TRANSPORTATION SYSTEM PLAN

Warrenton, Oregon
Adopted January 2019

"Making a difference through excellence of service"

CITY OF WARRENTON

ACKNOWLEDGMENTS

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The Context chapter describes the city of Warrenton and its existing transportation system. Current and potential issues are outlined and funding constraints are described.

Vision

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Plan

The Plan chapter outlines the lists of financially constrained and aspirational projects identified to be achieve the community's vision for the transportation system.

Standards

The Standards chapter outlines the requirements that the system must meet in order to fulfill the goals and objectives identified by the community.

CONTEXT

CONTEXT

What is a Transportation System Plan?

A TSP is a long-range plan that sets the vision for a community's transportation system for the next 20 years. This vision is developed through community and stakeholder input and is based on the system's existing needs, opportunities, and anticipated available funding.

In compliance with State requirements, the City of Warrenton updated the City's TSP, replacing the previous TSP was adopted in 2004. This Warrenton TSP update establishes a new 2016 baseline condition and identifies transportation improvements needed through the year 2040. The TSP addresses compliance with new or amended federal, state, and local plans, policies, and regulations including the Oregon Transportation Plan, the State's Transportation Planning Rule, and the Oregon Highway Plan.

How was this TSP developed?

The best way to build a community-supported TSP is through an open, inclusive process. The decision-making structure for this TSP was developed to establish clear roles and responsibilities throughout the project.

Warrenton Committee
was responsible for all final decisions for this TSP project.

Citizen Advisory Committee (CAC)
was approved by the City Committee to provide community-based recommendations. The CAC was the primary recommendation body for the project team.

Project Management Team (PMT)
made recommendations to the City Committee based on technical analysis and stakeholder input.

Public Engagement

The strategy used to guide stakeholder and public involvement throughout the TSP update reflects the commitments of the City of Warrenton and the Oregon Department of Transportation (ODOT) to carry out public outreach that provided community members with the opportunity to weigh in on local transportation concerns and to provide input on the future of transportation within their city.

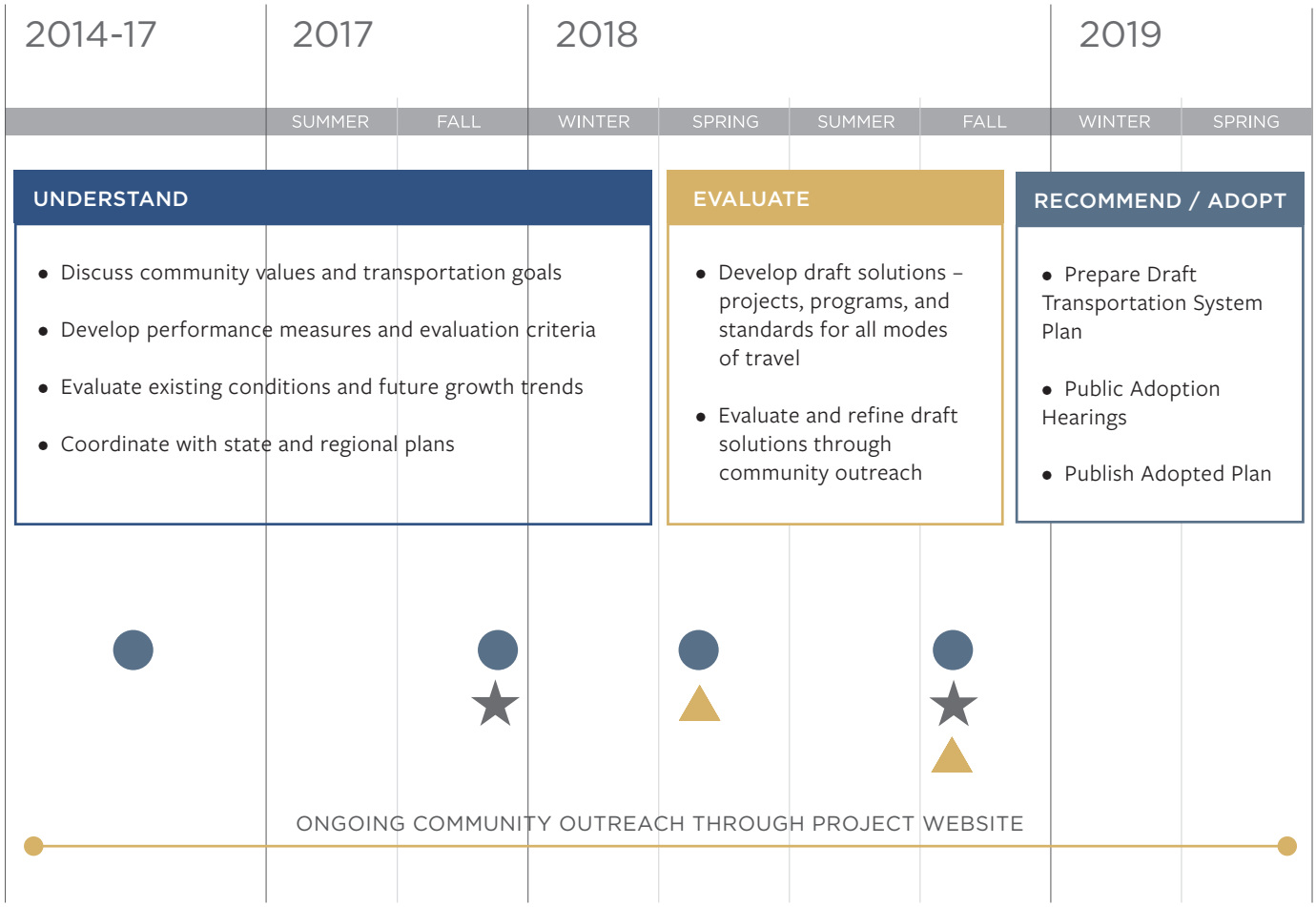
The City of Warrenton involved the public and stakeholders through a series of committee meetings, public open houses, and work sessions with elected officials and by providing project materials through the project's website www.warrentontsp.com. Engaging community members and organizations in the TSP process included engaging with the CAC, which included members representing:

- Oregon Department of Transportation (ODOT)
- City of Warrenton
- Clatsop County

Figure 1. Warrenton TSP Decision-Making Structure

- Warrenton-Hammond School District
- Emergency service providers
- Warrenton Business Association
- Sunset Empire Transportation District
- Other key community groups and stakeholders
- General public

Figure 2. City of Warrenton TSP Development Process



WARRENTON 2016

WARRENTON 2016

Warrenton is situated on the most northwestern point of Oregon, adjacent to the Pacific Ocean, Fort Stevens State Park and the mouth of the Columbia River. Although Warrenton has a shared history and ongoing connection with the City of Astoria, its neighbor to the northeast, Warrenton has its own unique character. Warrenton residents and visitors alike have access to significant amounts of open space, city parks and water features, as well as important historical sites, within the City's boundaries.

Key Destinations

An important aspect of evaluating and planning an effective transportation system is knowing where the people want to go. Warrenton has several destinations that attract a variety of visitors. Generally, these community features can be grouped into the following:

- Schools (e.g. Warrenton Prep, Warrenton Grade School, Warrenton High School)
- Places of employment (e.g. business areas, industrial areas, offices, airport)
- Shopping (e.g. downtown core, grocery stores, shopping centers, restaurants)
- Recreational (e.g., Fort Stevens State Park, beach, Warrenton Waterfront Trail)
- Cultural (e.g. Maddox Dance Studio, library, Wreck of the *Peter Iredale*)
- Public Transportation (e.g. Bus stops)

Wreck of the *Peter Iredale*

Warrenton Fiber-Nygaard Logging

Warrenton Waterfront Trail

Figure 3. Warrenton TSP Study Area

CITY OF WARRENTON | Transportation System Plan

Data Sources:
ESRI, ArcGIS Online, World Topography Map. 2015.
City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.

Document Path: C:\Users\emily.guise\Documents\ArcGIS\Packages\Fig_7-01_WarrentonTSP_CommunityFeatures_70D03253-7ED5-4AD0-A895-DCB23063A6B7\v10\Fig_01_WarrentonTSP_CommunityFe

Current and Anticipated Issues

Warrenton's existing transportation system poses issues for all users, including the following:

PEDESTRIANS & BICYCLISTS

On Warrenton-Astoria Highway, there is no sidewalk present on the south side of Harbor Drive/Marlin Avenue from 160 feet east of SE Anchor Avenue to SE Galena Avenue.

Sidewalks do not exist from SE/NE King Avenue to SE 2nd Street, or on the east side of the roadway approximately 160 feet north of SE 11th Place to the City limits.

Bicycle and pedestrian safety on the Old Youngs Bay and New Youngs Bay Bridges.

Sidewalks do exist on the north side of Warrenton-Astoria Highway between NE Heron Avenue and Ensign Road.

Most pedestrian facilities can be rated "poor" when considering what type of system is currently in place in Warrenton. This means that facilities either are not in place or a pedestrian is required to travel along a roadway shoulder against vehicles at higher speeds.

It is apparent that the current network service system is only partially connected.

TRANSIT USERS

Warrenton has about 10 bus stops. Improved access to transit may make this more desirable travel option for some community members.

Of the bus stops, only a fraction offer benches and shelter to the surrounding neighborhoods and businesses.

DRIVERS

Warrenton is expected to experience more tourism traffic, as well as increased congestion in neighboring communities such as Astoria.

The New Youngs Bay Bridge (US 101) and the Old Youngs Bay Bridge (US 101 Business) are existing bottlenecks in the traffic that travels to and from Astoria that are expected to increase by 2040.

US 101 between mile point 6.48 and 6.58 (by SE Neptune Drive) and US 101 between mile point 7.96 and 8.09 (by SE Ensign Lane) were identified as a high collision roadway segments.

Funding Constraints

The City's current revenue sources are expected to provide about $21 million through 2040. This estimate is based on the assumption that the average amounts received over the previous five years will continue to be received at that per capita rate through 2040. Warrenton is expected to generate $384,000 in Local Motor Vehicle Fuel Tax and $378,000 in State Highway Fund shared revenue. House Bill 2017 is expected to contribute an additional $121,000 annually. Forecast estimated System Development Charges (SDC) revenue was based, instead, on the current SDC rates that was used in the City's SDC methodology (for residential developments $669 per single-family dwelling and for non-residential developments $436 per hour per trip) and the forecasted yearly population and employment growth through 2040. This calculation yields an estimate of $1,784,400 over the planning horizon.

The current funding sources summarized below and potential additional funding sources are detailed in Volume 2 in Technical Memorandum #9.

ODOT Statewide Transportation Improvement Program (STIP) Enhance Funding

ODOT has modified the process for selecting projects that receive STIP funding to allow local agencies to receive funding for projects off the state system. Projects that enhance system connectivity and improve multi-modal travel options are the focus. The updated TSP prepares the City to apply for STIP funding. It is expected that ODOT will allocate about $5

million for improvements in Warrenton over the planning horizon.

Transportation Utility Fee

A transportation utility fee is a recurring monthly charge that is paid by all residences and businesses within the City. The fee can be based on the number of trips a particular land use generates or as a flat fee per unit. It can be collected through the City's regular utility billing. Assuming a flat fee of $5.00 per month per water meter for both residential and $ 0.5 per month per square foot for non-residential uses in the City, the City could collect approximately an additional $19 million ($1.6 million average annually) for transportation related expenses through 2040.

ODOT All Road Transportation Safety (ARTS) Funding

ODOT All Roads Transportation Safety Program is a competitive data-driven funding program that is used to address safety challenges on all public roads, including the local and state system. It is focused on reducing fatal and serious crashes. Safety funding will be distributed to each ODOT region, which will collaborate with local governments to select projects that can reduce fatalities and serious injuries, regardless of whether they lie on a local road or a state highway.

Safe Routes to School

The Oregon Safe Routes to School (SRTS) Program has money allocated for projects that improve connectivity for children to walk, bike and roll to and from school. Potential grant funds are distributed as a reimbursement program through an open and competitive process. Funding is available through this program for pedestrian and bicycle infrastructure projects within two miles of schools. These funds should be pursued to implement key pedestrian and bicycle projects identified through the SRTS process. The Warrenton Grade School is an ideal candidate due to its proximity to downtown and S Main Ave.

General Fund Revenues

At the discretion of the City Council, the City can allocate General Fund revenues to pay for its transportation program (General Fund revenues primarily include property taxes, use taxes, and any other miscellaneous taxes and fees imposed by the City). This allocation is completed as a part of the City's annual budget process, but the funding potential of this approach is constrained by competing community priorities set by the City Council. General Fund resources can fund any aspect of the program, from capital improvements to operations, maintenance, and administration. Additional revenues available from this source are only available to the extent that either General Fund revenues are increased or City Council directs and diverts funding from other City programs.

Urban Renewal District

An Urban Renewal District (URD) would be a tax-funded district within the City. The URD would be funded with the incremental increases in property taxes that result from construction of applicable improvements. This type of tax increment financing has been used in Oregon since 1960. Use of the funding includes, but is not limited to, transportation. Improvements are funded by the incremental taxes, rather than fees. The City has an existing URA serving the downtown core area.

Local Improvement Districts

Local Improvement Districts (LIDs) can be formed to fund capital transportation projects. LIDs provide a means for funding specific improvements that benefit a specific group of property owners. LIDs require owner/voter approval and a specific project definition. Assessments are placed against benefiting properties to pay for improvements. LIDs can be matched against other funds where a project has system wide benefit beyond benefiting the adjacent properties. LIDs are often used for sidewalks and pedestrian amenities that provide local benefit to residents along the subject street. The City has no active LIDs.

Debt Financing

While not a direct funding source, debt financing can be used to mitigate the immediate impacts of significant capital improvement projects and spread costs over the useful life of a project. This has been successful recently in Oregon communities such as Bend and McMinnville, where general obligation (GO) bond measures were passed. Key to the measures' success was that the increased property taxes were earmarked toward a defined set of projects with strong public support.

Though interest costs are incurred, the use of debt financing can serve not only as a practical means of funding major improvements, but is also viewed as an equitable funding strategy, spreading the burden of repayment over existing and future customers who will benefit from the projects. The obvious caution in relying on debt service is that a funding source must still be identified to fulfill annual repayment obligations.

In addition, a "value capture" district is another financing tool to consider similar to urban renewal but uses a payment in lieu of taxes (PILOT) from large institutions and employers to finance the repayment of bonds.

THE VISION

THE VISION

The Vision

The process of identifying a vision, goals, and objectives uncovers the transportation system that best fits Warrenton's values and sets the guide for development and implementation of the TSP.

The goals and objectives will guide the development of the transportation system plan, while the evaluation criteria will be used to evaluate and prioritize future transportation programs and improvements against the goals and objectives. Once adopted, the goals and objectives, as well as the project list, will become part of Warrenton's Comprehensive Plan. The goals and objectives outlined below were largely developed from previous local plans, including: 2004 Warrenton Transportation System Plan, 2009 Revised Warrenton Transportation System Plan, 2007 Warrenton Urban Renewal District Plan, Warrenton Comprehensive Plan , 2010 Warrenton Downtown and Marina Master Plans, 2005 Hammond Marina Master Plan, 2010 Warrenton Parks Master Plan, and 2008 Warrenton Trails Master Plan.

Towards the end of the process, once solutions were identified, policy statements to guide future decisions were developed to help the City implement plan recommendations.

Goals & Objectives

Goal 1: Health

Develop a transportation system that maintains and improves individual health by maximizing active transportation options.

Objectives

1. Maximize active transportation options.
2. Provide recreational opportunities outlined in the 2008 Warrenton Trails Master Plan.

Goal 2: Safety

Develop a transportation system that maintains and improves public safety and effectively manages evacuations and emergency response preceding and following natural disasters.

Objectives

1. Improve safety and provide safe connections for all modes.
2. Meet applicable City and Americans with Disabilities (ADA) standards.
3. Increase public safety.
4. Improve signage for streets, pedestrian and bike ways, and trails as well as directional signs to points of interest.
5. Create safe routes and connections for vehicles, bicycles, and pedestrians, especially across US 101.
6. Limit access points on highways and major arterials, and use techniques such as alternative access points when possible.
7. Increase the city's resilience to natural hazards.

Goal 3: Travel Choices

Develop and maintain a well-connected transportation system that offers travel choices, reduces travel distance, improves reliability, and manages congestion for all modes.

Objectives

1. Reduce travel distance for all modes.
2. Improve travel reliability for all modes.
3. Manage congestion for all modes.
4. Encourage ride sharing.
5. Work with the Sunset Empire Transportation District to expand transit service, improve amenities, and develop stations in appropriate locations that efficiently serve resident and employee needs.
6. Provide a network of arterials, collectors, and paths that are interconnected, appropriately spaced, and reasonably direct.
7. Develop unused rights-of-way for pedestrian and bike ways or trails where appropriate.
8. Increase access to the transportation system for all modes regardless of age, ability, income, and geographic location.
9. Encourage development patterns that offer connectivity and mobility options for all members of the community.
10. Balance the desires of community members with public agency requirements.

Goal 4: Economic Vitality

Support the development and revitalization efforts of the City, Region, and State economies and create a climate that encourages growth of existing and new businesses.

Objectives

1. Balance needs for freight system efficiency, access, and capacity with needs for local circulation, safety, and access.
2. Manage parking efficiently and ensure that it supports downtown business needs and promotes new development.
3. Balance the simultaneous needs to accommodate local traffic and through-travel on state highways.
4. Provide transportation facilities that support existing and planned land uses.
5. Enhance the vitality of the Warrenton downtown area by incorporating design elements for all modes in roadway design standards.
6. Ensure that all new development contributes a fair share toward on-site and off-site transportation system improvements.
7. Support expansion of local boating and shipping activities, including the development of waterfront activities along the Skipanon River, Youngs Bay, and Alder Cove.
8. Enhance the connection of the Warrenton Harbor to the surrounding community.
9. Enhance tourism opportunities and access to tourist attractions.

Goal 5: Livability

Customize transportation solutions to suit the local context while providing a system that supports active transportation, promotes public health, facilitates access to daily needs and services, and enhances the livability of Warrenton neighborhoods and business community.

Objectives

1. Minimize adverse social and economic impacts created by the transportation system, including balancing the need for street connectivity and the need to minimize neighborhood cut-through traffic.

2. Develop safe, connected pedestrian and bicycle facilities near schools, high-density residential districts, commercial districts, and waterfront areas.

3. Balance downtown livability with the need to accommodate freight access to industrial and waterfront areas.

4. Design streets to serve the widest range of users, support adjacent land uses, and increase livability.

5. Enhance the quality of life in commercial areas and in neighborhoods.

6. Improve public access to the waterfront and trails along the waterfront.

7. Develop transportation facilities that will allow development without major disruption of existing neighborhoods or the downtown area.

Goal 6: Sustainability

Provide a sustainable transportation system that meets the needs of present and future generations and is environmentally, fiscally and socially sustainable.

Objectives

1. Support travel options that allow individuals to reduce single-occupant vehicle trips.

2. Minimize damage to the environment.

3. Support the reduction of greenhouse gas emissions from transportation sources.

4. Support and encourage transportation system management (TSM) and transportation demand management (TDM) solutions to congestion.

5. Preserve and protect the City's historic sites.

Goal 7: Fiscal Responsibility

Plan for and implement an economically viable transportation system that protects and improves existing transportation assets while cost-effectively enhancing the total system.

Objectives

1. Plan for an economically viable and cost-effective transportation system.

2. Identify and develop diverse and stable funding sources to implement recommended projects in a timely fashion and ensure sustained funding for transportation projects and maintenance.

3. Make maintenance and safety of the transportation system a priority.

4. Maximize the cost effectiveness of transportation improvements by prioritizing operational enhancements and improvements that address key safety and congestion issues.

5. Identify local street improvement projects that can be funded through grant programs.

6. Provide funding for the local share (i.e. match) of capital projects jointly funded with other public partners.

7. Prioritize funding of projects that are most effective at meeting the goals and policies of the Transportation System Plan.

Goal 8: Compatibility

Develop a transportation system that is consistent with the City's Comprehensive Plan and that is coordinated with County, State, and Regional plans.

Objectives

1. Coordinate, support, and cooperate with adjacent jurisdictions and other transportation agencies to develop transportation projects that benefit the City, Region, and State as a whole (e.g. evacuation routes, county-wide transit, and jurisdictional transfer of roadways).

2. Work collaboratively with other jurisdictions and agencies to ensure the transportation system functions seamlessly.

3. Coordinate land use and transportation decisions to efficiently use public infrastructure investments to meet goals and objectives.

4. Maintain and implement functional classification standards and criteria.

5. Coordinate with other jurisdictions and community organizations to develop and distribute transportation-related information.

6. Review City transportation standards periodically to ensure consistency with Regional, State, and Federal standards.

7. Coordinate with the County and State agencies to ensure that improvements to County and State highways within the city benefit all modes of transportation.

8. Participate with ODOT, Clatsop County, and Astoria in the revision of their transportation system plans, and coordinate with neighboring jurisdictions regarding land development outside of the Warrenton urban growth boundary to ensure provision of a transportation system that serves the needs of all users.

9. Participate in updates of the ODOT State Transportation Improvement Program (STIP) and Clatsop County Capital Improvement Program (CIP) to promote the inclusion of projects identified in the Warrenton TSP.

10. Coordinate with the U.S. Army Corps of Engineers and the Oregon Division of State Lands to maintain appropriate operating depths at marina facilities, and identify beneficial uses of dredged material resulting from maintenance dredging.

11. Work to protect airspace corridors and airport approaches.

12. Coordinate planning for lifeline and evacuation routes with local, State, and private entities.

WARRENTON IN 2040

WARRENTON IN 2040

Future land use changes and growth in population, housing, and employment within Warrenton's urban growth boundary (UGB) will have a significant impact on the existing transportation system and will create new travel demands. These growth projections and how they translate to new trips on the transportation network are key elements of the future conditions and performance analysis.

Forecasted Population and Employment Growth

Understanding the influence of area land uses on the transportation system is a key factor in transportation system planning. The amount of land that is to be developed, the types of land uses, and their proximity to each other have a direct relationship to expected demands on the transportation system.

The process for developing future 2040 traffic volume forecasts for Warrenton involved three key components:

The Astoria-Warrenton regional travel demand model was utilized as the primary tool to estimate future travel demand in Warrenton, using a base model year of 2015 and a future model year of 2035.

Refined travel demand forecasts were developed by adding local circulation characteristics in the travel demand model as needed (using a focus area approach).

The 20-year growth increment between the base and future year models was extrapolated to a 25-year increment and then added to the base year 2015 count data (referred to as post-processing) to develop final year 2040 traffic volume forecasts for Warrenton.

As shown in Table 1, the 2015 model included approximately 2,179 households (representing 5,175 people) and 3,410 employees within the Warrenton UGB. With expected growth to the horizon year 2035, 579 households (or about 27 percent growth) are projected to be added, while the total employment is projected to grow by approximately 1,370 employees (40 percent growth). These future totals within the UGB were established in coordination with City using new population forecasts for Clatsop County and its cities.

Warrenton is currently experiencing a steep growth trajectory with several housing subdivision and employment-related land use applications being filed. The control totals shown in Table 1 represent our best estimate of 20-year growth given the available data and studies, and we understand that growth will not be linear over the 20 years.

Table 1. Warrenton UGB Land Use Summary

LAND USE	2015	2035	PERCENT INCREASE
Population	5,175	7,410	43%
Households	2,179	3,153	45%
Total Employment	3,410	4,934	45%

Note: Land use summary based on travel demand model and zones that approximate the Warrenton UGB

Future Conditions without Improvements

The population, housing, and employment growth projected to occur through 2040 will result in increased travel demands within and through the city. An evaluation of Warrenton's transportation system under these conditions was performed to understand how transportation needs might change if no further investments to improve the system were made. This resulted in the following findings:

The forecast generated by analysis of the future 2040 roadway system identifies the following findings:

- The US 101 signalized intersections at E Harbor Drive, Marlin Drive and SE Ensign Lane are all expected to operate at levels above their corresponding mobility targets.
  - Future (2040) Summer PM Peak Hour
- Driving needs: The future summer and average weekday conditions each have separate needs:
  - Future (2040) Average Weekday PM Peak Hour
- Alternative Mobility Targets: There is a need to pursue alternative mobility targets along US 101, as it is not expected that enough capacity can be reasonably added to this facility to alleviate congestion during summer months.
- Including the three intersections operating worse than mobility targets under the average weekday conditions, four additional intersections worsen to exceed mobility targets: US 101 at SE Neptune Drive, OR 104/Ft Stevens Highway at NE Skipanon Drive/S Main Avenue, E Harbor Drive at Marline Drive and OR 104/S Main Avenue at SW 2nd Street.
- Safety Needs: High collision locations were identified at 4 signalized intersections along US 101. Warrenton has two SPIS locations. Both are on US 101 and each include a signalized intersection, at East Harbor Street and Ensign Lane.[1]
- Walking and Biking Needs: Warrenton lacks existing bike and pedestrian facility networks to adequately connect neighborhoods with commercial, institutional, recreational areas, and transit stops. Future improvements could improve safety and accessibility of using active modes of transportation to get around the City.
- Transit Needs: There are a limited number of transit stops and there are gaps in service and frequency. Some neighborhoods to the south and west of downtown are not within comfortable walking distance to a transit stop. An expansion in the number of stops and buses on routes would be required to fully serve all areas of the City.
- Freight Needs: Warrenton's only Federal Truck Route is US 101. It is important that future improvements maintain the geometry required to accommodate large freight vehicles along US 101.

1 ODOT SPIS Report 2015(2012-2014 Data): Top ten percent SPIS sites

Preparing for Smart Mobility

Emerging vehicle technology and design approaches will shape our roads, communities, and daily lives. As vehicles become more connected, automated, shared, and electric, the way we plan, design, build, and use our transportation system will change.

When discussing these vehicles as a whole, they can be referred to as connected, automated, shared, and electric (CASE) vehicles. Many of these vehicles will not be exclusive of the others and it is important to think of the host of implications that arise from the combination of these technologies.

Connected Vehicles (CVs) will enable communications between vehicles, infrastructure, and other road users. This means that our vehicles will be able to assist human drivers and prevent crashes while making our system operate more smoothly.

Automated Vehicles (AVs) will, to varying degrees, take over driving functions and allow travelers to focus their attention on other matters. Today, we already have vehicles with combined automated functions such as lane keeping and adaptive cruise control. However, these still require constant driver oversight. In the future, more sophisticated sensing and programming technology will allow vehicles to operate with little to no operator oversight.

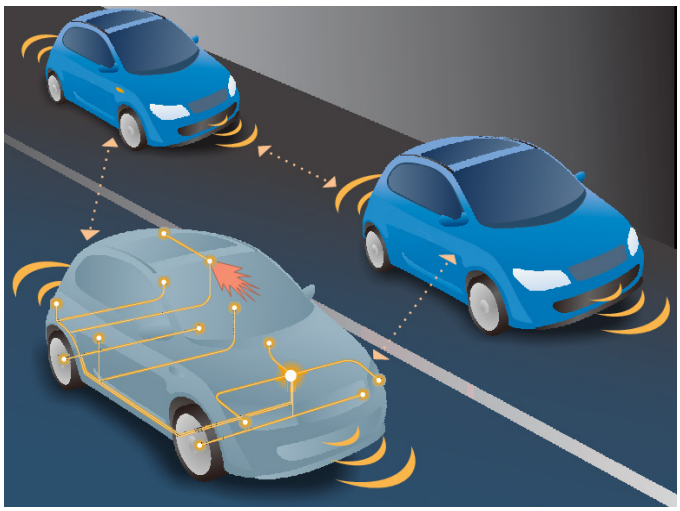
Shared Vehicles (SVs) are already on the road today that allow ride-hailing companies to offer customers access to vehicles through smart phone applications. Ride-hailing applications allow for on-demand transportation with comparable convenience to car ownership without the hassle of maintenance and parking. Ride-hailing applications can enable customers to choose whether share a trip with another person along their route, or travel alone.

Electric Vehicles (EVs) have been on the road for decades and are becoming more economically feasible as the production costs of batteries decline.

Planning for Change

The impacts of CASE vehicles on road capacity are uncertain. After CASE vehicles are widely adopted, there is a high likelihood that increases in road capacity will correspond with increasing traffic demand. We can expect that congestion will continue to persist.

Figure 4. Vehicle-to-Vehicle Communication



The expected congestion can be used to encourage use of transit, shared vehicles, and bike share. These modes could all be encouraged through pricing mechanisms that are vastly less expensive to implement than building more road capacity. A variety of pricing mechanisms are enabled with CASE technology because these vehicles will be tracked geographically, and by time of day. With time/location data, transportation system operators will be able to develop pricing mechanisms that reduce congestion at a lower cost than other roadway improvements. Larger cities will be the first to implement these strategies and smaller cities should follow these developments closely.

Potential Impacts, Questions and Policy Considerations

CONGESTION AND ROAD CAPACITY

Anticipated Impacts

- AVs may provide a more relaxing or productive experience and people may have less resistance to longer commutes.
- Shared AVs will likely cost significantly less on a per mile basis, increasing demand for travel.
- CVs will allow vehicles to operate safely at closer following distances. In the long run, this will increase road capacity in the long run as CVs and AVs comprise increasing portions of the public and private fleet of vehicles.
- In the near term, as AVs still make up a fraction of the fleet of vehicles, road capacity could decrease as AVs operate more slowly and cautiously than regular vehicles.
- A new class of traffic — zero-occupant vehicles — may increase traffic congestion
- Roadways may need to be redesigned or better maintained to accommodate the needs of automated driving systems.

Questions

- How much will AVs cost for people to own them personally?
- How much will AVs cost if they are used as a shared fleet?
- How does cost and the improved ride experience of AVs influence travel behavior?
- How much more efficiently will AVs operate compared to regular human driven vehicles once they dominate the vehicle fleet?
- How will AVs impact road capacity in the near term as they are deployed in mixed traffic with human driven vehicles?
- What portion of traffic will be zero-occupant vehicles and what areas will likely generate the highest portion of zero-occupant vehicles looking for parking or waiting for their next passenger?

PARKING

Because AVs and Shared AVs will be able to park themselves, travelers will elect to get dropped off at their destination while the vehicle goes to find parking or its next passenger. With parking next to their destination no longer a priority for the traveling public, parking may be over-supplied in many areas and new opportunities to reconfigure land use will emerge.

Questions

- How does vehicle ownership impact parking behavior?
- What portion of the AV fleet will be shared?
- How far out of the downtown area will AVs be able to park while remaining convenient and readily available?

Considerations

- Consider building new parking garages that can be converted (with flat instead of ramped floors) to other uses in case AVs make them underutilized in their lifetime. If that isn't financially feasible, consider alternative transportation demand management strategies.
- Consider revising minimum parking requirements for new developments, especially in areas that are within one mile of transit.
- Consider system development charges that fund the installation of charging stations in new developments.

CURB SPACE

The ability to be dropped off at your destination will also create more potential for conflicts in the right-of-way between vehicles dropping off passengers, vehicles moving through traffic, and vehicles parked on the street. In urban areas with ride-hailing companies, popular destinations are already experiencing significant double-parking issues. Curb-space management is a growing consideration. Jurisdictions should inventory parking utilization and identify areas that could be converted from parking to curbside pick-up and drop-off zones.

PACKAGE DELIVERY

With the use of AVs to deliver packages, food, and expanded services, these vehicles will need to be accommodated in the right-of-way. For instance, if the AV parks at the curb in a neighborhood and smaller robots are used to deliver packages to the door, new conflicts will arise between vehicles, pedestrians, and bicyclists.

TRANSIT

AVs could become cost competitive with transit and undermine transit ridership as riders prefer a more convenient alternative. However, transit will remain the most efficient way to move high volumes of people through constricted urban environments. AVs will not eliminate congestion and as discussed above, could exacerbate it — especially in the early phases of AV adoption. In addition, shared AVs may not serve all areas of a community and underserved communities still require access to transit to meet daily needs.

To avoid potential equity and congestion issues, transit agencies need to work together to integrate the use of automated vehicles and transit. Transit needs to adapt to new competition in the transportation marketplace as well as consider adopting CASE technologies to support transit operations.

Considerations

- Partnering with ride-hailing companies to provide first and last-mile solutions.
- Working with ride-hailing companies and bike share to integrate payment platforms and enable one button purchase of a suite of transportation options for multimodal trips.
- Creating fixed route autonomous shuttles to provide first and last-mile solutions.
- Creating on-demand autonomous shuttles to provide first and last-mile solutions.

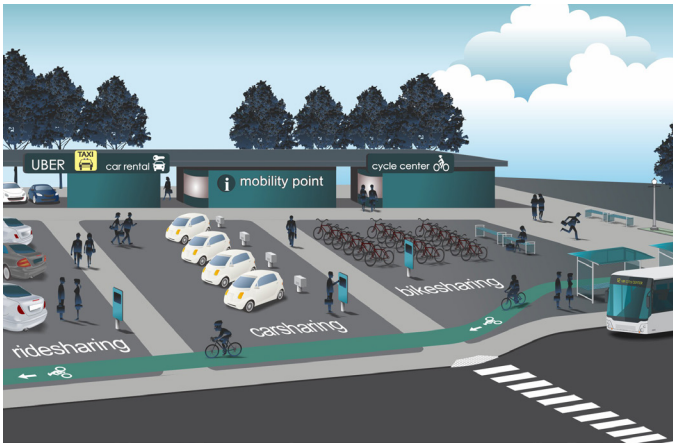
ELECTRIC VEHICLE CHARGING

To accommodate a future where electric vehicles will come to dominate our vehicle fleet, charging station capacity will need to be increased. Cities, electric utilities, regions, and states will need to work together to meet the significant increase in demand.

MOBILITY HUBS

A mobility hub is a central location that serves as a multimodal connection point for transit, car share, bike share, and ride share stations, see Figure 21. This system can serve as a tool to encourage travelers to take seamless multimodal trips that are well timed and convenient. Mobility hubs make the most sense to put in transit centers that are located near urbanized areas with multimodal supportive infrastructure (e.g., protected bike lanes) to maximize connectivity for first and last-mile solutions.

Figure 5. Mobility Hub



THE PLAN

THE PLAN

The purpose of the Warrenton TSP Update is to determine how best to serve the future transportation needs of Warrenton residents, businesses, and visitors. The existing and future conditions analysis suggest that the TSP will incorporate multi-modal options with the vision of the community to define draft transportation system solutions that address local needs.

Evaluating the Possibilities

Recommended solutions were developed to be consistent with the project vision and goals and to focus on creating a balanced system able to provide travel options for a wide variety of needs and users. The list of recommended projects was prioritized using guidance provided by the project goals and objectives and with input from three main sources:

- Review of projects in 2004 TSP Update and other Local and Regional Plans, including:
  - 2015 Clatsop County Transportation System Plan
  - 2010 City of Warrenton Downtown and Marina Master Plans
  - 2018-2023 Warrenton Streets Capital Improvement Program
  - 2010-2030 Warrenton Parks Capital Improvements Plan
  - 2018-2021 Oregon (Final as Amended) Statewide Transportation Improvement Program (STIP)
- New Projects based on identified deficiencies and feedback from public and advisory committees
- System and Demand Management strategies

While the recommended projects include all identified projects for improving Warrenton's transportation system, regardless of their priority or their likelihood to be funded, the TSP planning process eliminated projects that may not be feasible for reasons other than financial limitations (such as environmental or existing development limitations). The recommended project list is composed of the following three lists, created based on each project's priority and likelihood to be funded.

- Aspirational Projects list includes all projects identified in the TSP.
- Likely Funded Projects list identifies the high priority projects from the Aspirational Projects list that could be constructed with funding anticipated through 2040.
- Possibly Funded Projects list identifies projects from the Aspirational Project list that are highly supported but that, due to cost or jurisdiction, were unable to be included in the Likely Funded list. Should additional funding become available, these are projects the City may want to consider.

The City is free to implement projects identified on the Likely Funded list first. Priorities may change over time and unexpected opportunities may arise to fund particular projects. The City is free pursue any of these opportunities at any time. The purpose of the Likely Funded project list is to establish reasonable expectations for the level of improvements that will occur and give the City initial direction on where funds should be allocated. The project design elements depicted are identified for the purpose of creating a reasonable cost estimate for planning purposes. The actual design elements for any project are subject to change and will ultimately be determined through a preliminary and final design process, and are subject to City, County and/or ODOT approval.

Likely Funded Project List

The projects are listed in order of funding priority. Each project is identified by a project ID that consists of a mode acronym and number. Numbers do not imply priority. BP stands for Bicycle and Pedestrian, meaning it is a project primarily benefiting biking and walking; R is for Roadways, meaning it is primarily benefiting driving; T is for transit and benefits transit users, and O is for other, which stands for air or waterway travel improvements.

Table 2. Likely Funded Projects

PROJ. ID	DESCRIPTION	JURISDICTION	LOCATION	COST
BP1	Improve wayfinding signage and visibility of Warrenton Waterfront Trail. Provide a bicycle wayfinding signage network to help guide bicyclists to and from local destinations via bike routes and trails.	Warrenton	Warrenton Waterfront Trail	$50,000
BP2	Provide a path connection and wayfinding for the Airport Dike Trail to cross US 101 at Harbor Drive.	Warrenton / ODOT	Airport Dike Trail: US 101 at Harbor Dr	$34,000-$133,000*
BP3	Install bicycle parking at points of interest, such as downtown Warrenton, the City Park and the Warrenton Soccer Complex.	Warrenton	Parks, downtown, soccer complex	$5,000
BP4	Improve pedestrian crossing at Fort Stevens Hwy 104, Warrenton-Astoria Hwy 105 (E Harbor Dr) and Skipanon Dr/Main Ave	ODOT	Fort Stevens Hwy 104, Warrenton-Astoria Hwy 105 (E Harbor Dr) and Skipanon Dr/Main Ave	$100,000
BP5	Construct a 10-foot wide multi-use path on the east side of Ridge Road from SW 9th Street to the north edge of the Warrenton Soccer Complex.	County/ Warrenton	Ridge Rd: SW 9th St north along soccer fields	$200,000
BP6	Construct an at-grade pedestrian crossing of Ridge Road at the Warrenton Soccer Complex with high visibility paint and advanced signage.	County	Soccer fields and across/along Ridge Rd	$20,000
BP7	Enhance bicycle connectivity in Hammond. *Option A:* Install wayfinding and sharrows on parallel routes (6th and 7th) through Hammond and provide high visibility crosswalk across Pacific Drive. *Option B:* Construct curb, gutter and sidewalks on Pacific Drive through Hammond	ODOT/ Warrenton	Pacific Dr (Hammond)	*Option A:* $50,000 *Option B:* $3,300,000*
BP8	Add bicycle route designation signage for length of Warrenton-Astoria Hwy 105 within Warrenton city limits.	ODOT/ Warrenton	Warrenton-Astoria Hwy 105	$25,000
BP9	Install high visibility crosswalk at the intersection of Fort Stevens Hwy 104 (Main Avenue) at SW 9th Street to enhance visibility of crossing near elementary school.	ODOT/ Warrenton	Fort Stevens Hwy 104 (Main Ave) at SW 9th St	$2,000

PROJ. ID	DESCRIPTION	JURISDICTION	LOCATION	COST
BP10	Upgrade curb and crosswalks to be ADA-compliant at Warrenton Elementary School.	Warrenton	SW Cedar Ave at SW 7th St	$40,000
BP11	New marked crosswalks near community center/park. The crossings at SW 4th Street would also require installation of new curb.	Warrenton	SW Alder Ave at SW 3rd St and SW 4th St	$30,000
BP12	Enhance bicycle visibility on New Youngs Bay Bridge. *Option A:* Install signage indicating bicyclists in outer lane. *Option B:* Install additional bike detection for cyclists traveling along the bridge	ODOT	New Youngs Bay Bridge	*Option A:* TBD *Option B:* $500,000* (Clatsop County TSP estimate)
BP25	Construct bicycle lanes, curb, gutter and sidewalks on both sides of SE Neptune Avenue between Harbor Drive and US 101.	Warrenton	SE Neptune Ave: E Harbor Dr to US 101	$1,400,000
BP27	Construct curb, gutter and sidewalks on both sides of Warrenton-Astoria Hwy 105 (E Harbor Drive) from Marlin Avenue to US 101.	ODOT	Warrenton-Astoria Hwy 105 (E Harbor Dr): Marlin Ave to US 101	$1,600,000
BP32	Bike and pedestrian access from SW Dolphin Rd south to US 101. Consider an overpass to facilitate multi-modal crossing to employment and education center on SE Dolphin Rd south of US 101.	Warrenton / ODOT	SW Dolphin Rd at US 101	$50,000
T1	Extend hours, decrease headway, review scheduling, improve efficiency of dial-a-ride program, meet the needs of future demands, improve connections, and advertise and promote services.	Sunset Empire Transportation District / NorthWest POINT	City wide	TBD
T2	Modernize transit stops to accommodate mobility devices	Warrenton	City wide	TBD
T3	Install transit shelters and kiosks on US 101 and both the north and south ends of the New Youngs Bay Bridge.	Warrenton / Astoria / ODOT	US 101 North and South of the New Youngs Bay Bridge	TBD
R1	Modify intersection to accommodate WB-62 trucks with a minimum turning radius of 45 degrees. This project rebuilds the intersection and includes water quality facilities, a new drainage system, concreate walks and curb.	ODOT	Fort Stevens Hwy 104 (Main Ave/ Skipanon Dr) at Warrenton-Astoria Hwy 105	$3,000,000
R7	Construct shoulder widening of three feet on both sides (conservative estimate) of Fort Stevens Hwy 104 (Main Avenue) between 14th Street to just south of the spur to provide additional paved width. The estimate includes a new drainage system and two water quality facilities.	ODOT	Fort Stevens Hwy 104 (Main Ave) – 14th St to South of Spur	$1,100,000

PROJ. ID	DESCRIPTION	JURISDICTION	LOCATION	COST
R9	Improve SW 4th Street between S Main Avenue and SW Alder Court and add sidewalk. Also includes drainage and power line improvements.	Warrenton	SW 4th St: S Main Ave to SW Alder Ct	$296,000

* Cost were not considered for likely funded projects

Possibly Funded Projects

The Possibly Funded Plan identifies additional transportation solutions that could be funded if the City develops new revenue sources. If the new funding sources do not become viable options, these projects would not be funded. The assumed possible new sources are summarized in the table below.

Table 3. Potential New Funding Source

DESCRIPTION	ESTIMATED AMOUNT THROUGH 2040
Transportation Utility Fee	$19,000,000
Total New Revenue	$19,000,000

Using these potential new funding sources, the additional projects in Possibly Funded table could be funded. More projects could be funded through other sources, such as development, state or federal funding, urban renewal districts, local improvement districts, and reallocating general fund and lodging tax revenues to transportation projects. The Possibly Funded Transportation System includes about $18.7 million in transportation investments.

Table 4. Possibly Funded Projects

PROJ. ID	DESCRIPTION	JURISDICTION	LOCATION	COST OPINION (2018 DOLLARS)
BP13	Construct a new trail connection from the KOA access east to NW Warrenton Drive following the NW 11th Street alignment. Includes excavation and embankment.	Private/ Warrenton	KOA access/NW 11th alignment	$2,700,000
BP14	Install bicycle facilities along Fort Stevens Hwy 104 (Main Avenue): *Option A:* Install sharrows and "share the road" signage *Option B*: Remove parking on one side of the road and widening where needed to provide striped bicycle facilities	ODOT	Fort Stevens Hwy 104: Harbor Dr to 9th St	*Option A:* $30,000 *Option B:* $695,000*
BP15	Construct sidewalks on both sides of SE 19th Street south of Ensign Lane. Project includes new sidewalk, curb and gutter on the north/ east side of the road and extends the sidewalk on the south/west side of the road.	Warrenton	SE 19th: Ensign Ln to Chokeberry Ave	$1,600,000
BP16	Construct a 10-foot wide multi-use path on one side of Pacific Drive from Lake Drive to Fort Stevens State Park entrance.	State Parks/ County/ Warrenton	Hammond to Fort Stevens State Park	$600,000
BP17	Provide enhanced bicycle and pedestrian connectivity along SW 9th Street. *Option A:* Widen sidewalk to 10 feet on north side *Option B:* Multiuse path (Cedar Dr to Ridge Rd)	Warrenton	SW 9th St: SW 9th St to Ridge Rd	$1,160,000
BP18	Stripe bicycle lane stencil on both sides of the road for length of Fort Stevens Hwy 104 Spur to indicate bicyclists are present.	ODOT	Fort Stevens Hwy 104 Spur	$10,000

PROJ. ID	DESCRIPTION	JURISDICTION	LOCATION	COST OPINION (2018 DOLLARS)
BP19	Construct curb, gutter and sidewalks on the east side of Fort Stevens Hwy 104 between SW 3rd Street and SW 9th Street.	ODOT	Fort Stevens Hwy 104:SW 3rd St to SE 9th St	$1,400,000
BP20	Construct bicycle lanes, curb, gutter and sidewalks on both sides of SE Marlin Avenue between Harbor Drive and SE 6th Street.	ODOT	Warrenton-Astoria Hwy 105 (SE Marlin Ave): Harbor Dr to SE 6th St	$1,500,000
BP23	Provide bicycle and pedestrian improvements at the OR 104S bridge over the Skipanon River *Option A:* Advanced signing and striping to share the road with pedestrian and bicyclists *Option B:* Cantilever multi-use path on one side of bridge	ODOT	Skipanon River Br. No. 1400	*Option A:* $25,000 *Option B:* $2,100,000*
BP24	Construct multi-use path from north end of Burman Road to connect to Fort Stevens State Park trail system.	State Parks / County / Warrenton	Along Burma Rd to Delaura Beach Rd	$300,000
BP28	Provide sidewalks on S Main Ave	Warrenton / ODOT	S Main Ave and SW 14th Pl (Orchard Subdivision)	$24,000
BP29	Provide multi-use trail along NW 13th St between Warrenton Dr and River Front Trail.	Warrenton	NW 13th St and Warrenton Dr Trail	$113,000
R2	Rebuild N Main Avenue and NW 7th Place between NW Warrenton Dr and NE 5th Street to improve rideability. (Would also include water system upgrades of $500,000)	Warrenton	N Main Ave and NW 7th Pl (NW Warrenton Dr to NE 5th St)	$367,000
R3	This project would allocate the SDC funds for street improvements throughout the city.	Warrenton	City of Warrenton	$742,400
R4	Construct new section of SW 2nd Street to improve connectivity. Design will involve determining if any wetland mitigation needs to be done. Potential wetland mitigation not included in estimate.	Warrenton	SW 2nd St (Elm – Gardenia)	$315,000
R5	Rebuild SW Alder Avenue with curbs from 1st Street to 2nd Street, grind, and overlay from 2nd Street to 3rd Street.	Warrenton	SW Alder Ave Reconstruction Project (SW 1st – SW 3rd)	$185,000
R6	Modify signal timing to optimize traffic operations (e.g. Flashing yellow arrows, cycle length, optimize signal splits, protecting/ permitted phasing)	ODOT	US 101 at Harbor, Marlin and Neptune	$30,000

PROJ. ID	DESCRIPTION	JURISDICTION	LOCATION	COST OPINION (2018 DOLLARS)
R8	Rebuild SE Anchor Avenue and add sidewalk between Harbor Street and SE 3rd Street. Also includes drainage and power line improvements.	Warrenton	SE Anchor Ave: Harbor St to SE 3rd St	$1,323,000
R11	Install intersection capacity improvement such as traffic signal (if warranted), turn lanes or roundabout and then cite the ODOT approval criteria.	Warrenton / County	19th to Jetty or King	$1,700,000
R12	Install intersection capacity improvement such as traffic signal (if warranted), turn lanes or roundabout and then cite the ODOT approval criteria.	Warrenton	NW/SW Juniper Ave: SW 9th St to Ridge Rd	$3,800,000
R13	Provide access management control measures to improve safety and traffic flow at the Premarq Center accesses.	Private / ODOT	Premarq Center accesses	$10,000
R14	Install intersection capacity improvement such as traffic signal (if warranted), turn lanes or roundabout and then cite the ODOT approval criteria.	ODOT	Fort Stevens Hwy 104 (Main Ave/ Skipanon Dr) at Warrenton-Astoria Hwy 105	*Option A:* $1,000,000* *Option B:* $500,000
R15	Install intersection capacity improvement such as traffic signal (if warranted), turn lanes or roundabout and then cite the ODOT approval criteria.	ODOT	E Harbor Dr at SE Neptune Ave	*Option A:* $1,000,000* *Option B:* $500,000
R16	Install intersection capacity improvement such as traffic signal (if warranted), turn lanes or roundabout and then cite the ODOT approval criteria.	ODOT	East Harbor Dr at SE Marlin Ave (Warrenton-Astoria Hwy 105)	*Option A:* $1,200,000* *Option B:* $750,000
R17	Realign Delaura Beach Lane to intersect with Ridge Road at a T-intersection.	Warrenton	Delaura Beach Ln at Ridge Rd	$470,000
R25	Rebuild SE Main Court between SE 9th Street and SE 11th Street.	Warrenton	SE Main Ct (9th – 11th)	$107,000

* Cost were not considered for possibly funded projects

Aspirational Project List

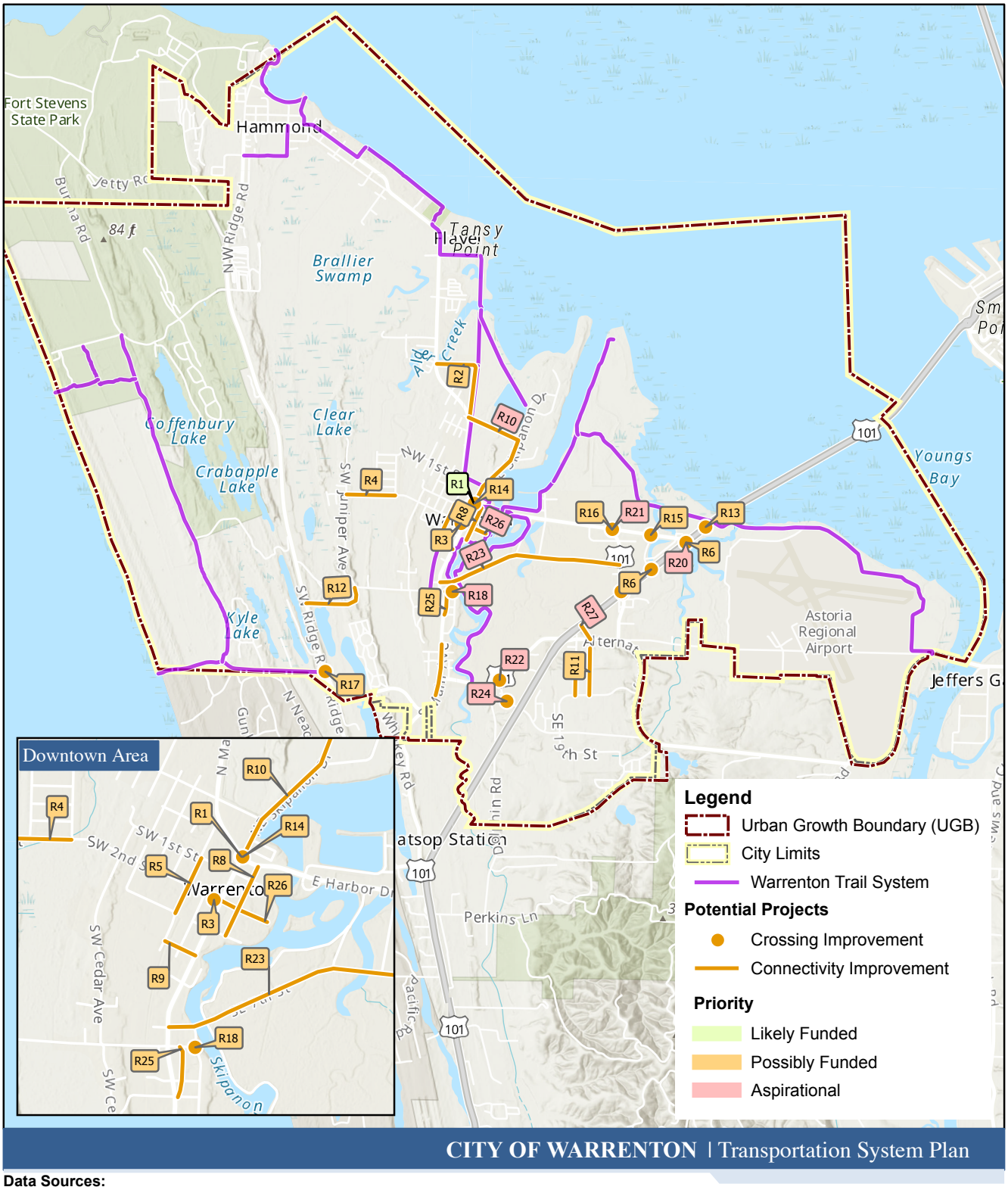
Table 5. Aspirational Project List

PROJ. ID	DESCRIPTION	JURISDICTION	LOCATION	COST OPINION (2018 DOLLARS)
BP21	Construct curb, gutter and sidewalks on both sides of Fort Stevens Hwy 104 Spur: *Phase 1:* Hwy 104 (Main Ave) to Ensign Ln *Phase 2:* Ensign Ln to US 101	ODOT	Fort Stevens Hwy 104 Spur	$3,300,000
BP22	Improve pedestrian amenities along the Warrenton Waterfront Trail including restrooms, lighting, trash receptacles	Warrenton	Warrenton Waterfront Trail	–
BP26	Construct curb, gutter and sidewalks on both sides of Warrenton-Astoria Hwy 105 (E Harbor Drive) from Fort Stevens Hwy 104 (Main Avenue) to Marlin Avenue.	ODOT	Warrenton-Astoria Hwy 105 (E Harbor Dr): Fort Stevens Hwy 104 (Main Ave) to Marlin Ave	$3,200,000
BP30	Construct sidewalk on south side of Ensign Ln	Warrenton	Fort Stevens Hwy 104 Spur to US 101	$472,000
BP31	Pave top of Airport Dike Trail from Hwy 105 by Lewis and Clark bridge to US 101.	Warrenton / Airport (?)	Airport Dike Trail	$3,300,000
T4	Increase transit amenities throughout the city (covered shelters, signage, and bus pullouts).	Warrenton / Varies	City wide	–
R10	Rebuild and widen roadway to accommodate WB 62 trucks. This improvement supports a truck route by rebuilding the intersection of Hwy 104 (Warrenton Drive) at 5th Street and roadway improvements along Skipanon Drive and 5th Street. Project assumes new water quality facilities, drainage system, curb, gutter and sidewalks.	Private / ODOT	5th St: Hwy 104 (Warrenton Dr) to Skipanon Dr	$9,000,000
R18	Add STOP-control at the intersection of SE 9th Street at SE Anchor Avenue.	Warrenton	SE 9th St at Anchor Ave	$28,000
R19	Install intersection capacity improvement such as right-turn lanes on SE Marlin Ave (Warrenton-Astoria Hwy 105)	ODOT	SE Marlin Ave (Warrenton-Astoria Hwy 105) at US 101	$1,100,000
R20	Add second eastbound left-turn lane on E Harbor Drive, second northbound through lane, and second southbound through lane.	ODOT	E Harbor Dr at US 101	$1,200,000
R21	Add westbound left-turn lane on East Harbor Drive. This improvement would decrease traffic delays for westbound through traffic on East Harbor Drive, but further improvements would be necessary to resolve the delays on the south leg.	ODOT	East Harbor Dr at SE Marlin Ave (Warrenton-Astoria Hwy 105)	*Option A:* $1,200,000* *Option B:* $400,000

PROJ. ID	DESCRIPTION	JURISDICTION	LOCATION	COST OPINION (2018 DOLLARS)
R22	Widen OR 104 Spur to add a dedicated westbound left-turn lane with 100 feet of storage.	ODOT	OR 104 Spur at Ensign Ln	*Option A:* $1,000,000* *Option B:* $140,000
R23	Construct a new local roadway by extending SE 7th Street east to connect to SE Marlin Avenue. The project assumes a new 3-lane bridge over the Skipanon Slough.	Private / Warrenton	Private road (SE 7th St): Hwy 104 (Main Ave) to SE Marlin Ave	$20,000,000
R24	Provide a westbound left-turn from SE Ensign Lane to the Warrenton Highland Shopping Center *Option A:* Remove existing raised median and add a westbound left-turn lane to provide single-vehicle turn lane *Option B:* Reconstruct roadway to provide a westbound left-turn lane and shared through-right	Warrenton	SE Ensign Ln at Warrenton Highland Shopping Center	*Option A:* $105,000 *Option B:* $420,000*
R26	Rebuild SE 2nd Street between S Main Street and SE Anchor Avenue and pave from Anchor Avenue to Skipanon River Park.	Warrenton	SE 2nd St (Main – Skipanon River Park/Anchor Ave)	$281,000
R27	Construct a new local roadway by extending SE King St to US 101. Traffic control at 101 to be determined and will be coordinated with ODOT.	Warrenton	SE King St from Alt US 101 to US 101	–
O1	Improve existing water facilities	Warrenton	Marina/Rivers	–
O2	Retrofit Skipanon River Bridge to address structural deficiency.	ODOT	Skipanon River Br. No. 1400	$2,100,000
O3	Improve runway surface at Astoria Regional Airport	Airport	Astoria Regional Airport	–
O4	Improve runway safety areas	Airport	Astoria Regional Airport	–

* Cost were not considered for aspirational projects

Figure 6. Proposed Roadway Projects

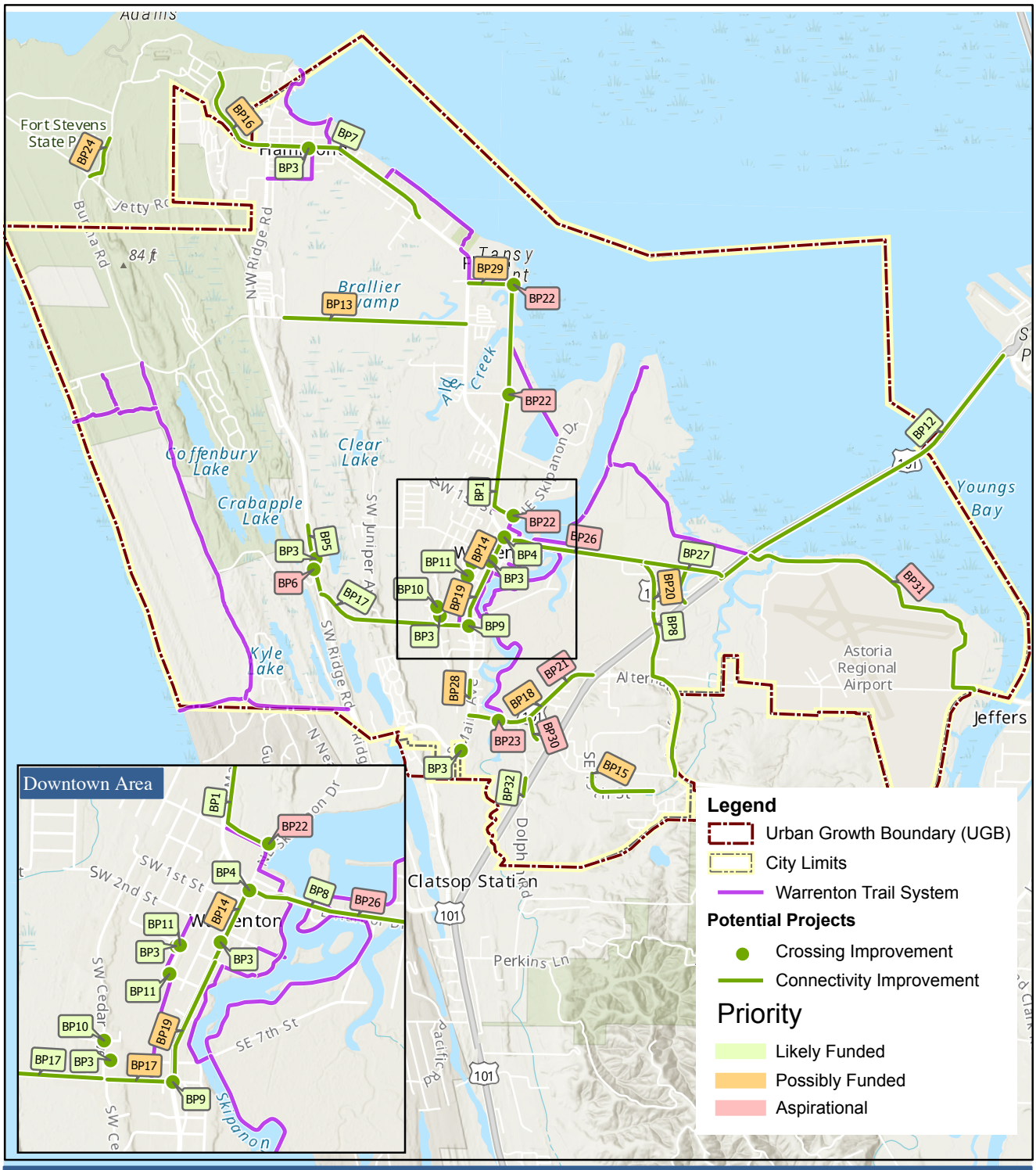


Data Sources:
ESRI, ArcGIS Online, World Topography Map. 2015.
City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.

0 4,500 9,000 Feet

Proposed Roadway Improvements

Figure 7. Proposed Bicycle and Pedestrian Projects



CITY OF WARRENTON | Transportation System Plan

Data Sources:
ESRI, ArcGIS Online, World Topography Map. 2015.
City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.

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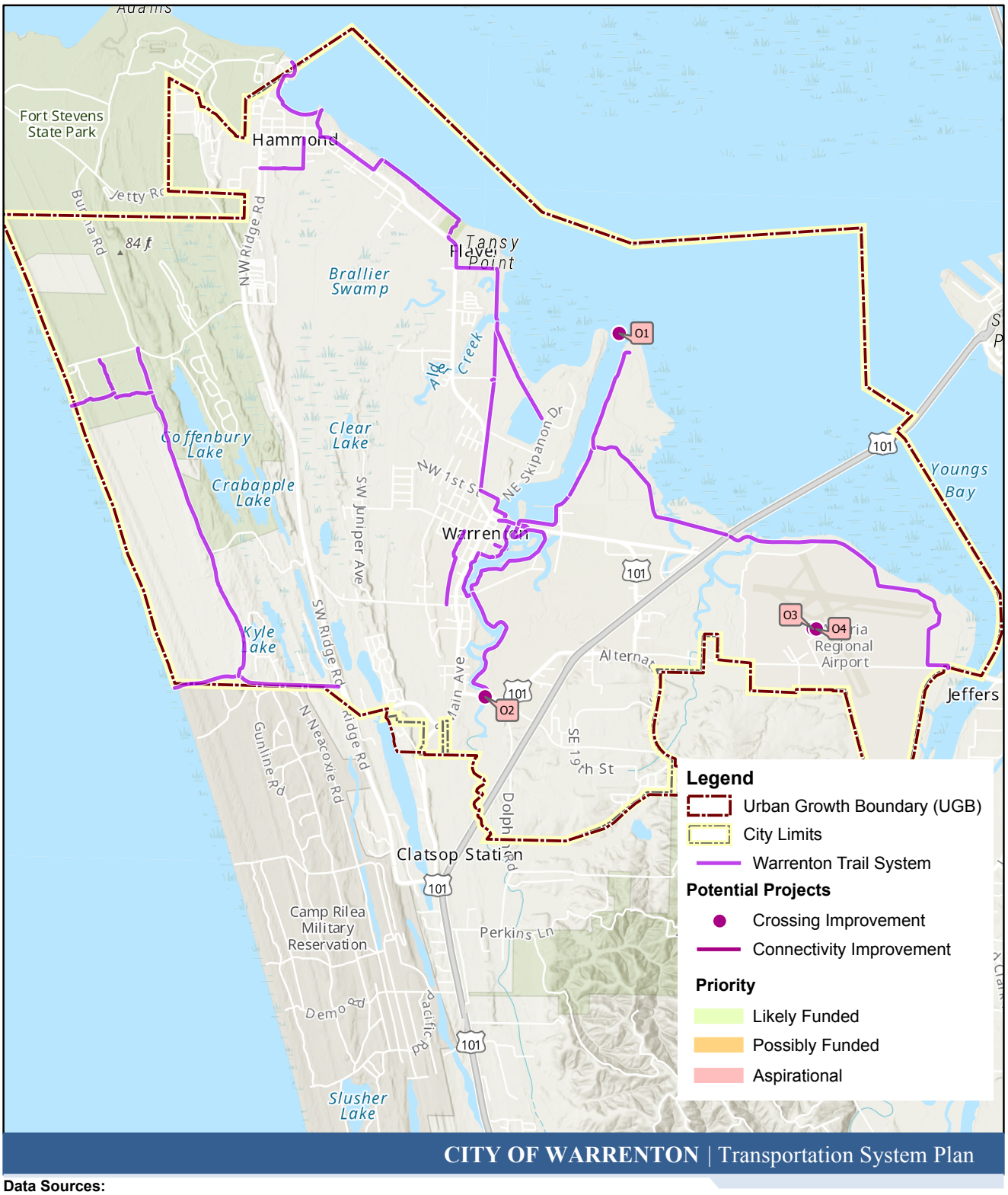
Proposed Bicycle & Pedestrian Improvements

Figure 8. Proposed Waterway and Airport Improvements



Data Sources:
ESRI, ArcGIS Online, World Topography Map. 2015.
City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.

Proposed Waterway & Airport Improvements

0 4,500 9,000 Feet

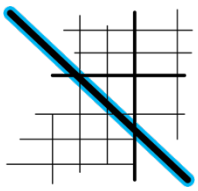
THE STANDARDS

THE STANDARDS

Warrenton applies transportation standards and regulations to the construction of new transportation facilities and to the operation of all facilities to ensure that the system functions as intended and investments are not wasted. These standards reflect the goals of the City for a safe and efficient transportation system and enable consistent future actions.

Street Functional Classification

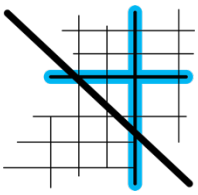
Street functional classification is an important tool for managing the roadway network. The street functional classification system recognizes that individual streets do not act independently of one another but instead form a network that works together to serve travel needs on a local and regional level. By designating the management and design requirements for each roadway classification, this hierarchal system supports a network of streets that perform as desired.



Principal and Minor Arterials

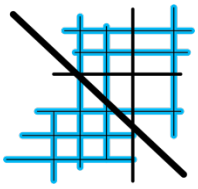
Principal Arterials provide a high degree of mobility and can serve both major metropolitan centers and rural areas. They serve high volumes of traffic over long distances, typically maintain higher posted speeds, and minimize direct access to adjacent land to support the safe and efficient movement of people and goods. Inside urban growth boundaries, speeds may be reduced to reflect the roadside environment and surrounding land uses.

Minor Arterials serve trips of moderate length and smaller geographic areas than Principal Arterials and are often used as a transition between Principal Arterials and Collectors. Minor Arterials typically serve higher volumes of traffic at moderate to high speeds, with posted speeds generally no lower than 30 mph.



Major and Minor Collectors

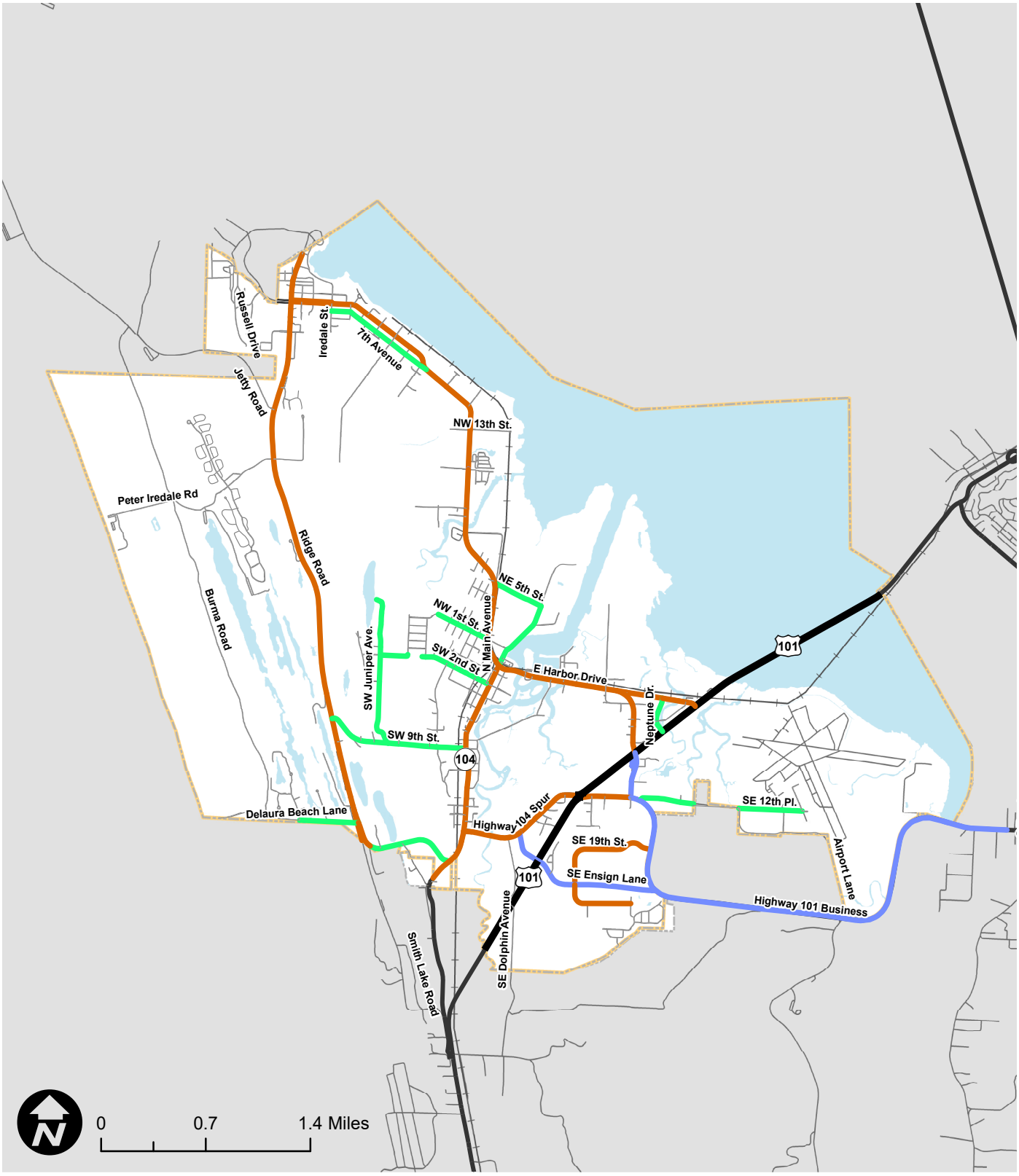
Collectors serve a critical role in the roadway network by connecting traffic from Local Streets with the Arterial network. Major Collector routes are generally distinguished from Minor Collector routes by longer length; lower connecting driveway densities; higher speed limits; greater spacing intervals; and higher traffic volumes. While access and mobility are more balanced than on Arterials, new driveways serving residential units should not be permitted where traffic volume forecasts exceed 5,000 vehicles per day.



Local Streets

Local streets prioritize provision of immediate access to adjacent land. These streets should be designed to enhance the livability of neighborhoods and should generally accommodate less than 2,000 vehicles per day. When traffic volumes reach 1,000 to 1,200 vehicles per day through residential areas, safety and livability can be degraded. A well-connected grid system of relatively short blocks can minimize excessive volumes of motor vehicles and encourage more use by pedestrians and bicyclists. Local streets are not intended to support long distance travel and are often designed to discourage through traffic.

Figure 9. Warrenton Proposed Street Functional Classification



Truck Route Designations

Streets designated as Truck Routes in Warrenton are recognized as being appropriate and commonly traveled corridors for truck passage. Decisions affecting maintenance, operation, or construction on a designated truck route must address potential impacts on the safe and efficient movement of truck traffic. However, the intent is not to compromise the safety of other street users to accommodate truck traffic, especially in areas where many conflicts with vulnerable travelers (e.g., people walking and biking) may be present. The following local roads that provide access to industrial areas and help to minimizing truck volumes in downtown have been proposed as designated Truck Routes in the currently adopted TSP:

- NW 13th Street
- NE 5th Street
- NE Skipanon Drive
- SE 12th Place
- SE Ensign Lane
- SE Neptune Avenue

Designating these streets as local truck routes would establish the movement of truck traffic as a priority when considering future decisions such as whether to allow on-street parking, addressing requests for traffic calming, determining the need for separate biking facilities, or making changes to the physical curb-to-curb width and corner radii.

As noted in Technical Memorandum #2, US 101 (No. 9) is classified as a Statewide Highway, part of the National Highway System (NHS), a Truck Route, and a Scenic Byway. US 101B Business (No. 105), Fort Stevens Highway 104, and OR-104S (Fort Stevens Spur) are classified as District Highways with no other designations.

The design and management of the Truck Routes through Warrenton is subject to a number of policies and standards in the Oregon Highway Plan and Highway Design Manual intended to maintain safe and efficient movement of large vehicles.

Roadway Cross-Section Standards

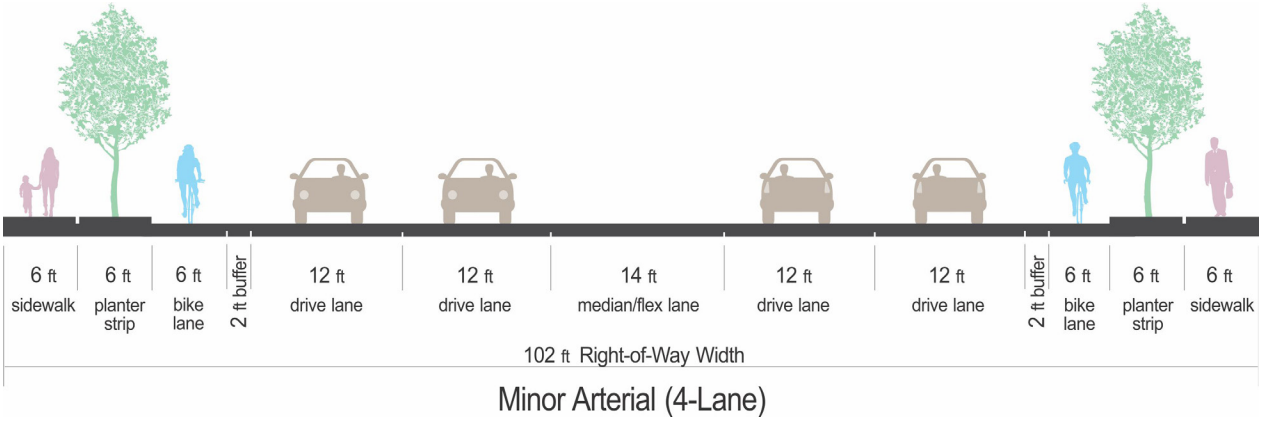
Roadway cross-section standards identify the design characteristics needed to meet the function and demand for each City of Warrenton transportation facility type. Since the actual design of a roadway can vary from segment to segment due to adjacent land uses and demands, this system allows standardization of key characteristics to provide consistency, while providing application criteria that allow some flexibility in meeting the design standards.

Figure 10 to Figure 15 and Table 7 to Table 10 illustrate the standard cross-sections for minor arterials, major collectors, minor collectors, local streets, and shared-use paths in the City of Warrenton. These street standards are compliant with the Oregon Transportation Planning Rule, which specifies that local governments limit excessive roadway widths. They are intended to be used as guidelines in the development of new roadways and the upgrade of existing roadways. Planning level right-of-way needs can be determined using these figures. Under some conditions a variance to the street standards may be requested from the City-appointed engineer to consider the alternative minimum cross-section or other adjustments. Typical conditions that may warrant consideration of a variance include:

- Infill sites
- Innovative designs
- Severe constraints presented by topography, environmental, or other resources present
- Existing developments and/or buildings that make it extremely difficult or impossible to meet the standards

Roadways under ODOT jurisdiction are subject to design standards in ODOT's Highway Design Manual. Roadways under Clatsop County jurisdiction are subject to design standards in the Clatsop County TSP.

Figure 10. Proposed 4-Lane and 2-Lane Minor Arterial Typical Cross-Section Standards



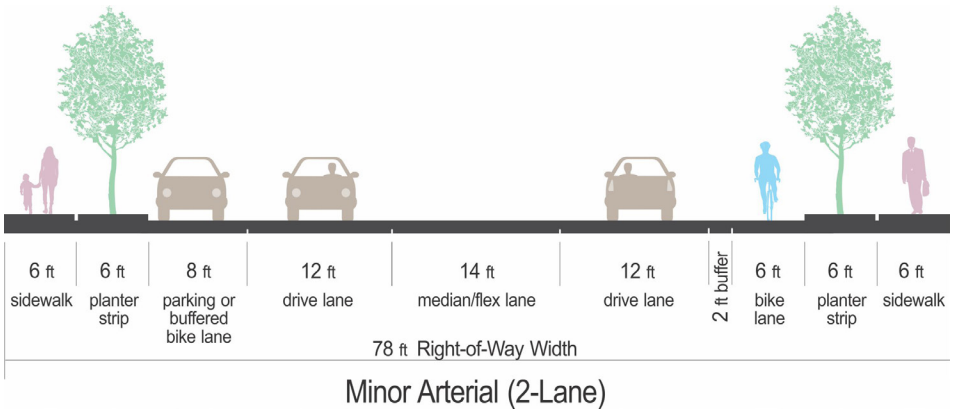


Table 6. Proposed Minor Arterial Typical Cross-Section Standards and Alternative Minimum Standards

WIDTH	4-LANE STANDARD	4-LANE ALTERNATIVE MINIMUM	2-LANE STANDARD	2-LANE ALTERNATIVE MINIMUM	CONSIDERATIONS
Right-of-Way	102 ft.	80 ft.	**78 ft.** ~~80 ft.~~ **(82 ft.)**[1]	**58 ft. (66 ft.)**[1]	Median/flex lane and planting strips is optional depending on surrounding land use and available right-of-way. The standard design should be provided where feasible. In constrained areas where providing the standard widths are not practical, alternative minimum design requirements may be applied with approval of the City Engineer. On-street parking is not permitted on 4-lane minor arterial streets. On-street parking is permitted in place of bike lanes on 2-lane minor arterial streets. However, where parking is constructed next to a travel lane, the travel lane width shall be increased to 14 feet to function as a shared roadway and accommodate bikes.
Curb-to-Curb Pavement	78 ft.	64 ft.	54 ft. **(58 ft.)**	**34 ft.** ~~40 ft.~~ **(42 ft.)**[1]	
Travel Lanes	12 ft.	11 ft.	12 ft. **(14 ft.)**[1]	**11 ft.** ~~12 ft.~~ **(14 ft.)**[1]	
Median/Flex Lane	14 ft.	None	14 ft.	None	
Bike Lanes	8 ft.	6 ft.	8 ft.	**6 ft.** ~~8 ft.~~	
On-Street Parking	None	None	8 ft.	**7 ft.** ~~8 ft.~~	
Curb	Yes	Yes	Yes	Yes	
Planting Strip	6 ft.	6 ft.	6 ft.	6 ft.	
Sidewalks	6 ft.	6 ft.	6 ft.	6 ft.	

*Changes from the Municipal Code Section 16.136.020 are shown in **bold text** and existing standards where changes are proposed are shown in ~~strike through text.~~ Text not bold or stricken is consistent with the City's current standard.

1. Width if on-street parking is constructed in place of bike lanes.
2. Minor arterials under ODOT jurisdiction have to follow Oregon Highway Plan and Highway Design Manual.

Figure 11. Proposed Major Collector Typical Cross-Section Standard

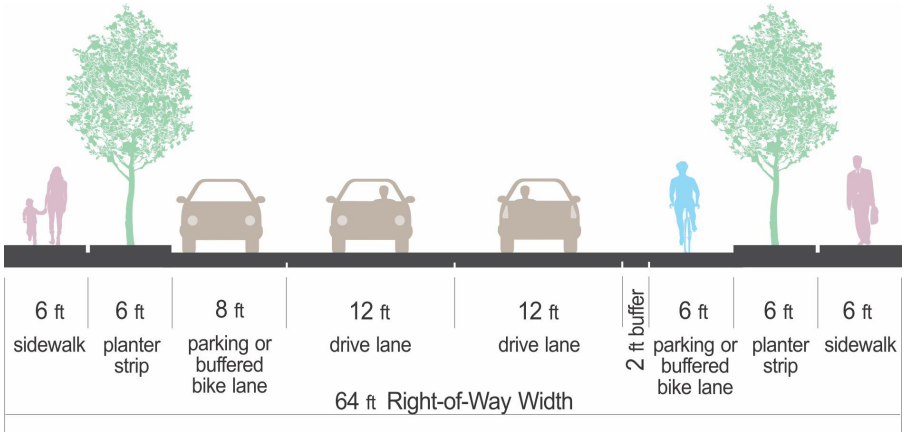


Table 7. Proposed Major Collector Typical Cross-Section Standards and Alternative Minimum Standard

WIDTH	STANDARD	ALTERNATIVE MINIMUM	CONSIDERATIONS
Right-of-Way	64 ft. **(68 ft.)**[1]	**58 ft.** ~~60 ft.~~ **(66 ft.)**[1]	Planting strips is optional depending on surrounding land use and available right-of-way. The standard design should be provided where feasible. In constrained areas where providing the standard widths are not practical, alternative minimum design requirements may be applied with approval of the City Engineer. On-street parking is permitted in place of bike lanes on major collector streets. However, where parking is constructed next to a travel lane, the travel lane width shall be increased to 14 feet to function as a shared roadway and accommodate bikes. On-street parking is discouraged where posted speeds are greater than 35 mph.
Curb-to-Curb Pavement	40 ft. **(44 ft.)**[1]	36 ft **(42 ft.)**[1]	
Travel Lanes	12 ft. **(14 ft.)**[1]	**11 ft.** ~~12 ft.~~ **(14 ft.)**[1]	
Median/Flex Lane	None	None	
Bike Lanes	8 ft	6 ft.	
On-Street Parking	8 ft.	**7 ft.**	
Curb	Yes	Yes	
Planting Strip	6 ft.	6 ft.	
Sidewalks	6 ft.	6 ft.	

*Changes from the Municipal Code Section 16.136.020 are shown in **bold text** and existing standards where changes are proposed are shown in ~~strike through text.~~ Text not bold or stricken is consistent with the City's current standard.

1. Width if on-street parking is constructed in place of bike lanes.

Figure 12. Proposed Minor Collector Typical Cross-Section Standard

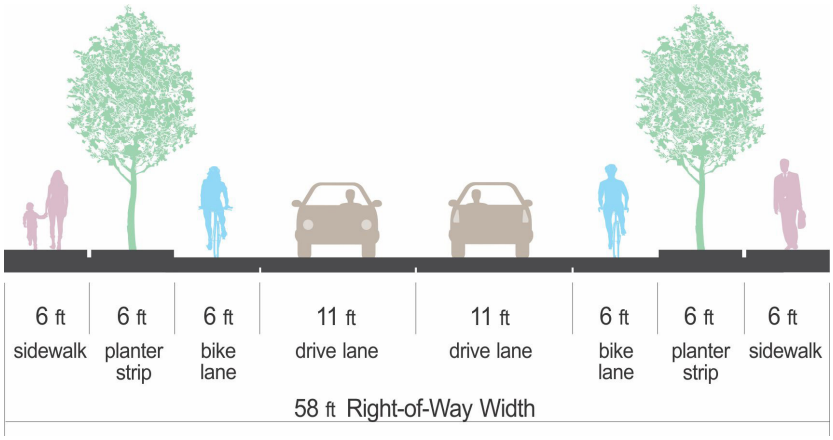


Table 8. Proposed Minor Collector Typical Cross-Section Standards and Alternative Minimum Standard

WIDTH	STANDARD	ALTERNATIVE MINIMUM	CONSIDERATIONS
Right-of-Way	**58 ft.** ~~64 ft.~~ **(68 ft.)**[1]	**50 ft.** ~~60 ft.~~ **(62 ft.)**[1]	Planting strips is optional depending on surrounding land use and available right-of-way. The standard design should be provided where feasible. In constrained areas where providing the standard widths are not practical, alternative minimum design requirements may be applied with approval of the City Engineer. On-street parking is permitted in place of bike lanes on minor collector streets. However, where parking is constructed next to a travel lane, the travel lane width shall be increased to 14 feet to function as a shared roadway and accommodate bikes. On-street parking is discouraged where posted speeds are greater than 35 mph.
Curb-to-Curb Pavement	40 ft. **(44 ft.)**[1]	36 ft **(42 ft.)**[1]	
Travel Lanes	**11 ft.** ~~12 ft.~~ **(14 ft.)**[1]	**10 ft.** ~~12 ft.~~ **(14 ft.)**[1]	
Median/Flex Lane	None	None	
Bike Lanes	**6 ft.** ~~8 ft.~~	**5 ft.** ~~6 ft.~~	
On-Street Parking	8 ft.	**7 ft.**	
Curb	Yes	Yes	
Planting Strip	6 ft.	**5 ft.** ~~6 ft.~~	
Sidewalks	6 ft.	**5 ft.** ~~6 ft.~~	

*Changes from the Municipal Code Section 16.136.020 are shown in **bold text** and existing standards where changes are proposed are shown in ~~strikethrough text.~~ Text not bold or stricken is consistent with the City's current standard.

1. Width if on-street parking is constructed in place of bike lanes.

Figure 13. Proposed Local Street Typical Cross-Section Standard

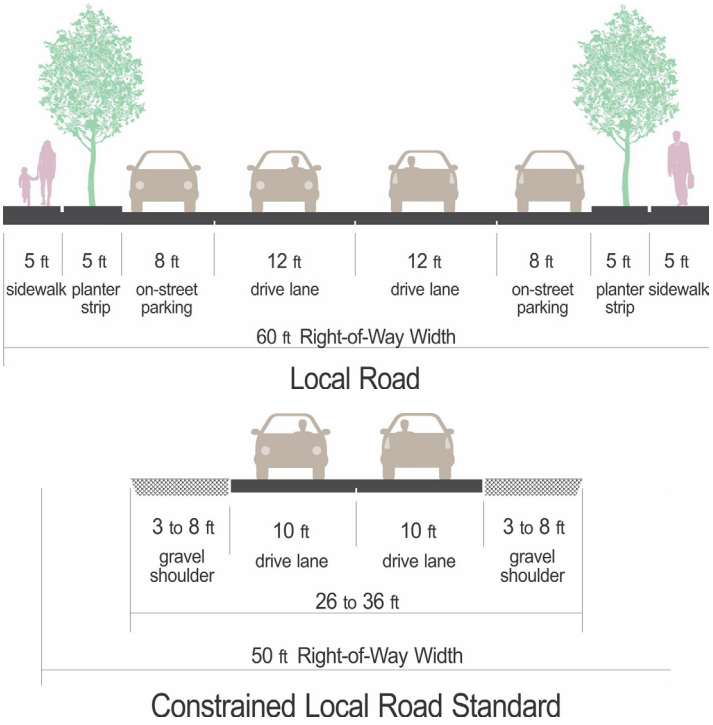


Table 9. Proposed Local Street Typical Cross-Section Standards and Alternative Minimum Standard

WIDTH	STANDARD	ALTERNATIVE MINIMUM	CONSIDERATIONS
Right-of-Way	60 ft.	50 ft.	Planting strips is optional depending on surrounding land use and available right-of-way. Parking on residential neighborhood streets is allowed and may be allowed on one side only in constrained areas or where approved by the City Engineer, resulting in a curb-to-curb width of 28 feet and overall right-of-way width of 48 feet. The constrained local road standard may be used when approved by the City of Warrenton. The standard is intended to apply under one of the following circumstances: 1. The local road will serve 18 or fewer dwelling units upon build out of adjacent property. 2. The ADT volume of the road is less than 250 vehicle/day. 3. Significant topographical or environmental constraints are present. Providing the following conditions will be met: 4. Use of the alternative local road standard will not create gaps in connectivity or roadway standards with adjacent roadway sections (i.e., sidewalk, parking, travel lane widths). 5. The City Engineer and emergency service providers have reviewed and accepted usage of the alternative local roadway standard.
Curb-to-Curb Pavement	36 ft.	28 ft.	
Travel Lanes	12 ft.	10 ft	
Median/Flex Lane	None	None	
Bike Lanes	None	None	
On-Street Parking	8 ft	8 ft	
Curb	Yes	Yes	
Planting Strip	5 ft.	5 ft.	
Sidewalks	5 ft.	5 ft.	

*Changes from the Municipal Code Section 16.136.020 are shown in **bold text** and existing standards where changes are proposed are shown in ~~strike through text.~~ Text not bold or stricken is consistent with the City's current standard.

1. Width if on-street parking is constructed in place of bike lanes.

Figure 14. Proposed Alley Typical Cross-Section Standard

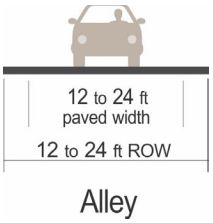
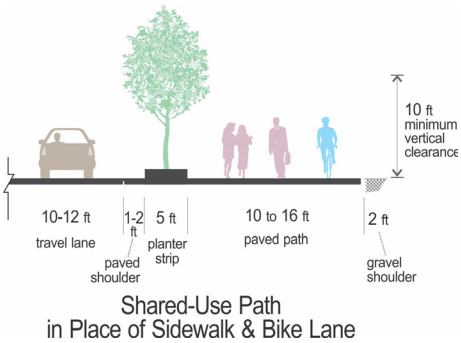
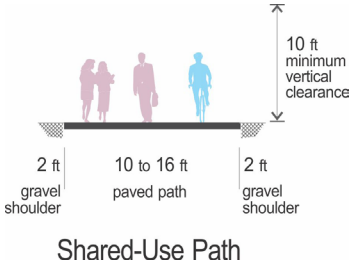


Figure 15. Proposed Shared-Use Path Typical Cross-Section Standards and Alternative Minimum Standards





Access Management

The number and spacing of access points, such as driveways and street intersections, along a roadway affects its function and capacity. Access management is the control of these access points to match the functionality and capacity intended by the roadway's functional classification.

Access management is especially important on arterial and collector facilities to reduce congestion and crash rates and to provide for safe and efficient travel. Since each access point is an additional conflict point, reducing or consolidating driveways on these facilities can decrease collisions and preserve capacity on high volume roads, maintaining traffic flow and mobility within the city. Balancing access and good mobility can be achieved through various access management strategies, including establishing access management spacing standards for driveways and intersections.

Table 11 below contains recommended access spacing standards under the City of Warrenton's jurisdiction. New access points shall meet or exceed these minimum spacing requirements. However, where no reasonable alternatives exist or where strict application of the standards would create a safety hazard, the City may allow a variance.

Both Clatsop County and ODOT maintain access regulations for roadways under their jurisdiction. Clatsop County's access regulations are documented in the Clatsop County TSP in Volume 1. Access Management regulations for the state highways are provided through the 1999 Oregon Highway Plan and OAR 734-051.

Table 10. Existing and Recommended Access Spacing Standards

FUNCTIONAL CLASSIFICATION	CURRENT MINIMUM ACCESS SPACING	RECOMMENDED MINIMUM ACCESS SPACING
Minor Arterial		300 ft
Major Arterial		150 ft
Minor Collector		100 ft
Local Street	25 ft	15 ft

Local Street Connectivity

Local street connectivity is required by the state Transportation Planning Rule (OAR 660-012) and is important for Warrenton's continued development. Providing adequate connectivity can reduce the need for wider roads, traffic signals, and turn lanes. Increased connectivity can reduce a city's overall vehicle miles traveled (VMT), balance the traffic load on major facilities, encourage citizens to seek out other travel modes, and reduce emergency vehicle response times. While improvement to local street connectivity is easier to implement in newly developed areas, retrofitting existing areas to provide greater connectivity should also be attempted.

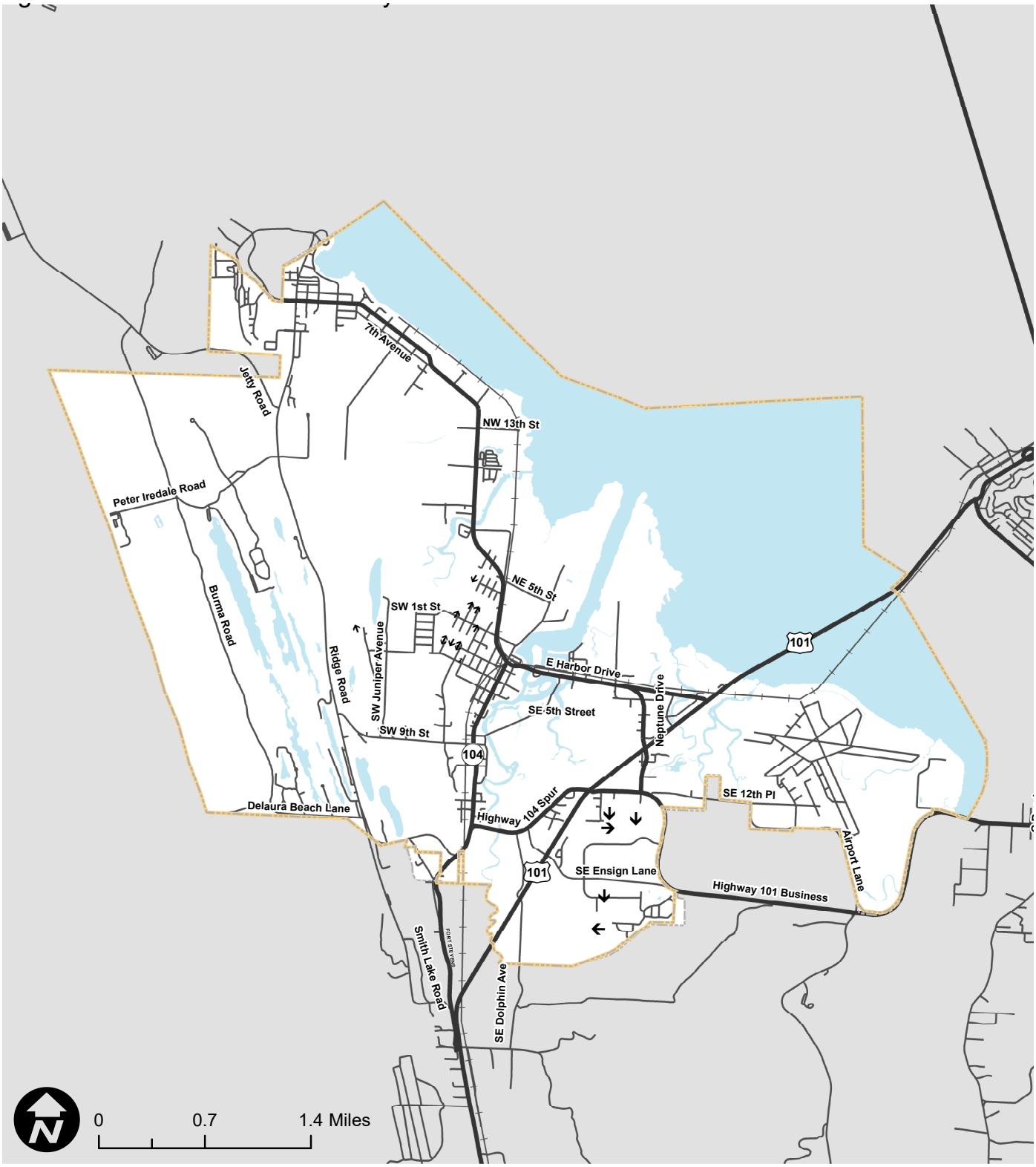
Warrenton's existing street connectivity is constrained by natural features such as wetlands, railroads, highways, and by undeveloped areas of future development. The proposed Local Street Connectivity Plan shown in Figure 16 identifies approximate locations where new local street connections should be installed as areas continue to develop.

The Warrenton Municipal Code regulates proposed development in residential zones to ensure good transportation system connectivity is provided. Table 12 highlights key requirements and some proposed changes to consider.

Table 11. Proposed Changes to Connectivity Requirements

EXISTING REQUIREMENT	PROPOSED CHANGE
Staggering of streets making "T" intersections at collectors and arterials shall not be designed so that jogs of less than 300 feet on such streets are created, as measured from the centerline of the street.	
Spacing between local street intersections shall have a minimum separation of 125 feet, except where more closely spaced intersections are designed to provide an open space, pocket park, common area or similar neighborhood amenity.	
The maximum block length shall not exceed 1,000 feet between street corner lines unless it is adjacent to an arterial street or unless the topography or the location of adjoining streets justifies an exception. The maximum length of blocks along an arterial is 1,800 feet.	
Cul-de-Sacs. A dead-end street shall be no more than 200 feet long, shall not provide access to greater than 18 dwelling units, and shall only be used when environmental or topographical constraints, existing development patterns, or compliance with other standards in this Code preclude street extension and through circulation.	
Pedestrian Access and Circulation	Pedestrian and Bicycle Access and Circulation
Continuous Pathways. The pathway system shall extend throughout the development site, and connect to all future phases of development, adjacent trails, public parks and open space areas whenever possible.	Continuous Pathways. The pathway system shall extend throughout the development site, and connect to all future phases of development, adjacent trails, public parks, **transit stops** and open space areas whenever possible.
Street Connectivity: Multi-use pathways (i.e., for pedestrians and bicyclists) are no less than six feet wide.	Street Connectivity: Multi-use pathways (i.e., for pedestrians and bicyclists) are no less than **10** feet wide.

Figure 16. Local Street Connectivity Plan



Mobility Targets

Mobility standards, or targets, are the thresholds set by an agency for the maximum amount of congestion that is acceptable for a given roadway. Warrenton does not currently have adopted mobility standards. The City would like to adopt mobility standards as part of this TSP Update process.

Similar cities, such as Philomath and Junction City, use "level of service" (LOS) as the measure of congestion for their mobility standards. Philomath has adopted LOS D as the minimum acceptable operating condition for both signalized and unsignalized intersections during the peak hour. Junction City has adopted LOS D as the minimum acceptable operating conditions for signalized intersection and LOS E for unsignalized intersections during the peak hour. LOS D equates to a maximum allowed average delay per vehicle of 55 seconds at signalized intersections and 35 seconds at stop-controlled intersections. LOS E equates to a maximum allowed average delay per vehicle of 50 seconds at unsignalized intersections.

It is recommended that Warrenton adopt LOS D as the minimum acceptable operating condition for both signalized and unsignalized intersections during the peak hour. The assessment of traffic operating conditions under existing and future (year 2040) conditions conducted in Technical Memoranda #5 and #7 found that all studied intersections under City jurisdiction comply with the adopted LOS D mobility standard and will continue to do so through 2040. Establishing the recommended mobility standard will give the City of Warrenton the ability to ensure that future development proposals do not overly burden the transportation system and that improvements are made in a timely manner to maintain the desired level of service.

For roadways within the City of Warrenton that are under ODOT or Clatsop County jurisdiction, the mobility standards/targets of those agencies will apply. All intersections under ODOT jurisdiction must comply with the volume to capacity (v/c) ratio targets in the Oregon Highway Plan (OHP). The ODOT v/c targets are based on highway classification and posted speed. Mobility standards for roadways under Clatsop County are documented in the Clatsop County TSP in Volume 1.

Traffic Impact Analyses

Warrenton's development review process is designed to manage growth in a responsible and sustainable manner. By assessing the transportation impacts associated with land use proposals and requiring that adequate facilities be in place to accommodate those impacts, the City is able to maintain a safe and efficient transportation system concurrently with new development, diffusing the cost of system expansion.

Technical Memorandum #3 included a review of the Warrenton Development Code that is needed to ensure and strengthen compliance with the state Transportation Planning Rule (OAR 660-012) and to help the transportation system serve planned growth. That review found that the existing development code already includes requirements for traffic impact analyses (TIAs) as part of development proposals. There are some recommended changes to consider.

A TIA will be required with a land use application where the following conditions apply:

- The development application involves a change in zoning or a plan amendment designation; or,
- The development shall cause one or more of the following effects, which can be determined by field counts, site observation, traffic impact analysis or study, field measurements, crash history, Institute of Transportation Engineers Trip Generation Manual; and information and studies provided by the local reviewing jurisdiction and/or ODOT:

- An increase in site traffic volume generation by 300 average daily trips (ADT) or more; or
- An increase in peak hour volume of a particular movement to and from the state highway by 20% or more; or
- An increase in use of adjacent streets by vehicles exceeding the 20,000-pound gross vehicle weights by 10 vehicles or more per day; or
- The location of the access driveway does not meet minimum sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the state highway, creating a safety hazard; or
- A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area.

The Warrenton Development Code currently does not establish minimum content required in a TIA. It is recommended that the development code be amended to specify that the scope and content of the TIA be determined in consultation with the City Engineer and the roadway authority.

It is recommended that Warrenton add approval criteria to existing TIA requirements, as well as an acknowledgment of transportation mitigation measures that may be required as conditions of approval in order to meet adopted mobility and safety standards. Mitigation measure provisions can address multi-modal transportation improvements that may be required to mitigate impacts of the proposed development and protect the function and operation of the planned transportation system.

Intelligent Transportation Systems

Two pieces of Intelligent Transportation System (ITS) equipment exist along US 101: a Highway Advisory Radio (HAR) Beacon Sign and a Variable Message Sign (VMS). The HAR Beacon is located just north of Dolphin Avenue and alerts northbound traffic to upcoming congestion with flashing lights. The VMS is just over a mile south of Warrenton. Although it is outside city limits, it provides alerts to northbound travelers on US 101.

Warrenton does not own or operate any ITS systems, or even traffic signals at this time. It is unlikely that the City of Warrenton will invest in ITS systems on its own, but there may be opportunities to work with regional partners on larger scale efforts that would benefit Warrenton residents. Such cooperation could range from agreements to share information and data or allow use of City right-of-way for regional ITS infrastructure.

For example, US 101 is a regional roadway facility that could benefit from transportation system management (TSM) infrastructure. Before future investments are made along this roadway designs should be reviewed with City and ODOT staff to determine if communications or other ITS infrastructure should be addressed as part of the street design/ construction. The City should follow the Oregon Statewide ITS Plan for any projects that affect operations on state roadways.

Neighborhood Traffic Management Tools

Neighborhood Traffic Management (NTM) describes strategies that can be deployed to slow traffic, and potentially reduce volumes, creating a more inviting environment for pedestrians and bicyclists. NTM strategies are primarily traffic calming techniques for improving neighborhood livability on local streets, though a limited set of strategies can also be applied to collectors and arterials. Mitigation measures for neighborhood traffic impacts must balance the need to manage vehicle speeds and volumes with the need to maintain mobility, circulation, and function for service providers, such as emergency responders. Figure 17 includes a visual summary of common neighborhood traffic management strategies.

Figure 17. Neighborhood Traffic Management Strategies

CHICANES

www.pedbikeimages.org/Dan Burden

CHOKERS

www.pedbikeimages.org/Dan Burden

CURB EXTENSIONS

www.pedbikeimages.org/Carl Sundstrom

DIVERTERS

www.pedbikeimages.org/Adam Fukushima

MEDIAN ISLANDS

www.pedbikeimages.org/Dan Burden

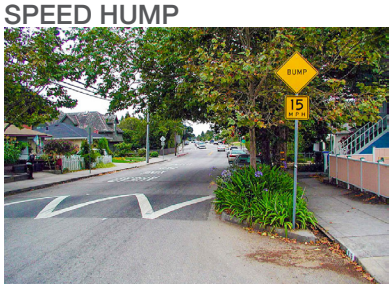
RAISED CROSSWALKS

www.pedbikeimages.org/Tom Harned

SPEED CUSHIONS

NACTO Urban Street Design Guide

SPEED HUMP



www.pedbikeimages.org/Dan Burden

TRAFFIC CIRCLES

www.pedbikeimages.org/Carl Sundstrom

Table 13 lists common NTM applications. Any NTM project should include coordination with emergency response staff to ensure that public safety is not compromised. NTM strategies implemented on a state freight route will require input from ODOT regarding freight mobility considerations.

Table 12. Application of Neighborhood Traffic Management Strategies

NTM APPLICATION	USE BY FUNCTION CLASSIFICATION			IMPACT	
	Arterials	Collectors	Local Streets	Speed Reduction	Traffic Diversion
Chicanes			■	■	■
Chokers			■	■	■
Curb Extensions	■	■	■	■	■
Diverters (with emergency vehicle pass-through)		■	■		■
Median Islands	■	■	■	■	■
Raised Crosswalks			■	■	■
Speed Cushions (with emergency vehicle pass-through)			■	■	■
Speed Hump			■	■	■
Traffic Circles			■	■	■

The City of Warrenton currently does not have a formal neighborhood traffic management program. If such a program were desired to help respond to future issues, suggested elements include:

- Provide a formalized process for citizens who are concerned about the traffic on their neighborhood street. The process could include filing a citizen request with petition signatures and a preliminary evaluation. If the evaluation finds cause for concern, a neighborhood meeting would be held and formal data would be collected and evaluated. If a problem is found to exist, solutions would be identified and the process continued with neighborhood meetings, feedback from service and maintenance providers, cost evaluation, and traffic calming device implementation. Six months after implementation the device would be evaluated for effectiveness.
- For land use proposals, in addition to assessing impacts to the entire transportation network, traffic studies for new developments must also assess impacts to residential streets. A recommended threshold to determine if this additional analysis is needed is if the proposed project at ultimate build out increases through traffic on any one residential street by 200 or more vehicles per day. Once the analysis is performed, the threshold used to determine if residential streets are impacted would be if their daily traffic volume exceeds 1,200 vehicles.