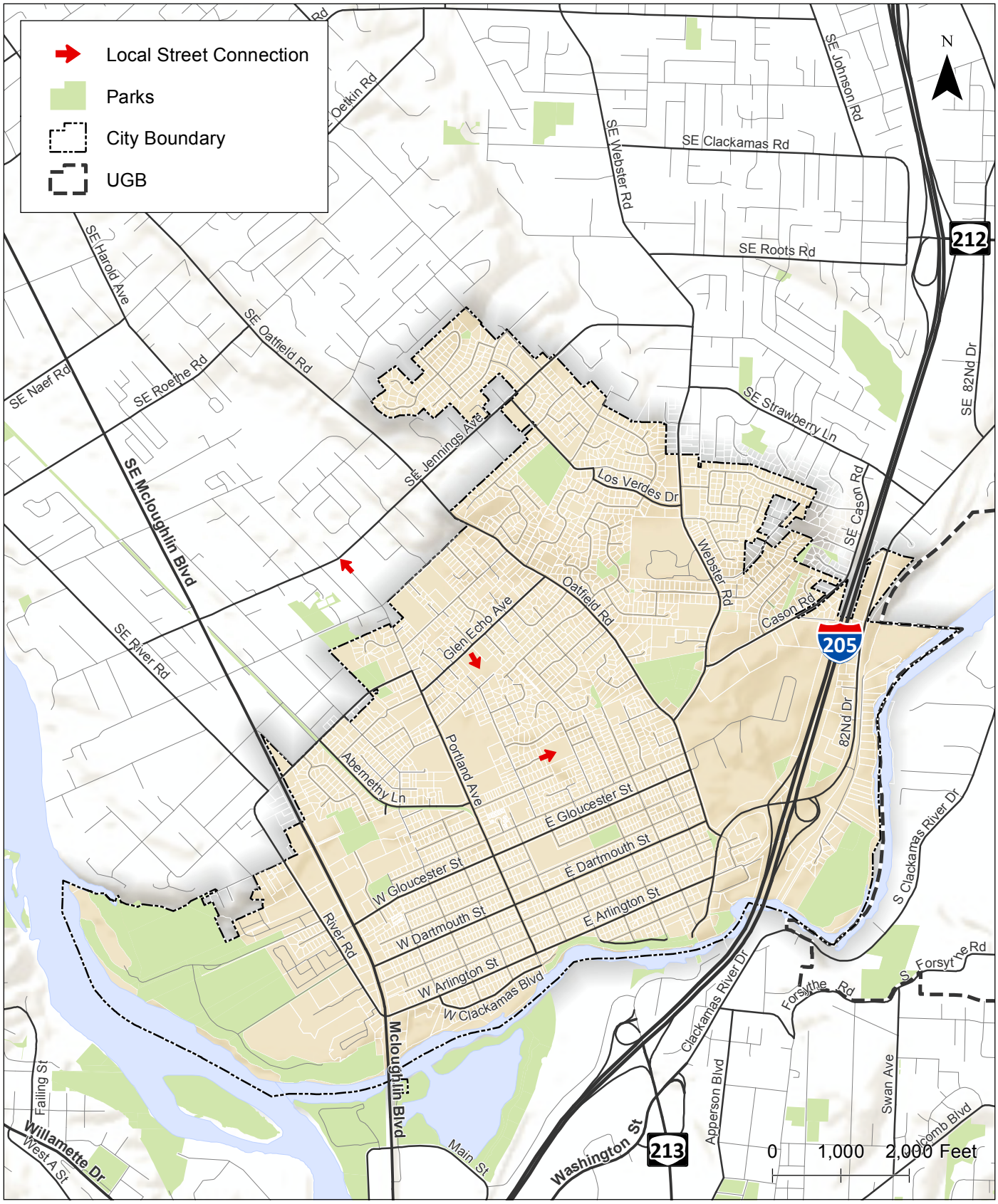
LOCAL STREET CONNECTIVITY

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

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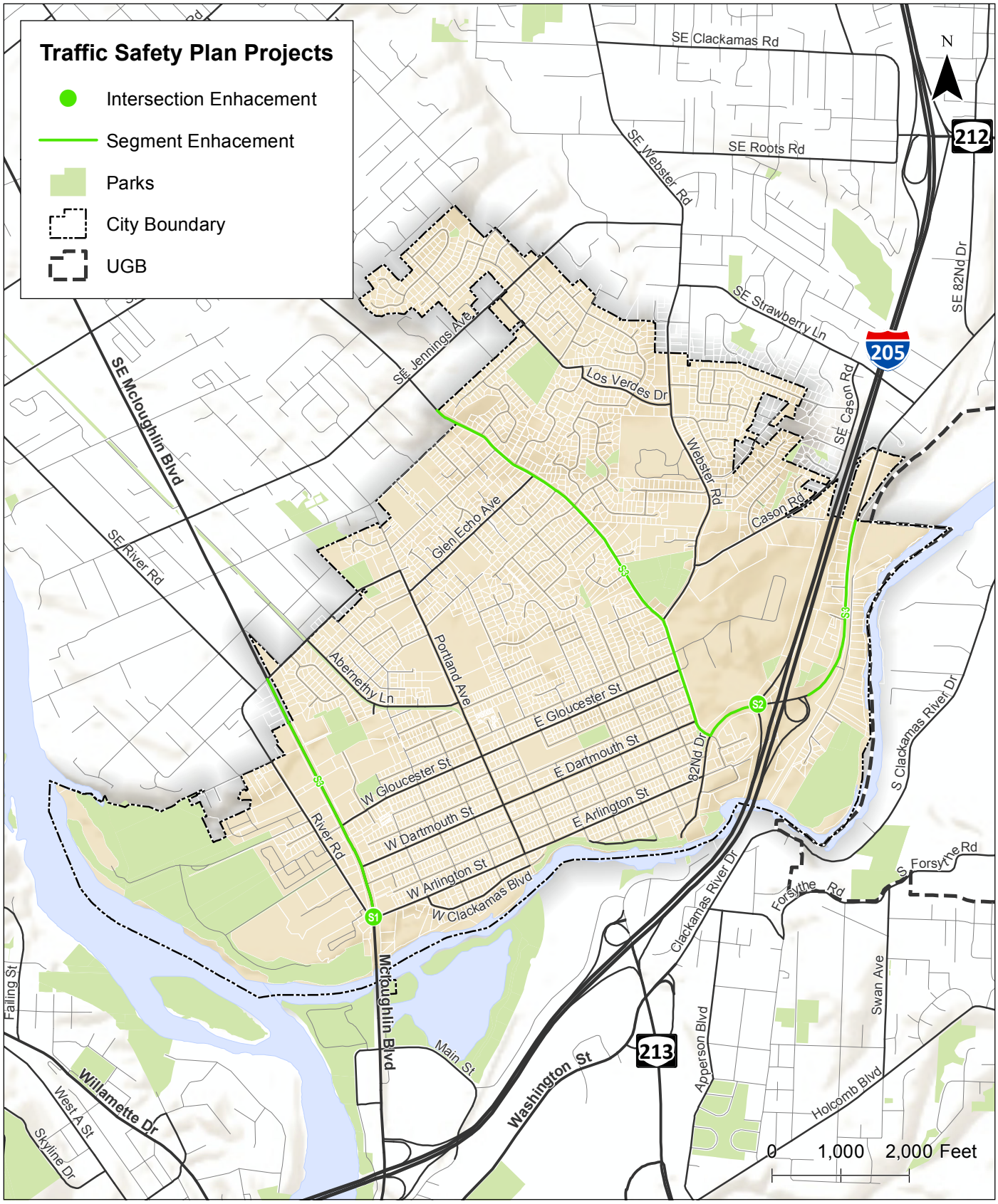
TRAFFIC SAFETY PLAN

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

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CHAPTER 7 MOTOR VEHICLE MASTER PLAN

MOTOR VEHICLE PLAN

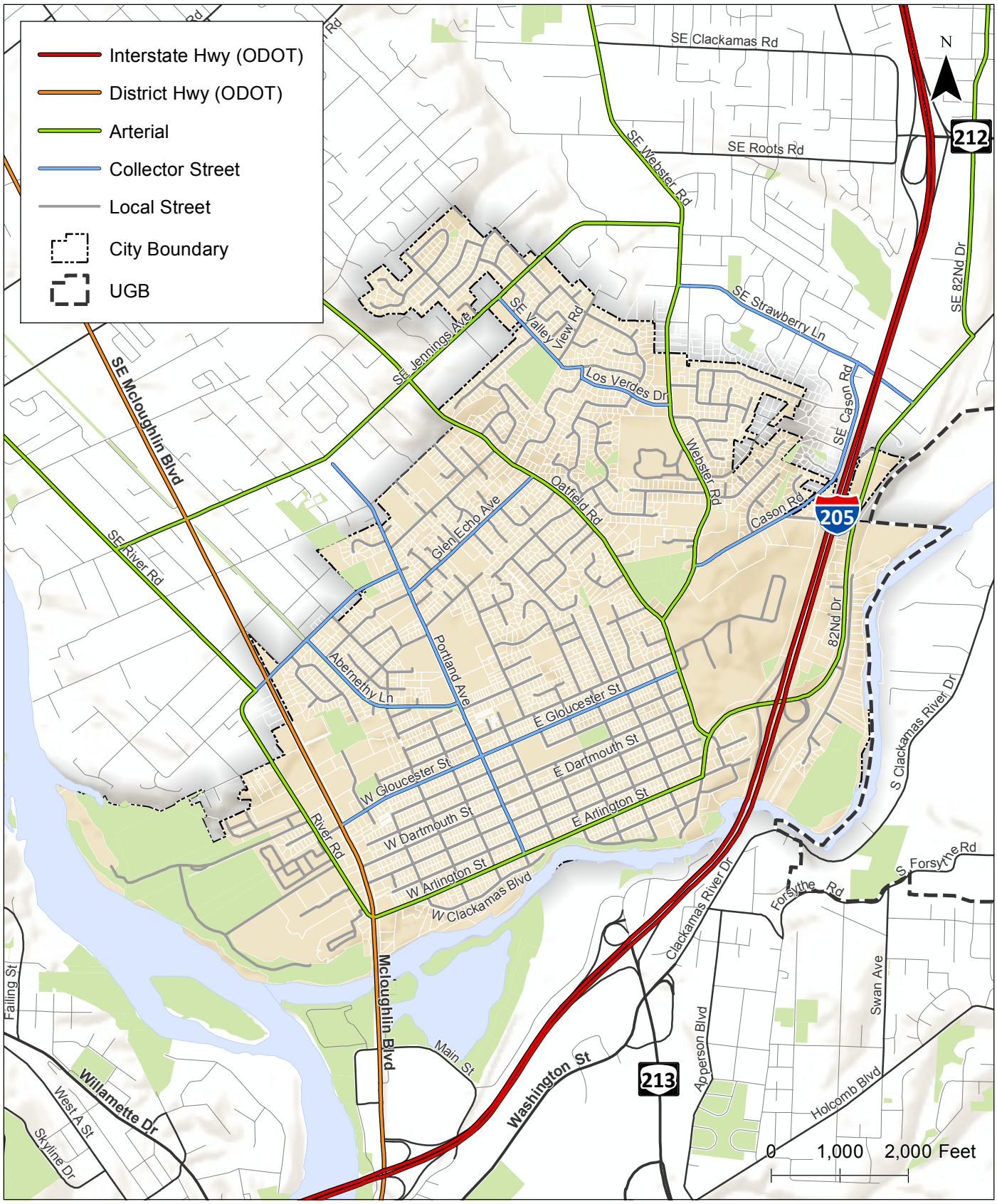
The street system within Gladstone is largely built-out and there are few opportunities to construct new roadways. There are also few operational issues under existing and projected future traffic conditions. Therefore, the Motor Vehicle Plan includes projects to increase the efficiency of the transportation 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**

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

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ROADWAY CROSS SECTION STANDARDS

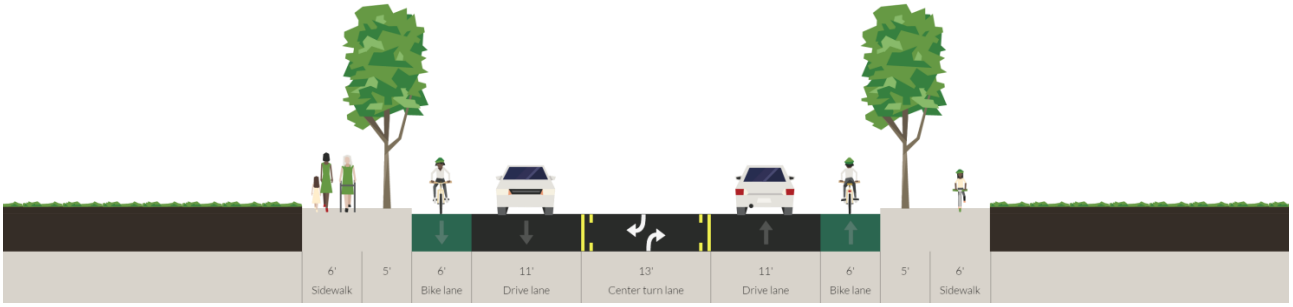
The roadway cross section standards generally reflect the characteristics of existing roadways within the city. While the actual design of roadways can (and will) vary from street to street and segment to segment due to adjacent land uses and demand, the roadway cross section standards are intended to 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.

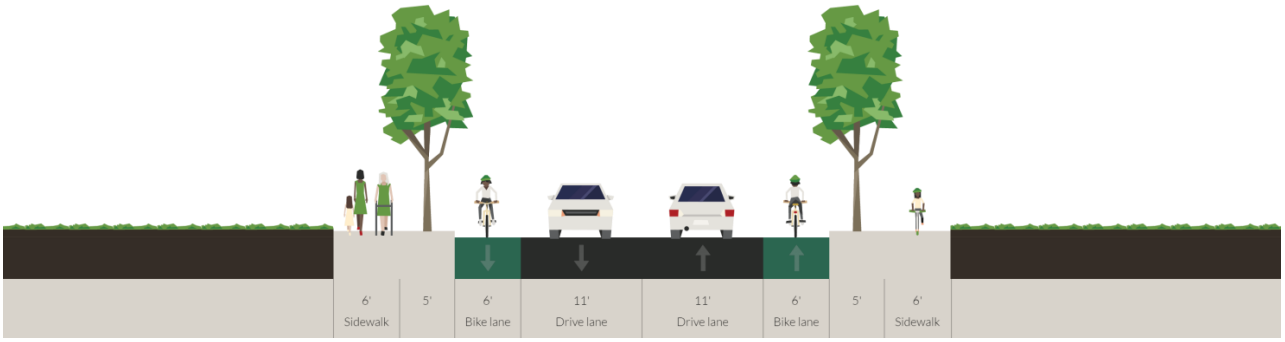
Table 16: City of Gladstone Roadway Cross Section Standards

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

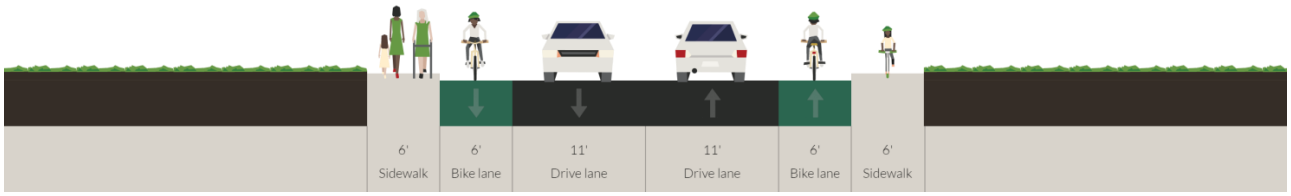
Exhibit 6: Arterial Cross Sections



Arterial with Median/Center Turn Lane



Arterial without Median/Center Turn Lane



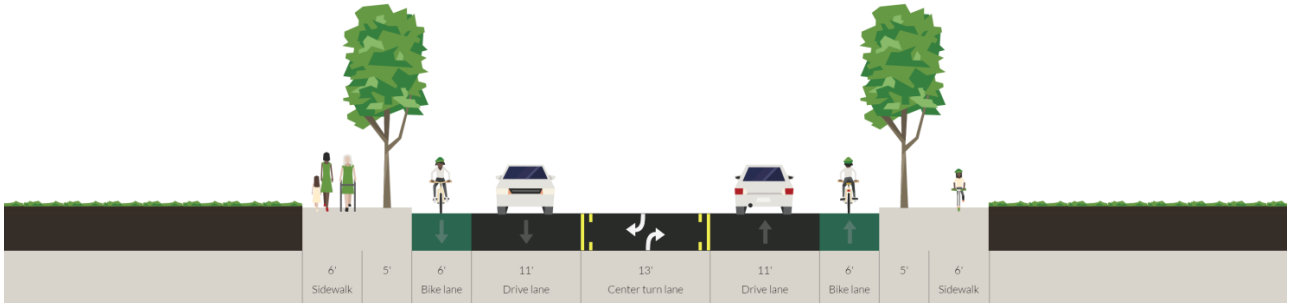
Arterial Constrained

Table 17: Arterial Cross Section Standards

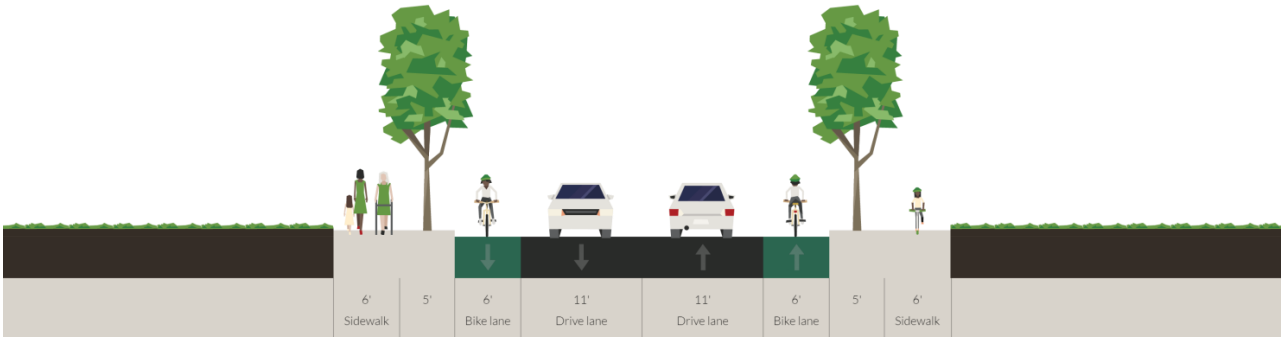
Standards	Arterial
Vehicle Lanes	11-12 feet
On-Street Parking	7-8 feet in Commercial Zones[1]
Bike Lanes	6-7 feet
Sidewalks	6 feet; 10-12 feet in Commercial Zones
Landscape Strips	5-6 feet[2, 3]
Median/Center Turn Lane	13-14 feet
Neighborhood Traffic Management	Not Appropriate

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.

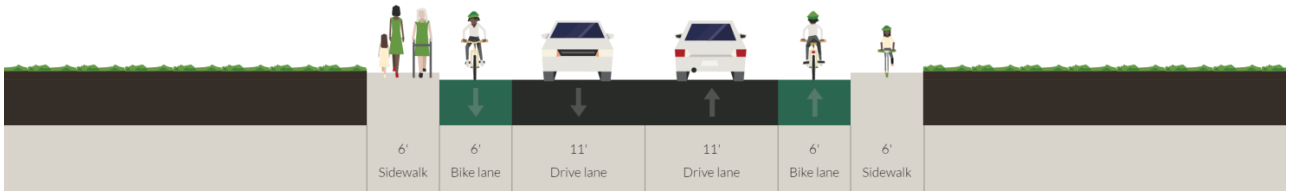
Exhibit 7: Collector Cross Sections



Collector with Median/Center Turn Lane



Collector without Median/Center Turn Lane



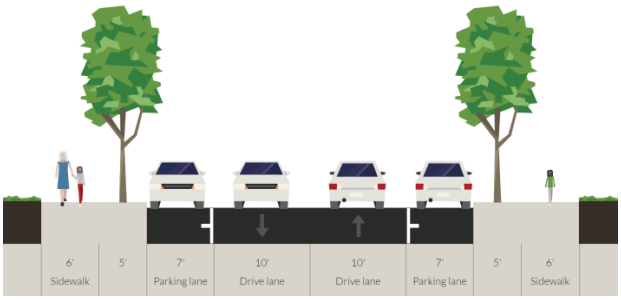
Collector Constrained

Table 18: Collector Cross Section Standards

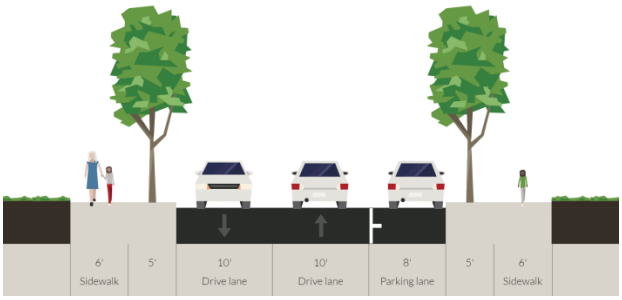
Standards	Arterial
Vehicle Lanes	10-12 feet
On-Street Parking	7-8 feet in Commercial Zones[1]
Bike Lanes	5-6 feet[2]
Sidewalks	6 feet; 8-19-feet in commercial Zones
Landscape Strips	5-6 feet[3, 4]
Median/Center Turn Lane	13-14 feet
Neighborhood Traffic Management	Only in special circumstances

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.

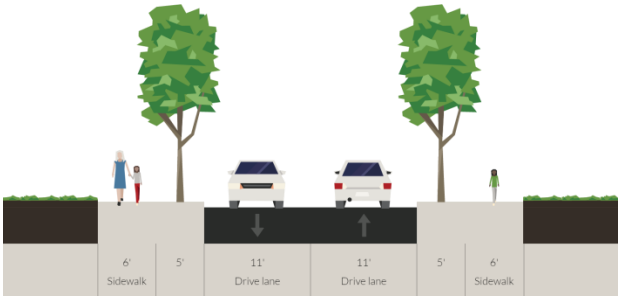
Exhibit 8: Local Street Cross Sections



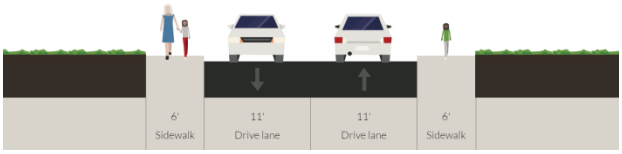
34-foot Local (Parking on Both Sides)



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.

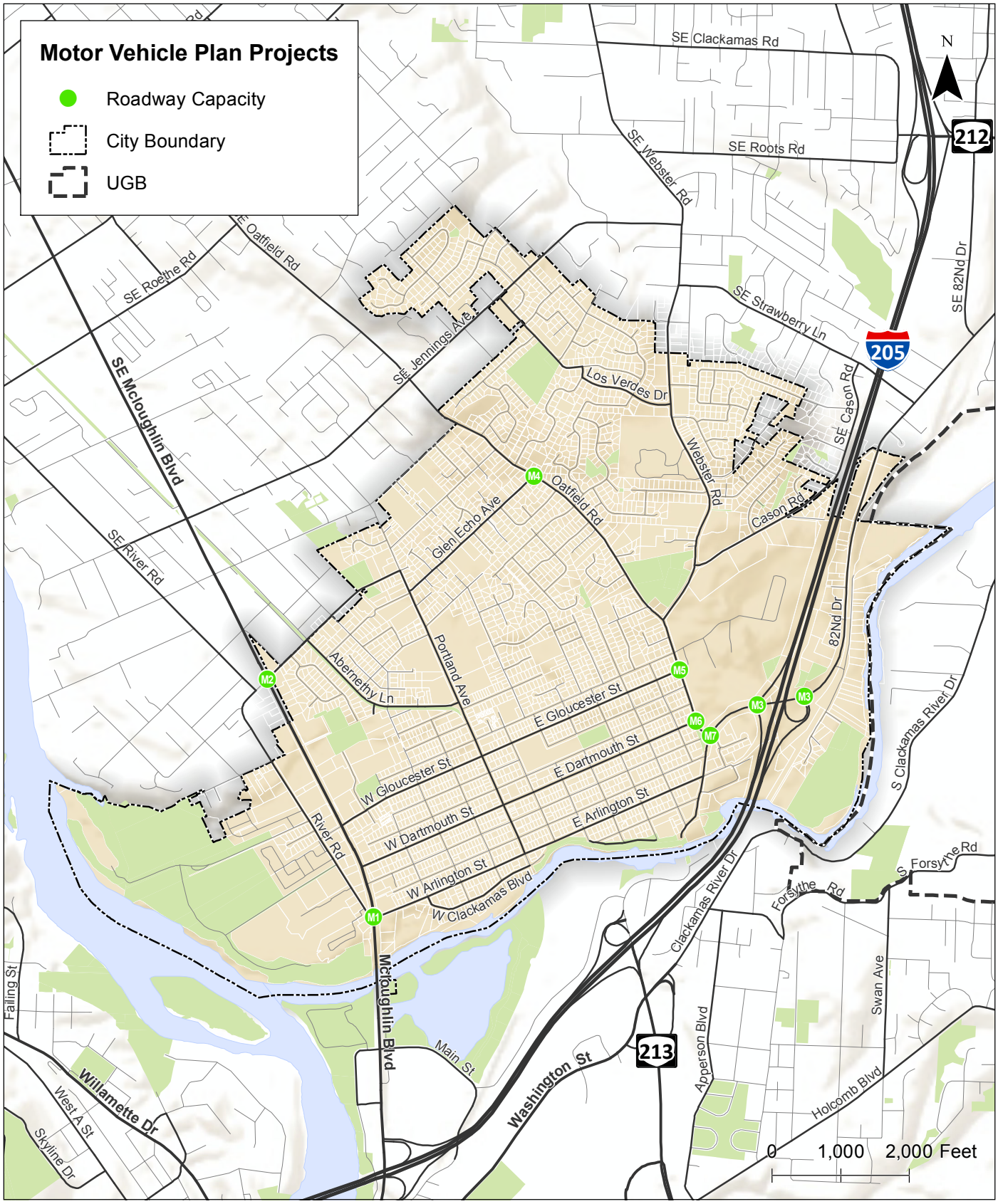
Motor Vehicle Plan

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

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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

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