WASHINGTON COUNTY

FIRST AND LAST MILE

TRANSIT ACCESS STRATEGIES

FINAL REPORT

January 2021

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Acronyms and Abbreviations

ADA	Americans with Disabilities Act
AV	autonomous vehicle
ECO	Employee Commute Options
EV	electric vehicle
FLM	first and last mile
GHG	greenhouse gas
GIS	geographic information system
GPS	global positioning system
MaaS	mobility as a service
Metro	metropolitan
PBOT	Portland Bureau of Transportation
PCC-Rock Creek	Portland Community College-Rock Creek
SMART	South Metro Area Regional Transit
SOV	single occupancy vehicle
TAC	Technical Advisory Committee
TDM	transportation demand management
THPRD	Tualatin Hills Park and Recreation District
TMA	Transportation Management Association
TOD	transit-oriented development
URMD	(Washington County) Urban Road Maintenance District
WES	Westside Express Service
WTA	Westside Transportation Alliance

INTRODUCTION

Since adopting the Transportation System Plan in 2015, Washington County has taken proactive steps to improve access to and encourage the enhancement of transit service. Distance and physical barriers such as disconnected sidewalks, limited bike facilities, long distances between signalized crossings and more can make it difficult for people to get to and from the transit stop, known as the first and last mile (FLM) problem.

In support of policies adopted by Washington County, local jurisdictions, Metro, and TriMet, Washington County has developed a Strategic Solutions for First Mile/Last Mile Transit Connections Report. This report provides actionable first and last mile projects and programs that are coordinated, flexible, and responsive to varying community needs and challenges.

PURPOSE AND BACKGROUND

Ease of access is critical for making transit a practical and attractive transportation option. Disconnected sidewalks, limited bike facilities, long distances between signalized crossings, inadequate lighting, and a lack of other modern mobility options (car sharing, bike sharing, on-demand shuttle) are common first and last mile barriers to transit access in Washington County. To accomplish long-term regional goals of reducing automobile trips, providing travel options for people without vehicles or those who choose not to drive, and curbing carbon emissions, a set of projects, programs, and strategies is needed to improve access to transit.

This report provides recommendations that reduce the real or perceived distance and time it takes people to travel from home to the transit stop and from transit stops to their destinations—the first and last mile. This report also provides actionable first and last mile projects and programs that are coordinated, flexible, and responsive to varying community needs and challenges. Projects and programs will fall under two categories: infrastructure investments that provide safer, faster, and more comfortable access to transit; and opportunities to support and integrate innovative mobility options. Additionally, the report outlines policy shifts that can enable greater transit access, and a framework for implementing these changes, including a robust pilot program to test and learn from innovative solutions.

PRIORITIZING EQUITY

Washington County is one of the most racially and ethnically diverse counties in Oregon. This report strives to advance equitable outcomes by prioritizing opportunities and strategies with the most potential benefit for marginalized groups. Equity is also a formal goal for the report, as described in Goals for Transit Access, below.

In alignment with Washington County's February 2020 Resolution on Diversity, Equity and Inclusion,[1] this report defines *equity* and *marginalized groups* as:

> **Equity:** The result of fairness and justice in the creation and delivery of public policy. Equity in Washington County will exist when every county resident participates fully in the region's economic vitality, has access to the county's services and other resources, and has the opportunity to reach their full potential.
>
> **Marginalized groups:** LGBTQIA [lesbian, gay, bisexual, transgender, queer or questioning, intersex, and asexual or allied], elder adults, persons with a disability, refugees and immigrants, and any group that is societally, socially or economically disadvantaged and is considered a protected class by federal or state law.

Importantly, marginalized groups include Black, Indigenous, and People of Color (BIPOC), who, on average, experience higher rates of poverty and unemployment, and have lower median incomes than the county's white, non-Hispanic residents.

[1] https://www.co.washington.or.us/CAO/upload/BOC_02-25-20_5b_Equity-Resolution.pdf

GOALS FOR TRANSIT ACCESS

People reach transit in a variety of ways including walking, biking, and riding in a car. A goal of this report is to support these multimodal connections by considering how people access transit throughout a variety of land use and transportation contexts—from urban town centers to suburban and rural areas within the county. Potential strategies for first and last mile access to transit will consider factors such as their proximity to transit, the suitability of sidewalks or bike paths, park-and-ride capacity, connections to key destinations, and the type of transit that is available.

The following high-level goals reflect a vision for improving transit access and guide the development of this report.

Safety and Security

Safe, secure, and attractive walking and biking facilities, stations, and park-and-ride areas facilitate better access to transit.

Health and Environment

Policies and investments that support walking, biking, and transit use are associated with increased active transportation and physical activity, and reduced greenhouse gas emissions.

Economic Opportunity

Improved access to public transit for people who cannot drive or do not have access to a vehicle can have regional and local economic benefits.

Equity

Equity in transit, including equal distribution of services, ensures that transit is a viable transportation option for all people in Washington County regardless of age, race, income, English proficiency, and physical ability.

PUBLIC AND INTERAGENCY ENGAGEMENT

The public engagement strategy for the project aimed to ensure interested residents, community partners and other stakeholders had the opportunity to meaningfully participate. Engagements strategies included:

- Convening a stakeholder advisory committee comprised of representatives from cities, Ride Connection, South Metro Area Regional Transit (SMART), TriMet, Westside Transportation Alliance (WTA), Washington County Health and Human Services, Washington County Disability, Aging and Veterans Services, and Tualatin Hills Park and Recreation District (THPRD).
- Briefings with stakeholders, elected officials and community groups/organizations.
- Two stakeholder workshops for community members and key employers.
- Month-long online open house, including a survey with over 300 respondents.

The report recommendations reflect the community input on actionable first and last mile projects and programs, and key considerations to enable greater transit access, and improve the first and last mile experience. See Appendix A for detail on the stakeholder workshops and online open house survey summary.

TRANSPORTATION AND LAND USE CONTEXT

TRANSPORTATION CONTEXT

Washington County is home to a variety of transportation services in the Portland metropolitan (metro) region. Many of the most urban areas of the county are well connected by a variety of travel options, but most people drive alone to work, school, essential services, shopping and recreating. The county, particularly in urban areas, is rapidly growing with increasing numbers of employees and residents, heightening the need for improved non-auto transportation options. (See Appendix C for more on Washington County's transportation context, land use context, and applicable plans and policies.)

Commute Travel Patterns

Washington County attracts many trips from throughout the Portland metro region and beyond. To date, driving alone has been the primary mode of travel for most residents and employees in the county. Figure 1 illustrates that the number of Washington County working residents (254,000) who work in the county (54 percent) and who work outside the county (46 percent) is almost evenly split. The largest portion of Washington County employees who live outside of the county commute from Multnomah County. As growth continues in the coming decades, congestion on key thoroughfares like US-26 and parallel roadways will worsen if current trends continue. Increasing transit ridership presents an opportunity to improve transportation viability and livability.

Figure 1. Work Locations of Portland Metropolitan Region Working Residents

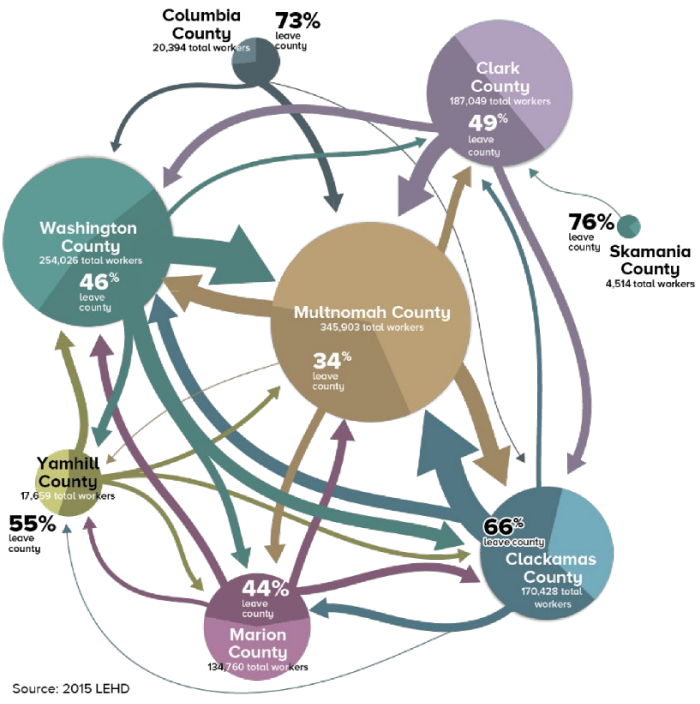


Image source: Oregon Metro 2018 Regional Transportation Plan

Commute Mode Split

Drive alone trips make up the largest portion of commute trips in Washington County regardless of home or work location. As seen in Table 1, nearly three quarters of Washington County residents drive alone to work, and non-residents commute to Washington County jobs at an even higher rate (83.0 percent). Additionally, roughly 10 percent of people who live or work in Washington County carpool to work. Residents who work outside the county are more likely to commute by transit (13.5 percent) than residents who work in the county (4.0 percent) or people who live elsewhere and work in the county (4.0 percent). The rates of walking and biking to, from, or within Washington County are lower than for those in the region that start and end outside of the county.

Table 1. Commute Mode Share Patterns in Washington County

Home Location	Work Location	Mode Share					
		Drive Alone	Transit	Carpool	Bicycle	Walk	Other[2]
Washington County	Washington County	72.4%	4.0%	10.5%	1.3%	3.3%	8.6%
	Outside Washington County[1]	74.7%	13.5%	10.0%	0.4%	0.4%	1.0%
Outside Washington County	Washington County	83.0%	4.5%	9.8%	1.1%	0.7%	1.0%
	Outside Washington County	67.5%	7.3%	9.1%	3.2%	4.0%	8.9%

Notes:
(1) The regions in "Outside Washington County" include Multnomah, Clackamas, and Clark Counties.
(2) Other modes include motorcycle, working from home, taxis, and other.

Source: Census Transportation Planning Products, 2012-2016

Oregon's Employee Commute Options (ECO) program aims to decrease drive alone trips among employees of large employment sites. ECO requires all employers in the Portland metro area[2] with more than 100 employees at a work site to develop a transportation demand management (TDM) program to reduce SOV trips to work by 10 percent within 3 years. Non-SOV trips include taking transit, ridesharing, biking, walking, and telecommuting.

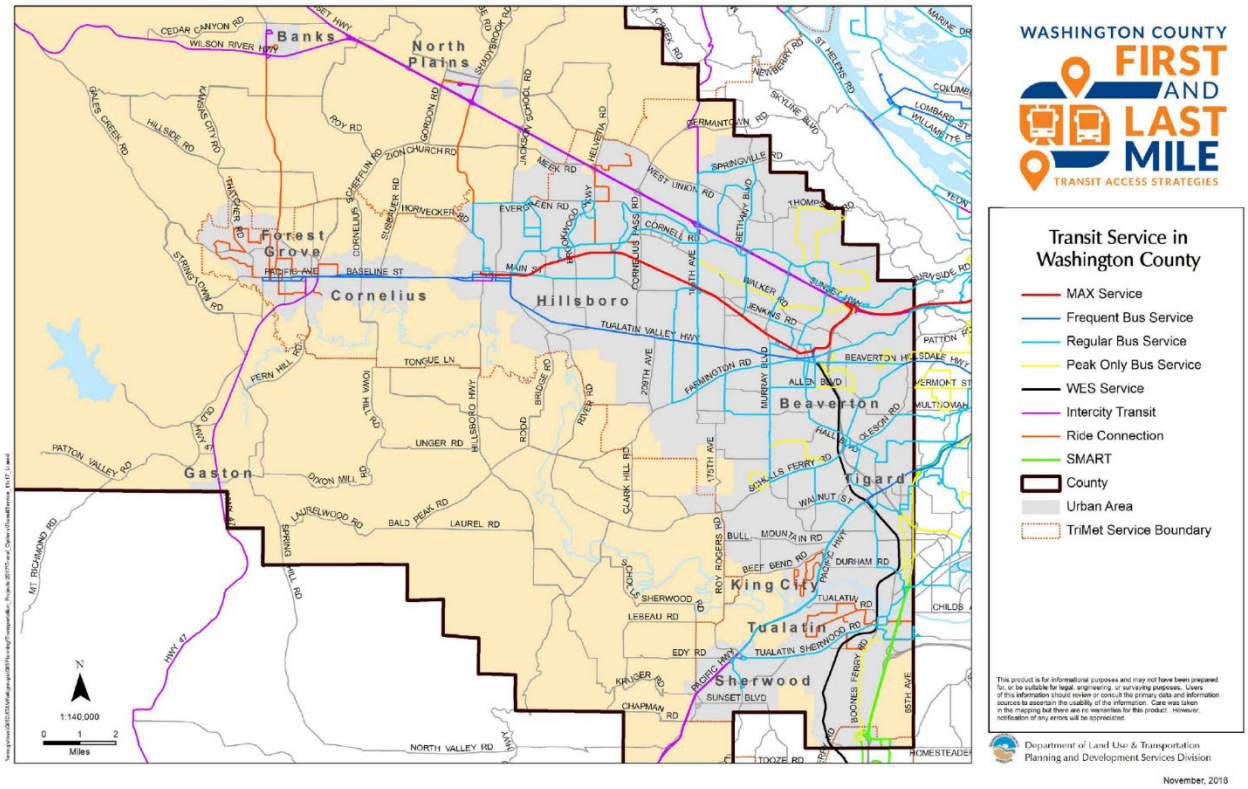
Transit Options

Washington County residents enjoy access to multimodal transit options, including bus, light rail, commuter rail, shuttles, and intercity service, which is substantial for a county that is largely suburban and rural. See Figure 2 for a map of services available in Washington County. TriMet is the primary transit service provider, offering local and regional bus, MAX light rail, and Westside Express Service (WES) commuter rail (Photograph 1). The City of Wilsonville provides South Metro Area Regional Transit (SMART) bus service that links to the TriMet system. Non-profit organizations (such as Ride Connection) and other regional and statewide transit service

[2] The law only applies to employers within the Portland Air Quality Maintenance Area.

providers (including Yamhill County Transit Area, Tillamook County Transit District, Columbia County Rider and POINT) also provide public transportation services that connect to service in Washington County.

Figure 2. Transit Service in Washington County



Although the local bus networks of TriMet and SMART serve as an extension of regional services, many transit users need a first or last mile connection to complete their trip. Both public and private transportation shuttles are made available for people in Washington County, as well as ride sourcing and car share options.

Public Shuttles

Several publicly operated shuttles in Washington County provide local service within the community as well as important last mile connections between MAX and WES stations and major employment areas. These shuttles (as follows) are funded in part by Statewide Transportation Improvement Fund (STIF) created as part of House Bill (HB) 2017,[3] along with other state, federal, and local funding and contributions:

- GroveLink: GroveLink shuttle service, operated by Ride Connection, has three routes within Forest Grove, Monday through Friday. The East and West loop routes provide critical connections for employees and students, connecting central Forest Grove and Pacific University with other parts of the city, including Forest Grove High School. The Employment Service route provides access to an industrial employment

[3] Oregon House Bill 2017 (HB 2017), known as "Keep Oregon Moving," is the transportation preservation and modernization bill that funds many transportation improvement projects across the state. In addition to highway funding, HB 2017 provides investments in public transportation, walking and biking, and other ways of moving goods and people.

area along 24th Avenue, as well as the Via Systems building. All three routes provide connections to TriMet's Line 57.

- Tualatin Shuttle: Tualatin Shuttle is a deviated fixed-route service operated by Ride Connection that provides access to Tualatin WES station and industrial/employment zones in the surrounding area. This free service operates two routes—Red Line and Blue Line—Monday through Friday in coordination with the WES schedule.
- westLink: The westLink community bus (formerly known as the Washington County Bus Service) is a fare-free rural transit service operated by Ride Connection, connecting the Hillsboro Transit Center, North Plains, Banks, and Forest Grove along Glencoe Road, Sunset Highway, and Nehalem Highway.
- North Hillsboro Link: The North Hillsboro Link is a deviated fixed-route service operated by Ride Connection that connects the Orenco MAX Station with suburban employment destinations throughout the North Hillsboro area.

Private Shuttle Service

In addition to publicly operated transit service, several Washington County employers provide shuttle service for their employees. Although the shuttles require significant operations and capital investment, employers see them as an important strategy to encouraging their employees to take transit to work and attracting and retaining quality employees. The following shuttles are employer operated:

- Intel Shuttle: Intel provides shuttles between MAX and its three main campuses during peak commute hours and carry approximately 530 people per day. Intel provides a shuttle to the Hillsboro Airport as well.
- Nike Shuttle: Nike operates five shuttle routes that connect employees internally between campus buildings and externally to nearby MAX stations, such as the Beaverton Creek and Merlo/SW 158th Avenue stations. Nike also provides a taxi program for on-demand transportation services, as well as their corporate bike share program.

Emerging Technology

In the past decade, emerging technologies have enabled new transportation options that are significant for first and last mile transit connections. The combination of smartphones and inexpensive GPS devices have made possible ride hailing services, such as Uber and Lyft, as well as micromobility, such as bike share and scooter share. Electric-powered micromobility got a boost from more efficient and lower cost batteries. Similarly, electric vehicles, which lack the exhaust that comes from standard combustion engine vehicles, are becoming affordable. Fast and reliable broadband networks allow people to work from home, avoiding commuting altogether. Transportation options are expected to further evolve with new technologies, making way for advanced motor vehicles that instantly communicate with one another (connected vehicles) and drive themselves (autonomous vehicles).

Emerging technologies offer the potential to improve transit connections, particularly easy to use technologies like ride hailing and micromobility. However, these technologies are likely to exacerbate inequities if left unregulated. Most technologies require smartphones and bank accounts or credit cards, leaving out many

people from low income or immigrant communities. New technologies are usually operated by private companies, who keep their data private and are motivated by financial interests. Ride hailing services are, relative to transit, expensive to use and contribute to increased traffic congestion, slowing other drivers and transit riders in the process. The opportunity to work from home is only available to people with space, computer, and broadband at home, and who have jobs that can be done remotely.

Challenges for Transit Access

Washington County has a variety of contexts, ranging from rural to suburban to urban. Even so, there are challenges for transit access that exist broadly across the county. This section summarizes these common challenges and distills important themes that projects, programs, and policies must address in the future.

SAFETY

The design of TriMet's fixed-route network results in stops and station areas that are often located along high volume, high speed roads with multiple travel lanes and long gaps between safe crossings. Many crossings near transit stops are unmarked or uncontrolled, where people walking and biking must wait for a break in the flow of vehicles. Moreover, the pedestrian crossing interval at many signalized intersections is too short for older or younger transit riders or people with mobility impairments to cross safely. The net effect is a large number of transit stops — particularly for high-frequency routes — that are more challenging for transit users of all ages and abilities.

Intersection without marked crosswalk at Orenco MAX Station

NETWORK CONNECTIVITY

Critical gaps and deficiencies in the bicycle and pedestrian network present additional challenges. Many station areas lack complete sidewalk and bicycle facilities. Some of the facilities that do exist are sub-standard . Many curb ramps are not ADA-compliant. Narrow, painted bike lanes on the edge of busy, high speed roads do not provide sufficient protection, and are therefore underused. Gaps in the sidewalk and bicycle network — particularly along high speed roads and at busy intersections — can deter people from using those modes, which negatively impacts transit ridership.

Sidewalk abruptly ends and turns to gravel along roadway at Adair/Baseline and 10th Avenue

LAND USE CONTEXT

Land use strongly influences the transportation options that are practical in an area. Mixed-use urban areas, with short distances between destinations, can more easily be travelled by walking, biking, or a quick transit trip. Their higher densities make transit more cost effective with higher ridership per vehicle mile traveled. Rural areas with longer distances between destinations, making

walking or biking more challenging and less practical for all travelers. Their densities are often too low to justify fixed route transit service. However, as noted above, there are public shuttles connecting rural residents and smaller communities in Washington County to urban areas.

Existing Land Use: Major transit corridors are primarily developed as commercial, industrial, and mixed-use residential. Mixed-use residential areas are closer to a variety of travel options — high-frequency transit, better biking and walking infrastructure, car sharing or ride hailing — than single-family residential uses. Lower-density single-family residential land uses may have access to local or peak only bus service, but often requires one or more transfers to get to a destination. Travelers originating from lower density areas may be more likely to use other travel options, such as community shuttles, carpooling or vanpooling, micro transit to access major destination or frequent transit and reduce the number of transfers.

Future Land Use: By 2040, targeted development is expected to occur in North Hillsboro, along the Highway 217 corridor, Tigard Triangle, and the Basalt Creek employment area. These targeted areas of development are expected to have the most employment growth in the future. Urban Transit Corridors and Regional Corridors primarily located along high-frequency transit, such as the MAX, are planned to continue to provide future opportunities to offer additional housing, commercial, and employment choices. New urban areas including South Cooper Mountain (Beaverton), River Terrace (Tigard), South Hillsboro, Amberglen (Hillsboro), and West Sherwood are expected to develop as mixed-use centers with residential neighborhoods, commercial nodes, and employment districts.

Travel Options Propensity

This report considered four key indicators for employees and residents' propensity to use travel options, which help inform first and last mile strategies. Analyses highlighted where these groups live and work to help determine suitable locations for first and last mile projects, programs, and targeted outreach to partners. See Appendix C for detailed travel options propensity analyses. The selected target populations include four primary characteristics that influence a person's propensity to use travel options:

- **Income.** Individuals who are identified as low income (a person whose income totals less than 150 percent of the poverty level) may be more likely to use travel options rather than driving alone.
- **Access to an automobile.** People who do not have access to an automobile are more likely to utilize other travel options.
- **Young adults.** Recent trends show that younger adults (between the ages of 18 and 29) are less likely to own vehicles and more likely to use other travel options.[4,5] Young adults make up approximately 16 percent of Washington County's population.[6]

[4] A study conducted by the American Public Transportation Association (APTA) found that Millennials are multimodal, choosing the best transportation mode based on the trip they're planning to take. Taking transit and riding a bike were the most preferred modes of transportation, while driving a car was the least preferred mode. This study was conducted in 2013 and retrieved from http://www.apta.com/resources/reportsandpublications/Documents/APTAMillennials-and-Mobility.pdf

[5] Pew Research Center. April 2016. Retrieved from http://www.pewresearch.org/fact-tank/2016/04/25/millennialsovertake-baby-boomers/

[6] Portland State University Certified Population Estimates, 2017.

- **Older adults.** Older adults, people age 65 and older, make up approximately 13 percent of Washington County's population.[7] Travel options become ever more important for older adults as driving becomes less viable with age.

[7] Ibid.

TRANSIT ACCESS NETWORK ANALYSIS

IDENTIFY EXISTING INFRASTRUCTURE

The analysis began by identifying current conditions and infrastructure within a 1-mile radius of each transit stop. Elements such as sidewalks, bike paths, crosswalks, through streets, and geographical barriers were input into a geographic information system (GIS) to establish baseline conditions.

TRAVEL SHED ANALYSIS

Travel sheds made up a large part of the transit access network analysis. (See Appendix E for details about the analysis methodology.) A travel shed analysis measures the area (around a transit stop) currently accessible by foot or bike using the existing transportation network. For example, while a transit stop might be within a short walk in distance, disconnected streets or limited sidewalks may require an out-of-the-way trip using the transportation network. A well-connected network is typically represented as a diamond-shaped area, which means that there is high connectivity within the entire walkshed area. Figure 2 illustrates the differences.

Figure 3. *Representation of poor and ideal pedestrian travel sheds (walkshed). (Source: Provo/Orem Bus Rapid Transit Corridor Transit Oriented Development Study)*

Pedestrian Walkshed

Existing pedestrian access and connectivity infrastructure (for example, sidewalks and multi-use paths) to transit stations were assessed within a half-mile radius from each transit stop to identify the current "walkshed" serviced by the stations. Several infrastructure elements were used in the analysis, including sidewalks, trails (multi-use trails and on-street connection trails), crosswalks, signalized intersections, and intersections. Trails needed to have lighting to be considered part of the walkshed, since evening commutes during the winter months in the Pacific Northwest are usually in darkness.

Bicycle Bikeshed

Existing bicycle connectivity to transit stations was assessed within a one-mile radius from each transit stop to identify the current "bikeshed" serviced by the stations. Several infrastructure elements were used

in the analysis, including existing on-street bikeways (sharrows and lanes) and regional multi-use trails. As with the pedestrian analysis, trails needed to have lighting to be considered part of the bikeshed.

MARKET ANALYSIS

A transit market analysis was conducted to complement the transit access network analysis described above. While the transit access analysis focused on establishing baseline conditions and identifying gaps for potential improvement, the market analysis was developed to assess market conditions and establish priority markets for 40 identified major transit stops in Washington County. (See Appendix F for details about the market analysis.) The market analysis developed market typologies for transit stops and station based on ridership, land use characteristics, and existing access networks to transit. Together, the market analysis and the transit access analyses established the best first and last mile mobility programs and access improvements to be considered.

The major transit stops were assessed, as follows, to understand transportation and land use characteristics within a one-mile service area around each transit stop:

1. **Transit demand assessment**, based on transit ridership at the stop level and transit propensity for residential and employment uses;
2. **Bicycle and pedestrian access network assessment**, based on pedestrian access network within a half-mile service area of stops and bicycle access network within a one-mile service area of stops; and
3. An assessment of **additional factors**, such as transit service type (MAX and/or WES service, Frequent Service bus lines), future transit service improvements, and the presence of nearby community facilities that may affect transit usage.

TRANSIT ACCESS OPPORTUNITIES

This section considers opportunities for improving access to transit stops by defining a stop typology. See Appendix E for a detailed accounting of the stop analysis and evaluation.

Transit Stop Typology

Defining a major transit stop (station) typology allows closer analysis of the challenges and opportunities for people accessing each stop. The six types of stops listed in Table 2 were evaluated based on their representative land use and transportation characteristics. The findings for each can be applied to other stops of the same type across Washington County.

Figure 6: Representative Transit Stops

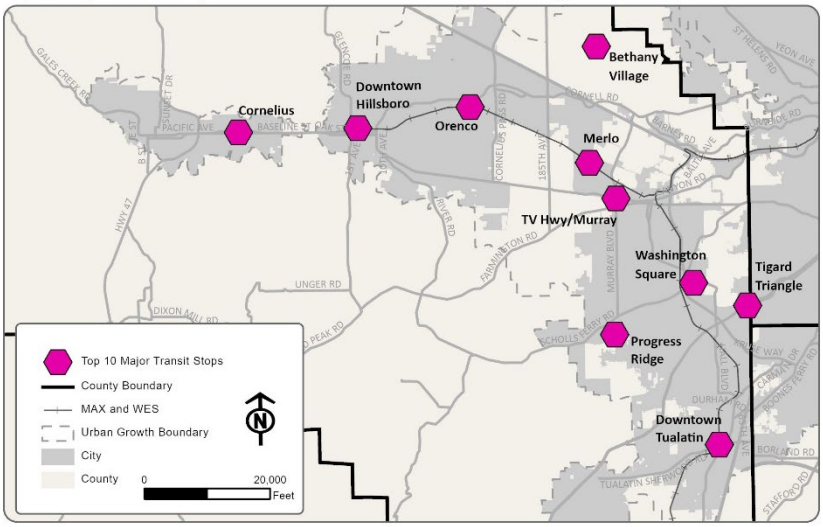


Table 2. Representative Transit Stop

Stop Type	Representative Stop Location
Residential areas with future service improvements	Progress Ridge - Barrows Rd and Horizon Blvd
Town centers	Cornelius - Adair/Baseline and 10th Ave Bethany Village - Bethany Blvd and Laidlaw Rd Downtown Tualatin - Boones Ferry Rd and Nyberg and Seneca St
High ridership stations with limited biking and walking access	Merlo Station - Merlo Rd/SW 158th Ave MAX Station
High ridership stops with strong walking access	Downtown Hillsboro - Hillsboro Transit Center Orenco - Orenco MAX Station
Suburban highway corridors	Tigard Triangle - Pacific Hwy and 68th Pkwy TV Highway and Murray Blvd
Retail and job destinations served by transit	Washington Square Transit Center

Opportunities by Stop Type

The following section lists opportunities to improve first and last mile access for each of the six transit stop types defined above. Opportunities were identified in an analysis of the 10 representative stops, as described in Appendix H.

RESIDENTIAL AND INDUSTRIAL AREAS WITH FUTURE SERVICE IMPROVEMENTS

Locations where growth and development are occurring, and where there are significant opportunities to leverage first and last mile solutions once planned transit service improvements are implemented.

- Fill bicycle facility gaps and consider shared roadway bicycle facilities in neighborhoods to facilitate bicycle access to transit via low-stress, low-volume routes.
- Install crosswalks and fill sidewalk gaps.
- Schedule infrastructure investments to be ready when TriMet's service improvements come online.
- Pilot FLM on-demand services — such as ride hailing partnerships for reduced fares for trips to and from the station areas — to connect residents and workers to high-speed and high-frequency transit once service begins. This will build ridership in these areas that might have low initial ridership without the FLM pilot.

TOWN CENTERS

Representative of town centers in Washington County.

- Fill pedestrian and bicycle network gaps, including crossings and ADA-compliant curb ramps.
- Provide FLM on-demand services to connect transit riders to nearest high-frequency or high-speed line.
- Leverage active transportation investments to support placemaking and wayfinding efforts in the town center.
- Consider internal circulation and access routes within commercial parking lots and retail areas.

HIGH RIDERSHIP STOPS WITH LIMITED BIKING AND WALKING ACCESS

High ridership stops in areas with concentrated residential and employment centers and significant pedestrian or bicycle network gaps.

- Fill pedestrian and bicycle network gaps, including crossings and ADA-compliant curb ramps.
- Partner with TriMet to provide enhanced transit stop amenities, bike parking, and pick-up/drop-off areas.
- Pilot FLM on-demand services to expand stop access beyond walking/biking distance.

HIGH RIDERSHIP STOPS WITH STRONG WALKING ACCESS

Stops with high ridership and relatively well-connected pedestrian and bicycle networks.

- Fill bicycle network gaps with improved on-street facilities and signage where necessary.

- Enhance bicycle/pedestrian environment with wayfinding signage and improve safety and comfort with improved crossings and ADA-compliant curb ramps.
- Pilot FLM on-demand and micromobility services (e-scooters, dockless bike share) to expand stop access beyond walking/biking distance.
- At stops where bicycle and pedestrian networks are mostly complete, develop a pilot program for micromobility services, and ride hailing, shuttle, and pick-up/drop-off locations.
- Partner with TriMet to provide enhanced transit stop amenities, bike parking, and pick-up/drop-off areas.

SUBURBAN HIGHWAY CORRIDORS

Transit stops with medium levels of ridership located along suburban highway corridors.

- Fill pedestrian and bicycle network gaps, including crossings and ADA-compliant curb ramps.
- Coordinate infrastructure and access improvement investments with TriMet's transit improvements.
- Pilot FLM on-demand and micromobility services to expand stop access beyond walking/biking distance.
- Partner with TriMet to provide enhanced transit stop amenities, bike parking, and pick-up/drop-off areas.

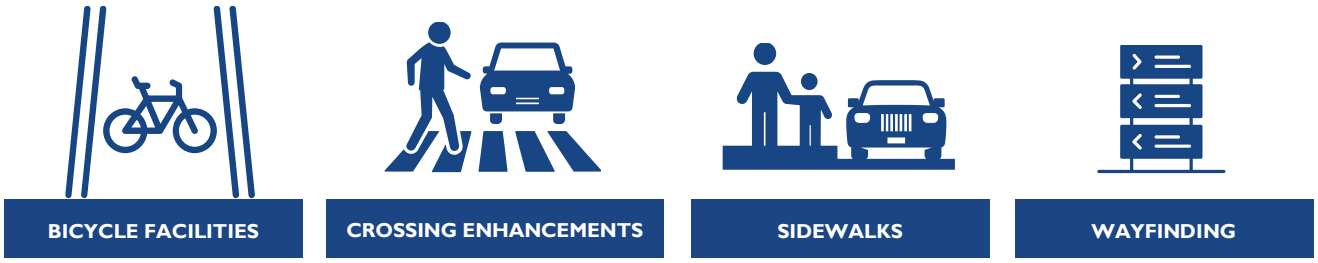
RETAIL AND JOB DESTINATIONS SERVED BY TRANSIT

Transit centers in Washington County with high ridership, high residential and employment propensity, and significant gaps in the pedestrian and bicycle network.

- Fill pedestrian and bicycle network gaps, including crossings and ADA-compliant curb ramps.
- Partner with TriMet to provide enhanced transit stop amenities, bike parking, and pick-up/drop-off areas.
- Seek to expand and enhance service during peak periods (such as, employer and on-demand shuttles and increased service frequency).
- Pilot FLM on-demand services to expand stop access beyond walking/biking distance.

FIRST AND LAST MILE STRATEGIES

INFRASTRUCTURE PROJECTS



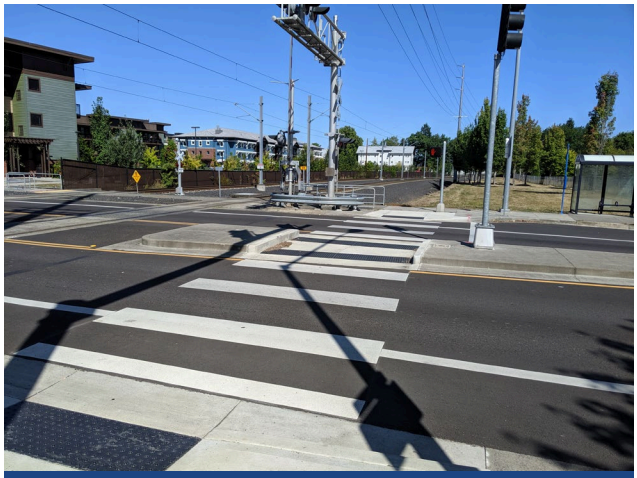
Infrastructure investments to improve pedestrian and bicycle access in Washington County can dramatically expand the reach of transit. The county has made substantial investments since the mid-1980's with new bike lanes, sidewalks, and regional trails. In the current transportation network:

- 52 percent of collector and arterial roadways have bike lanes that are suitable or built to standard.
- 83 percent of collector and arterial roadways have a sidewalk or pathway.

Providing adequate infrastructure for walking and biking to transit stations makes multimodal transit easier and more convenient. Walking is the most common way to get to and from transit stops and stations and is more attractive if pedestrian connections are safe and easy to use. Bicycling as a first/last mile mode is likewise dependent on access to bicycle facilities. Over 300 specific infrastructure project opportunities have been identified and prioritized to address gaps and deficiencies in the active transportation network.

Infrastructure improvements include:

- Crosswalk
- Sidewalk
- Bicycle facilities
- Wayfinding
- Intersection improvements
- Lighting

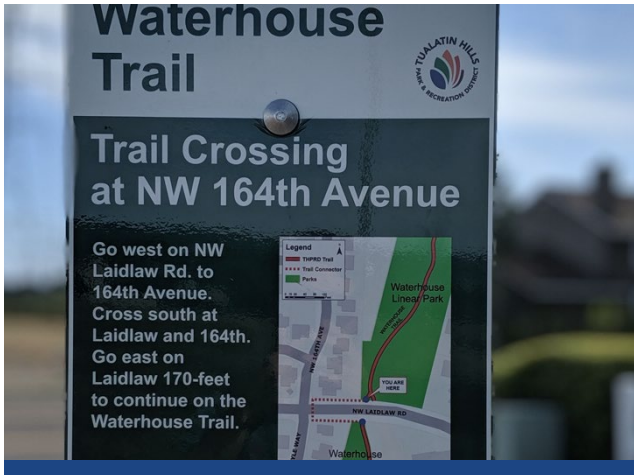


CROSSWALK IMPROVEMENTS

SIDEWALK IMPROVEMENTS

BICYCLE FACILITIES

CURB RAMP IMPROVEMENTS



WAYFINDING

INTERSECTION IMPROVEMENTS

Key Considerations

As the lead agency for constructing and maintaining streets that provide access to transit, Washington County has the opportunity to invest directly in critical first/last mile infrastructure and better align infrastructure investments and transit:

- Coordinate infrastructure improvements with transit providers. Encourage transit providers to place stops near existing marked or signalized street crossings. If a mid-block stop is warranted transit provider should work with the road authority to install marked or signalized street crossing.
- Leverage infrastructure investments to improve wayfinding. Wayfinding, instructions, and user interfaces should be in multiple languages.
- Collaborate with communities of color and others to ensure all people feel safe and secure accessing transit.
- Prioritize investments in active transportation projects that access transit and in areas that serve marginalized groups as part of construction and maintenance funding programs:
    - Major Streets Transportation Improvement Program
    - Washington County's annual maintenance program
    - Urban Road Maintenance District's list of biking and pedestrian improvement projects
    - Washington County's Transportation Development Tax project list
- Encourage or require new or reconstructed roadways in town centers and station communities to have furnishing zones to allow for micromobility parking or repurpose street parking if a furnishing zone is not available.
- Repurpose curbside parking in station communities and town centers as taxi, ride-hailing and shuttle loading zones.
- Leverage local, regional, state and federal funding, integrating access to transit improvements into related project proposals.
- Create a complete, connected bicycle network that includes identifying opportunities to implement wayfinding, traffic calming and other recommended improvements on lower classification streets (Neighborhood Bikeways) to better accommodate all-ages and all-abilities.
- Leverage infrastructure investments to create a transportation network that allows mobility hubs.
- Adopt lighting standards for regional trails.

LAND USE AND PARKING MANAGEMENT

Land use influences people's travel behaviors. Destinations that are close together in areas with mixed uses have higher percentages of trips being made by walking, rolling and/or transit, whereas areas with wider roads and more abundant parking often have higher percentage of trips being made by driving. Where appropriate land use policies can encourage transit-supportive densities and mixed-use neighborhoods where more destinations are accessible by walking, rolling, biking and transit.

Land Use

Washington County can work with local jurisdictions and agency partners to plan and implement transit-supportive land use and market conditions:

- Washington County maintains eleven community plans. Updating the plans to facilitate mixed-use residential developments within a half-mile of major transit service can build more transit-supportive densities and create neighborhoods where more destinations are accessible by walking, rolling, biking and transit. However, this extends the typical boundary of a quarter-mile for transit corridor planning.
- Provide incentives to encourage development along transit corridors. Use zoning to increase allowable density near transit stations. Work with development community to identify and address barriers to higher-density projects in high-capacity transit corridors throughout the county.
- Pursue plan and code changes (as needed) to facilitate mixed-use residential developments within a half-mile of major transit service to reduce the distances people must travel to access services. This extends the typical boundary of a quarter-mile for transit corridor planning.
- Optimize land use at transit stations by planning for higher intensity mix of uses and integrating travel options. Near-term opportunities include coordinating with TriMet on its station area planning for the Red Line extension and Hillsboro transit center redesign.
- Provide incentives for developments that commit to a TDM plan or implement strategies that encourage transit use, such as free or reduced transit passes, employee shuttles, paid parking, and parking cash-out. Incentives could include floor area ratio bonuses and expanded parking minimum waivers.
- Centralize transportation services at mobility hubs. These could be in repurposed parking areas in a block or two of existing right-of-way or on private land facilitated by a partnership with the landowner. Mobility hubs are best located at intersections of transit lines, with connected bike and pedestrian networks, and near places where people want to go.
- Encourage a diversity of housing types and unit sizes to provide additional affordable transit-accessible housing.

Parking Management

Parking can make transit more difficult to access by spreading destinations farther apart. By managing parking, Washington County can reduce the amount of space it uses and ensure that parking is available for those who need to drive. The following considerations support better effectively utilizing parking supply and allow for more flexibility in use of parking and loading zones for taxis, ride hailing vehicles, shuttles, car, bike and scooter share:

- Accommodate micromobility parking in town centers and station communities (see Micromobility Framework above).
- Repurpose curbside parking in urban areas as loading zones for ride hailing and deliveries. This provides a safe place for passengers to access the vehicle and reduces conflicts between loading vehicles double-parked in bike lanes and other travel lanes.
- Enhance the pedestrian environment by requiring large parking lots to have dedicated bike and pedestrian routes for people to traverse comfortably and safely. The routes must be clearly marked, convenient to use, and provide access to the buildings it serves as well as to adjacent rights-of-way.
- Reduce minimum parking requirements for developments that have access to car share, micromobility services, dedicated carpool parking (for employers), or other strategies that reduce dependency on driving.
- Allow flex spaces in station communities and town centers for bike and scooter share parking, as well as for loading of taxis, ride hailing vehicles, and shuttles. Spaces may be curbside or elsewhere.
- Explore managing parking supply at park-and-rides to maintain parking availability. Dynamic pricing and real-time parking availability information will avoid the anxiety drivers can feel when hoping to get a parking spot at a park-and-ride. These programs can advance equity goals with priority parking and with low-income fares. Programs can encourage carpooling with priority parking spaces.
- Negotiate parking spaces with micromobility services and free-floating car share providers to ensure parking does not conflict with the right-of-way and encourages trips to access transit.
- Repurpose parking lots near popular destinations served by multiple transit lines as mobility hubs.

TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) is a program of strategies that promote alternatives to driving alone. The strategies focus on when, where, and how people travel. TDM is a relatively low-cost way to encourage transit and other non-automobile modes of transportation. TDM strategies are best suited to large employers or other concentrations of workers that can receive targeted incentives, information and travel training resources. However, these strategies can also be applied across regions.

BENEFITS	CONSTRAINTS	EQUITY CONSIDERATIONS	MARKET SUITABILITY
With a flexible, partnership-based approach that leverages private sector participation, TDM can support a range of trip options, increasing the attractiveness of public transportation.	TDM may not address barriers to getting to the transit system, particularly in suburban and rural environments.	TDM programs often only benefit workers in office-based medium- and large-scale businesses, excluding individuals with non-office jobs (day-laborers and construction and manufacturing workers, for example.)	Typology: Retail and Job Centers Strategies can also be applied more broadly as incentives, marketing or training supporting programmatic strategies.

Key Considerations

Washington County can play an expanded role in funding and implementing transportation demand management programs in partnership with community-based organizations and Transportation Management Associations (e.g. Westside Transportation Alliance):

- Seek opportunities to offer community-based transportation demand management services to residents.
- Incentivize (FAR bonus, parking minimum waiver, etc.) the development and implementation of TDM strategies as part of new development.
- Provide free or subsidized travel options to lower-income populations. Partner with affordable housing projects to implement on-site travel options programs.

BIKE SHARE AND SCOOTER SHARE: MICROMOBILITY

MICRO-MOBILITY

Bike share and scooter share programs aim to provide convenient, affordable, on-demand transportation over short-to-medium distances, helping reduce traffic congestion and vehicle parking demand. Micromobility refers to small, fully or partially human-powered vehicles such as bikes, e-bikes, and e-scooters.[8] Shared micromobility solutions are best suited to medium and high-density communities that have enough active transportation paths to ensure safety and connectivity.

Bike share systems come in a few forms: (1) station-based systems, where users pick up and drop off bikes at kiosks that are typically located near transit stops and desirable destinations; (2) dockless systems, where bikes have an onboard global positioning system (GPS) and riders can park anywhere within a designated service area; (3) hybrid systems that combine docking stations with dockless options; and (4) internal, limited-access systems that employers, visitor destinations (e.g., hotels and resorts), and other organizations may provide for explicit use by their employees or patrons.

Several cities and counties have recently approved scooter share programs. These programs allow private companies to provide shared electric scooters (e-scooters) for short-term, app-based rentals. E-scooters use an electric power source and feature a floorboard for the rider to stand on and sometimes a seat to sit on. Like dockless bike share systems, scooter share allows users to end rides anywhere within a designated service area. However, local governments typically create rules for allowable parking areas and other elements of the program.

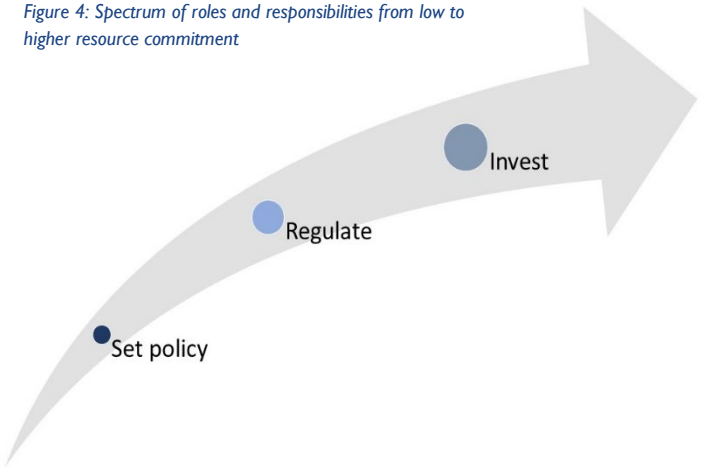
BENEFITS	CONSTRAINTS	EQUITY CONSIDERATIONS	MARKET SUITABILITY
Bike and scooter shares enable flexible trip planning and can be customized to match a community's demographic profile, land use patterns, and geographic characteristics.	Launching and operating these programs requires staff and budget. Introducing many bikes and scooters in areas with missing or substandard active transportation facilities and high-speed traffic can create safety challenges.	Bike and scooter share programs can be unaffordable and inaccessible for low-income, marginalized communities, and households that are unbanked or lack access to a smartphone.	Typologies: Town Centers, High Ridership Stations, Suburban Highway Corridors, Retail and Job Centers Medium and high-density communities with active transportation routes for safety and connectivity

[8] "Guidelines for Regulating Shared Micromobility." NACTO (September 2019).

Key Considerations

There is a range of potential roles and responsibilities (Figure 4) with regards to shared mobility for Washington County consideration:

Figure 4: Spectrum of roles and responsibilities from low to higher resource commitment



- Coordinating with agency and cities partners to develop a framework defining public priorities around shared mobility.
- Setting policy to establish performance targets related to shared mobility or codifying new definitions of modes and services.
- Setting clear roles and expectations to service providers. This may include establishing a regulatory framework to address use of right-of-way, safety, privacy standards, parking and equal access. This could also include a permit program, usage fees and establishing new data collection and management protocols. Potential roles and expectations that can be further explored:
    - Allowing micromobility parking in plazas associated with land development near transit.
    - Collaborating with service providers to provide an affordable pricing structure for low-income users, including enabling use by people who lack electronic banking as well as by people who lack smart phones.
    - Defining terms for operators to manage the number of shared micromobility vehicles on the public ROW, recharge vehicles, manage their safety, redistribute in the system.
    - Collaborating with service providers to provide discounted service for users who begin or end their trip at a transit station.
    - Providing micromobility vehicles that can be used by people with different abilities, e.g. scooters with seats.
    - Ensuring consistent vehicle availability in areas important for equitable access.
    - Establishing a data sharing agreement with providers that allows integration into a MaaS system and allows access for planning and decision-making purposes.
    - Consider creating new staff position and/or initiating a new oversight committee.
- A successful program will be dependent on a complete bike network that can accommodate the safe operation of micromobility devices.

CAR SHARE

Car share is a convenient way to make connections beyond the first and last mile of a transit stop. Vehicles may be parked within a specified service area, at transit stations, or other locations, and people can find them by using a smartphone app. Users are typically charged according to a combination of time and distance traveled. Fees cover car insurance, parking, emergency roadside service, and other car-related expenses.

Car sharing companies operate under three different models:

1. Round-trip car share services where cars must be picked up from and returned to a designated parking space.
2. Free-floating services that allow cars to be returned to any parking spot within a service area, useful for one-way trips.
3. Peer-to-peer car share services that allow individual car owners to rent out their vehicles, usually for round-trips.

BENEFITS	CONSTRAINTS	EQUITY CONSIDERATIONS	MARKET SUITABILITY
Car sharing can support flexible trip planning and make it easier for residents to forgo private car ownership.	Car share produces the same negative environmental and congestion impacts as driving personal vehicles, can be expensive, and requires ample space for parking. Round-trip services are impractical - require returning the car to the origin point.	Car share may be less appealing for low-income communities and residents traveling outside the service area. Driving requires a driver's license, sufficient mobility and sight, and typically a mobile phone application.	Typologies: High ridership stations, Suburban Highway Corridors, Retail and Job Destinations Parking with pedestrian access linking it to the station, destinations beyond biking and walking distance, and destinations with limited parking.

RURAL VAN SHARE

Van sharing is a mid- to long-distance commute option for employees working at the same location. Typically accommodating 5 to 15 riders, they can be organized by individuals, employers, private mobility companies, non-profits, or public agencies. In a rural setting, van sharing is frequently used by farmworkers, and employees working at large, remote businesses without access to public transportation. Rural van share is best suited to low density population areas beyond the transit system, serving riders with limited parking options at their destinations.

BENEFITS	CONSTRAINTS	EQUITY CONSIDERATIONS	MARKET SUITABILITY
Formal or informal van sharing can be an excellent way to facilitate mid- to long-distance connections for agricultural workers and those sharing a common work site.	Typically used for longer trips to or from transit-inaccessible environments, van sharing may not promote transportation access to public transportation stops.	These services are particularly important for individuals who lack access to a private vehicle and live or work outside of fixed-route transit service areas.	Typology: Residential Areas Low density population areas beyond the transit system, serving riders with limited parking options at their destinations

Key Considerations

- Incentivize free-floating car share services to operate in Washington County.
- Coordinate parking arrangements with TriMet and local jurisdictions.
- Design the service to encourage use for transit access with discounts or other incentives for trips that begin or end at transit stations.
- Integrate car/van share into transit providers' trip planning tools. This will show users their menu of options to reach transit.
- Partner with electric utility providers and car share companies to procure and utilize electric vehicles in its delivery of service.
- Facilitate a planning process to identify priority locations to implement electric vehicle charging infrastructure.

ON-DEMAND SHUTTLES

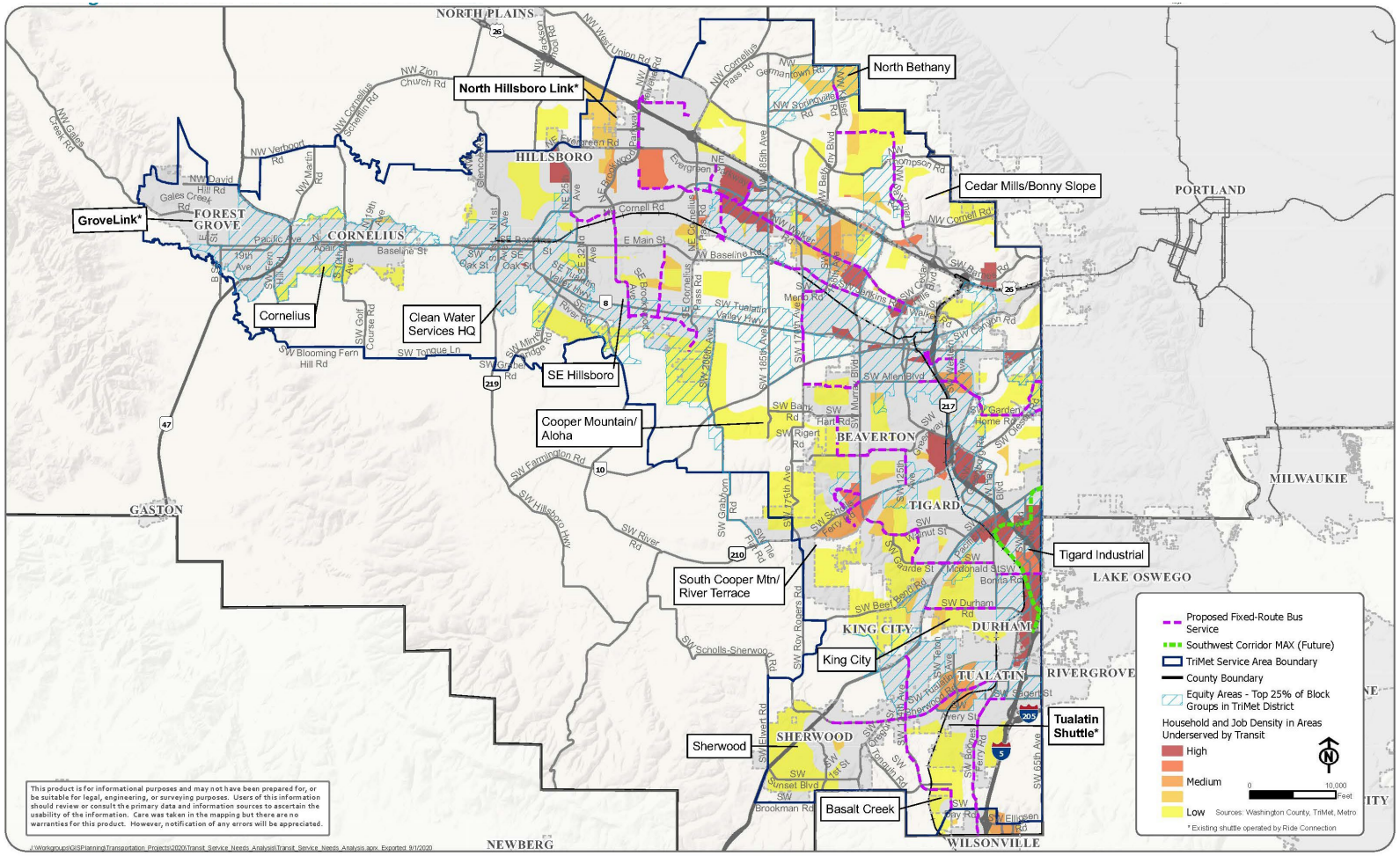
ON-DEMAND SHUTTLES

Shuttles can provide an accessible connection to transit in areas too distant or with ridership that is too low to warrant fixed-route bus service. Shuttles may be operated by transit providers, employers, or other institutions. On-demand shuttles carry between five and 15 passengers, operating on both fixed and deviated routes. Riders request service by phone, online, or through a mobile app that directs them to a common pickup location along the service route.

BENEFITS	CONSTRAINTS	EQUITY CONSIDERATIONS	MARKET SUITABILITY
These services can fill transportation gaps where fixed-route transit does not operate, providing an effective, accessible way to increase transit use.	On-demand shuttles are typically not as cost-effective as fixed-route transit since they often carry fewer riders, follow inconsistent deviated routes, and have longer trip times.	Shuttle programs can be critical for low-income individuals, seniors, and people living wit h disabilities.	Typologies: Town Centers, High Ridership Stations, Suburban Highway Corridors, Retail and Job Destinations Medium density mixed use with limited pedestrian and bicycle connections and transit service. Option for people with limited mobility options, such as older adults or youth

An assessment of areas underserved by transit and key population and job characteristics helped identify potential shuttle service opportunities. These conditions are illustrated in Figure 5.

Figure 5. Transit Service Needs Analysis



Key Considerations

As a public transportation service provider that receives state funding, Washington County can play a role to help identify, prioritize and support shuttle services in areas underserved by transit:

- Prioritize shuttle service in areas that serve marginalized groups and that are underserved by transit.
- Washington County's Transit Development Plan should account for potential shuttle service areas and routes that can prove up traditional fixed-route transit service.
- Expand shuttle service to residential neighborhoods, employment areas and important community destinations that are beyond the reach of existing fixed-route transit and shuttle service.

RIDE HAILING

Ride hailing allows people to request rides in real-time from drivers who provide the ride in their personal vehicle in exchange for payment. These services have evolved to offer both pre-scheduled rides and ride-splitting, so that several passengers who are matched with the same driver may split the cost of the trip. Private companies that provide these services are classified as Transportation Network Companies (TNCs). Partnerships with ride hailing services can improve first/last mile access and promote carpooling to transit stations, which is especially beneficial for stations experiencing a high demand for parking.

RIDE-HAILING

BENEFITS	CONSTRAINTS	EQUITY CONSIDERATIONS	MARKET SUITABILITY
TNC partnerships provide on-demand first/last mile service using a technology and service that many riders are already comfortable with.	TNCs makes many companies reluctant to share their data externally, making coordination with transit and long-term planning more difficult.	Ensuring non-smartphone access options and pricing options for people with low incomes. Ensuring wheelchair-accessible vehicles.	Suburban areas with destinations outside easy walking distance of fixed-route transit stations.

Key Considerations

Coordinating with agency and cities partners to develop a framework defining public priorities, regulate service providers for use of right-of-way with specific requirements that ensures equitable benefits. Important considerations include:

- Ensuring Civil Rights Act Title VI compliance.
- Ensuring access for people with disabilities that meets or exceeds standards set by ADA.
- Serving geographic areas important for marginalized groups.
- Offering a fare structure that accommodates people with low incomes.
- Providing access for those without electronic banking or credit cards.
- Providing access for those without mobile phones or smartphones.
- Establishing fair labor practices and ensuring safety for users and operators.
- Integrate ride hailing into transit providers' trip planning tools. This will show users their menu of options to reach transit.
- Establish data sharing agreements that allow Washington County to use anonymized user data for informing transportation strategies and decision making.

MOBILITY HUBS

Mobility hubs are centralized sites with amenities, activities, and programs that support multimodal connectivity near transit stations and provide services and supporting technologies to facilitate seamless connections between transit, walking, biking, and shared mobility options. They can support electric vehicle and bike charging, real-time transit information, micromobility vehicle docking, Wi-Fi, and more, often including placemaking features to increase aesthetic appeal and assist with wayfinding.

BENEFITS	CONSTRAINTS	EQUITY CONSIDERATIONS	MARKET SUITABILITY
Mobility hubs can increase transportation options and expand access to a wide range of transportation services.	Mobility hub programs require initial investments in new infrastructure (vehicle charging stations and placemaking) and ongoing maintenance requirements.	A collection of hubs near high-frequency transit and more central areas primarily benefit individuals who already have a variety of transportation options, rather than those living or working in underserved areas.	Town Centers, High Ridership (strong walking access), Retail and Job Centers Mixed land use with multimodal and service connections.

Key Considerations

Washington County can play a role to help identify, prioritize and support implementation of mobility hubs by:

- Convening partners needed to implement mobility hubs, ideally near popular destinations and with strong transit, bicycle, and pedestrian connections. Refer to best practices for mobility hubs as reported by TransLink in Vancouver, British Columbia.[9]

[9] https://sustain.ubc.ca/sites/default/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-71%20Identifying%20Best%20Practices%20for%20Mobility%20Hubs_Aono.pdf

IMPLEMENTATION

This final section describes potential strategies to advancing recommended first and last mile transit connections, including dependencies, a pilot program framework and funding opportunities.

PHASING AND DEPENDENCIES

Feedback received during the community engagement, respondents strongly favored infrastructure investments that improve safe mobility for all people — including transit users and non-transit users alike. These include sidewalks, crossings, intersection, and bicycle facilities. To that end when considering implementation, some investments must be made first to enable others (Table 4). Bike and scooter share programs benefit when there are extensive and high-quality bicycle and pedestrian facilities on which to ride and safe places to park that do not interfere with pedestrian traffic. Other strategies, such as shuttle services TDM measures can be deployed independently with little or no physical infrastructure needs.

Table 3: Program Investments

ACTION	INITIAL REQUIREMENTS	ENABLED PROGRAMS
Infrastructure projects to serve active modes	• Pedestrian improvements (sidewalks, paths, and crossings) • ADA improvements (curb ramps, pedestrian push buttons, and transit loading areas) • Bike improvements (bike lanes, paths, and intersection treatments) • Human-scale wayfinding • Human-scale lighting	• Mobility hubs • Bike share • Scooter share
Programs to work with new technology	• Micromobility • Shuttle services • Free-floating car share • Ride hailing services	• MaaS • Mobility hubs

PRIORITIZATION

Program implementation is best prioritized by:

1. Addressing equity.
2. Ensuring programs support and complement each other.
3. Integrating programs with existing transit.

FRAMEWORK FOR IMPLEMENTING PILOT PROGRAMS

Temporary pilot implementation is an effective, low-risk method to try a new strategy or technology without fully adopting it. Pilot programs allow the overseer to monitor progress and adjust as necessary. This informs the plan for long-term implementation and allows the program to end if it does not perform as designed. Pilot programs can be useful for gaining public support because they allow people to experience a program before committing to it.

It is important to establish a policy framework to make sure pilot programs are implemented effectively and advance Washington County's goals. Based on a literature review of 220 pilot programs, the Urbanism Next Center at the University of Oregon recommends 10 actions for successful pilot programs[10]:

1. Define pilot goals and outcomes at the beginning of the process and make sure every pilot activity is designed to achieve them
2. Foster relationships and build trust
3. Create a policy framework for each pilot project that advances the public good and is easy to understand
4. Plan for volatility
5. Collect information needed to ensure the public good (while protecting privacy) to help make relevant policy decisions
6. Measure the impact on equity, health and safety, the environment, and the economy
7. Measure the impact of the pilot project on transit
8. Perform study and include findings in a final evaluation report
9. Build in compliance mechanisms
10. Apply lessons learned and recommendations to future pilot projects

[10] https://www.urbanismnext.org/resources/perfecting-policy-with-pilots-new-mobility-and-av-urban-delivery-pilot-project-assessment

FUNDING AND PARTNERSHIPS

Transit access involves many stakeholders. Local jurisdictions are responsible for much of the roads and sidewalks, private companies operate car share and micromobility options, and transit providers manage stops and service. Collaboration among these and others offer opportunities to make holistic transit access improvements. Some strategies require a broad assortment of partners to come together.

Funding will be needed to implement transit access strategies. Washington County can leverage its funding resources by directly supporting programs and making funding available to its partners, thereby using economic incentives and its role as a convener to further these programs and pilot projects. Table 4 lists potential partners and strategic role(s) the county can take to implement strategic solutions for first and last mile transit connections.

Table 4. Funding and Partnerships

PROGRAM/POLICY	POTENTIAL COUNTY ROLE	PARTNERS
Expanded TDM	Staff resources, funding, regulation	Community-based organizations Employers Westside Transportation Alliance (WTA)
Bike Share and Scooter Share	Convener	Micromobility service providers Local jurisdictions
Shuttle Service	Coordinate, convene, and fund	Transit providers Employers Other jurisdictions
Mobility Hubs	Coordinate, convene, and fund	Transit providers Private transportation services Other jurisdictions Landowners Electric utilities
Park-and-Ride Parking Management	Coordinate and convene	Transit agencies Landowners Other jurisdictions

Appendix A
Summary of Stakeholder Workshops and Community Input Survey

Stakeholder Business and Community Summit Summary

Dec. 31, 2019

Overview

Washington County convened two First and Last Mile Project summits at Beaverton City Hall in October 2019 to engage key stakeholders and solicit input on proposed projects, programs and strategies. The first event on Oct. 15 was geared towards major employers, while the second event on Oct. 16 invited community members to participate. The feedback heard at the summits will help inform the final report to be released in early 2020.

Format

Participants were given an overview of the First and Last Mile project., followed by a panel presentation by Ride Connection, City of Portland and Fehr & Peers. This allowed participants to learn about mobility services and programs available in the metro area and beyond, including shuttle services, the ongoing shared e-scooter pilot in Portland and other first/last mile strategies and case studies in regions like Seattle and the Bay Area. After a question-and-answer session, participants broke out into small groups to discuss topics raised during presentations and then reported out the key points of each conversation. The following is a summary of the major themes that were heard over the course of the two events.

Business Summit Summary

The business summit was attended by 13 people and focused on themes of partnership and equity.

- Transit service was cited as an increasing consideration for employers siting potential workplace locations in order to attract and retain talent.
- Participants noted transit needs to be better incorporated into the development process as an essential service, citing several areas in the county that have recently developed with no or very limited transit service.
- Participants expressed interest in seeing more public-private partnership. Attendees were interested in learning about case studies from other regions that fit the suburban context of Washington County, where employment is more dispersed than in central cities. A representative from WeDrive noted an on-demand shuttle pilot program with Carlsbad, CA.
- Participants identified the value-added proposition that travel options present, including moving more than one person, improved partnerships, information sharing, access to opportunity, improved productivity and economic development.
- Participants noted a few opportunities to better encourage the use of travel options including integrating travel options (shared mobility) into multifamily/affordable housing development

and improved demand-management strategies like directly linking travel options into Human Resources benefit programs.

- Some participants pointed out that jurisdictions need to make a concerted effort to meet equity goals and ensure equitable access to travel options. Portland's e-scooter share program was cited as an example where the city required scooter companies to place 20% of scooters in East Portland.
- Participants supported focusing on the needs of families and the elderly, not just commuters, when developing new programs. It was noted that the price of transit fare for a family can greatly exceed the cost of driving and parking a vehicle that they already own, discouraging use of transit.

Community Summit Summary

The community summit was attended by 15 people and focused more on rural transit needs and micromobility. Participants included fourth- and fifth-graders from Terra Linda Elementary taking part in a First Lego League Challenge competition to solve a real-world problem. Students chose first-last mile access as their problem.

- There was significant interest in Portland's e-scooter pilot, with some concerns raised over the program's safety record and instances of sidewalk riding that can impact pedestrians. The City of Portland uses crash reports and emergency room visit data compiled by Multnomah County, but acknowledges that these metrics are usually underreported. A City representative noted that they are embarking on strategies to prevent unsafe behavior, including education and enforcement to scooter companies and riders, as well as initiatives to build dedicated bicycle infrastructure to make streets safer for vulnerable road users.
- There were a couple questions about mobility options for youth. It was noted that most micromobility services generally have minimum-age restrictions for liability reasons.
- Attendees emphasized developing an inclusive system to serve the transportation needs for all individuals, including those who may not have access to smartphones and apps to access on-demand systems.
- Participants noted the importance of completing sidewalk and crossing gaps and lighting to improve pedestrian safety and connectivity.
- Some participants expressed a desire for additional park-and-ride capacity at MAX stations and interest in policies to increase density and reduce parking requirements near transit.
- There was also concerns raised over public subsidies of new mobility services, such as microtransit, in areas where fixed-route transit is not readily accessible.
- Other topics of interest included investing in Safe Routes to Schools projects and programs to make it safer for children to walk or bike to school, as well as reducing vehicle speeds through roadway design, lowering speed limits and traffic enforcement.

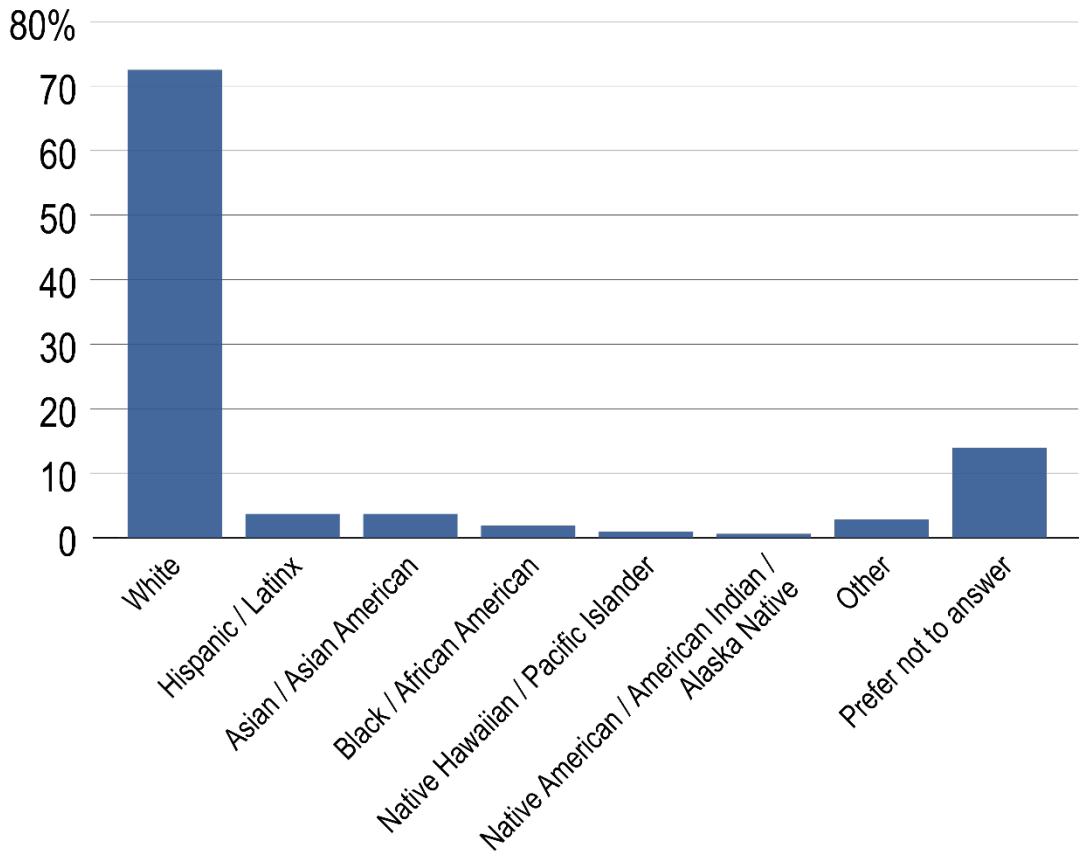
Online Open House

Survey Results, Fall 2019

WASHINGTON COUNTY OREGON

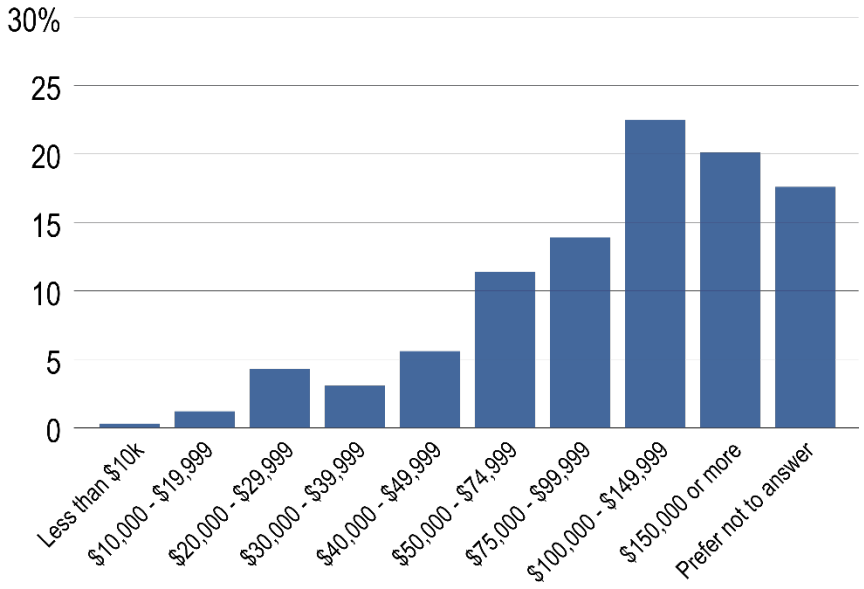
Demographics

Race / Ethnicity

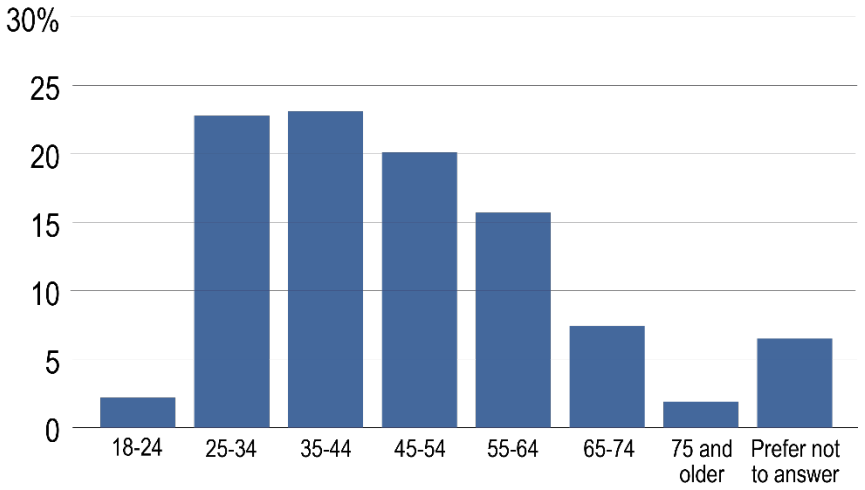


Demographics

Household Income

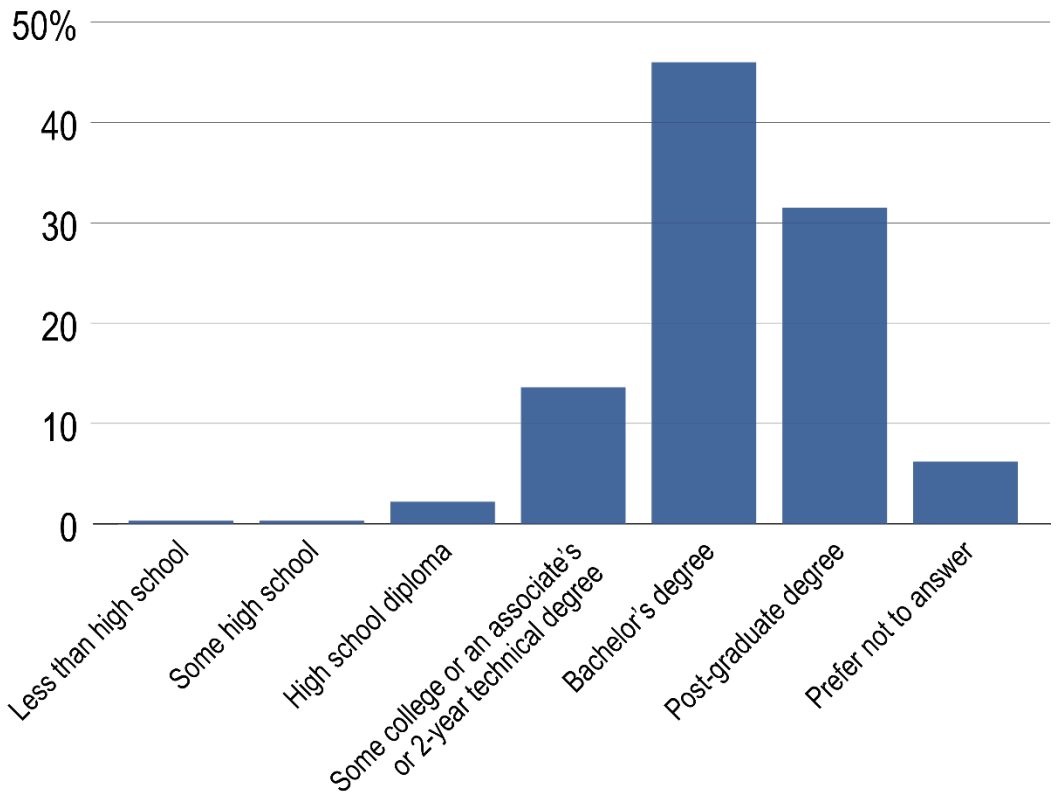


Age



Demographics

Educational experience



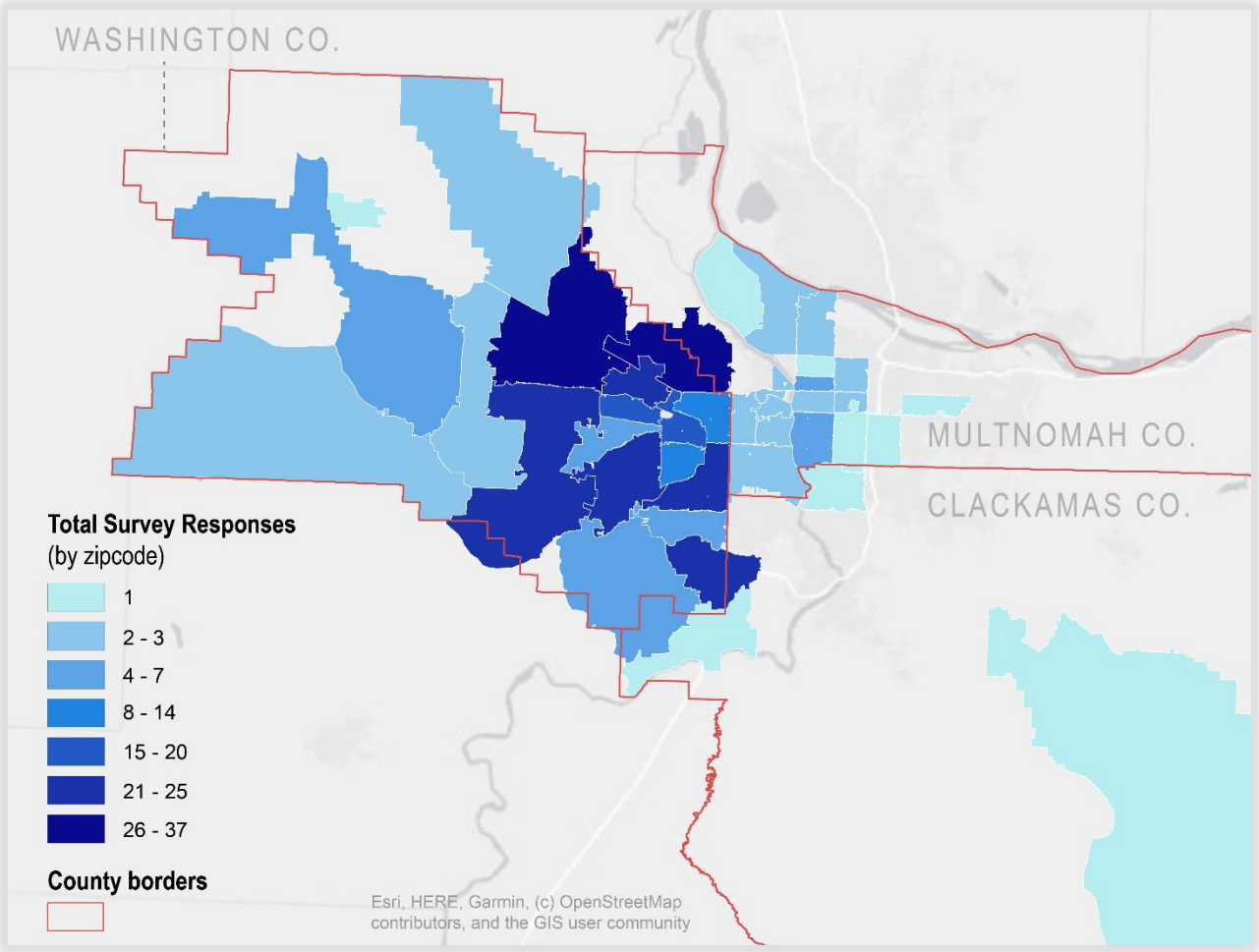
Response Locations

Primary ZIP code locations:

- 33% - Portland
- 31% - Beaverton
- 17% - Hillsboro
- 7% - Tualatin
- 2% - Forest Grove
- 2% - Tigard

Portland ZIP Codes:

- 77% came from the West Hills and Southwest



Key Findings

Key Findings

Transit Use

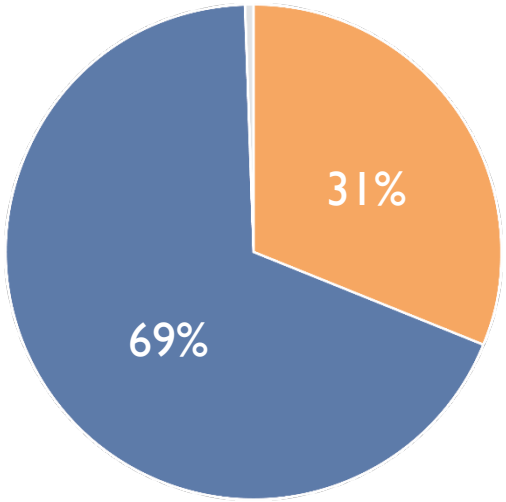
- Nearly half of all transit riders use transit daily or 2-5 times a week
- Transit riders were nearly twice as likely to say that safer streets would encourage more transit use
- Non-riders were twice as likely to say that information about time and cost savings would encourage them to use transit

Alternative Modes

- Regardless of favorability or previous use, large majorities of riders and non-riders both view all alternatives as appropriate for Washington County
- Carshare, bike share / scooter share, and rideshare are far more popular among transit riders (all of them also had net negative favorability among non-riders)
- More people have used ride-hailing than any other alternative mode (both riders & non-riders)
- Shuttles have the lowest "have used" & "would not use" responses, but also the highest "might use" score, suggesting a level of interest but perhaps also some uncertainty about the concept
- Ridesharing is the least commonly used overall, but ridehailing has the lowest net favorability
- Bike share / scooter share is extremely popular among transit riders, but has a net negative favorability among non-riders; still more than 50% of non-riders view it as appropriate

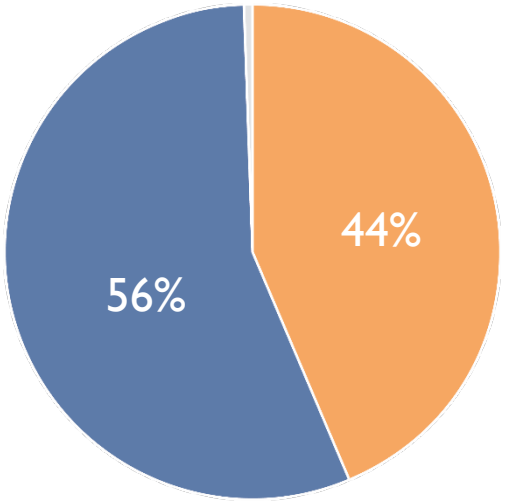
Transit Use

Q1. Do you currently use transit?



Yes

No



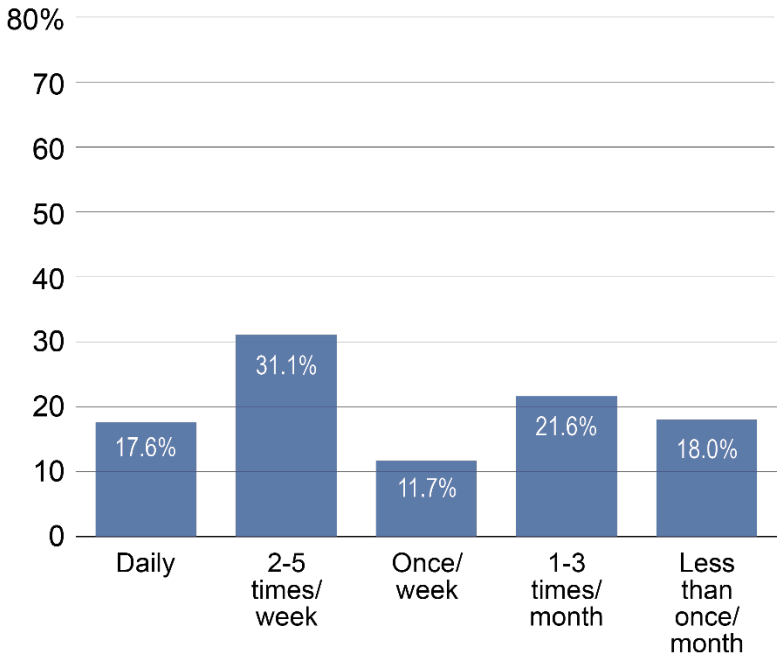
Yes

No (including "yes" responses of "less than once a month")

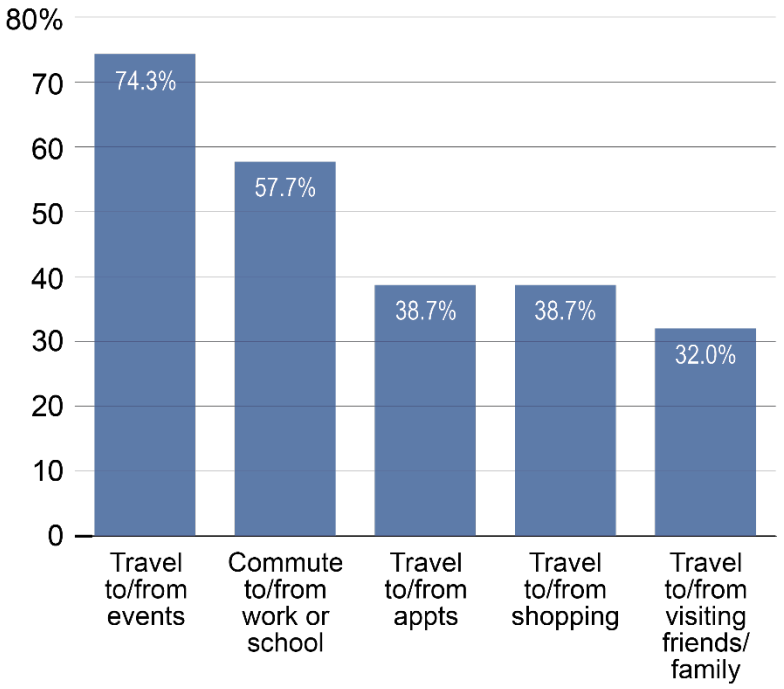
NOTE: The remainder of the analysis uses the grouping of non-transit riders that includes those who ride less than once a month, as shown on the right side of this slide.

Transit Use (Riders)

Q1a. How often do you typically use transit?

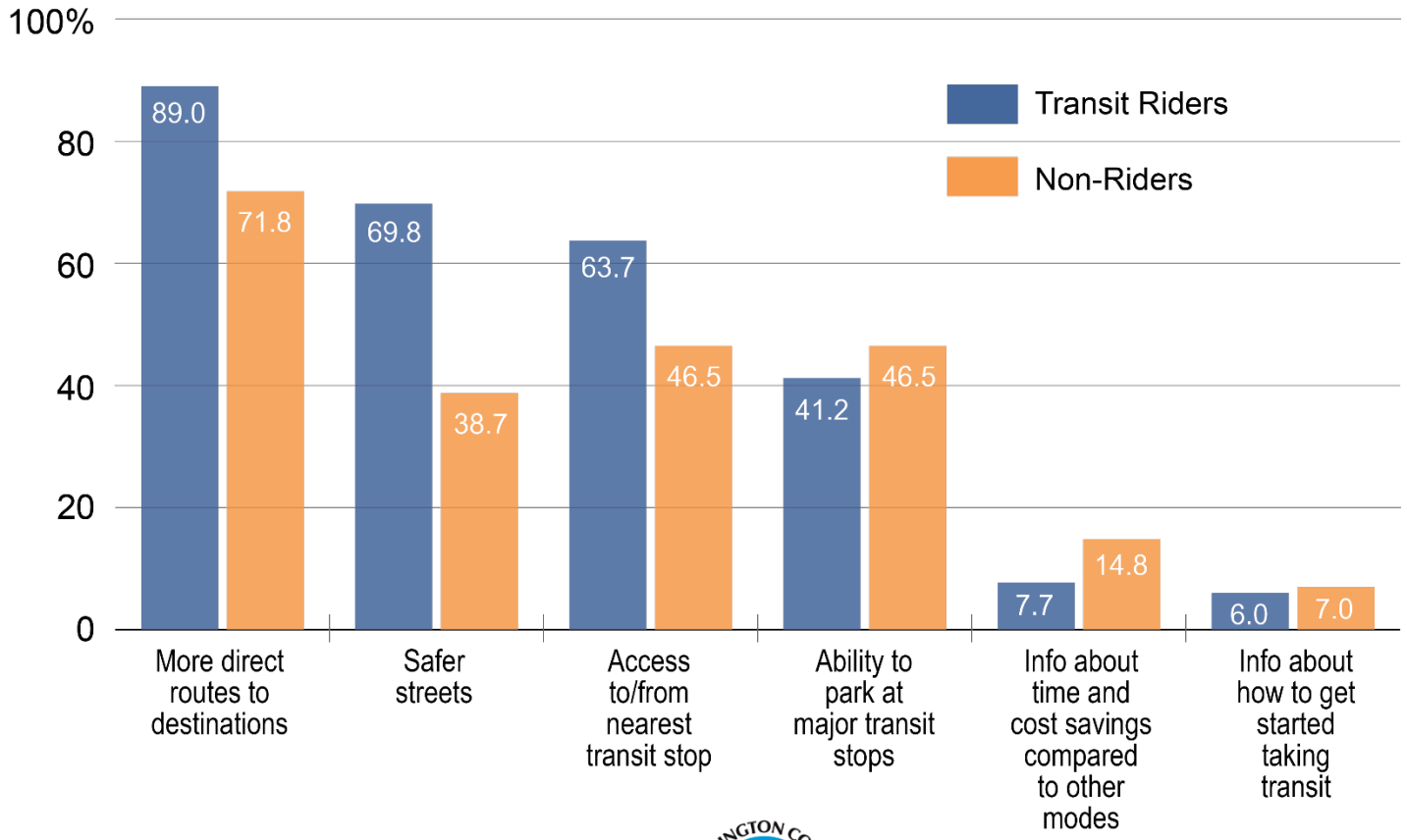


Q1b. For what types of trips do you use transit?



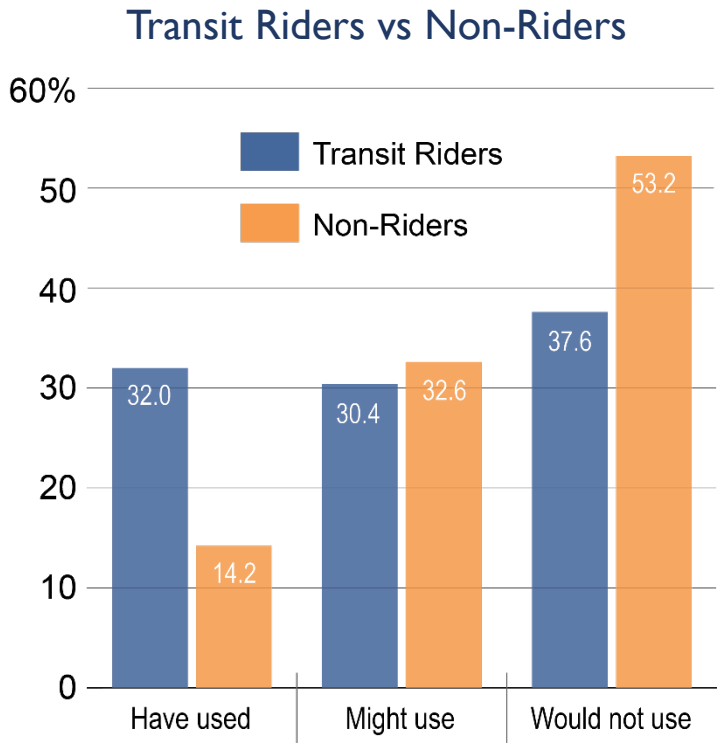
Transit Use

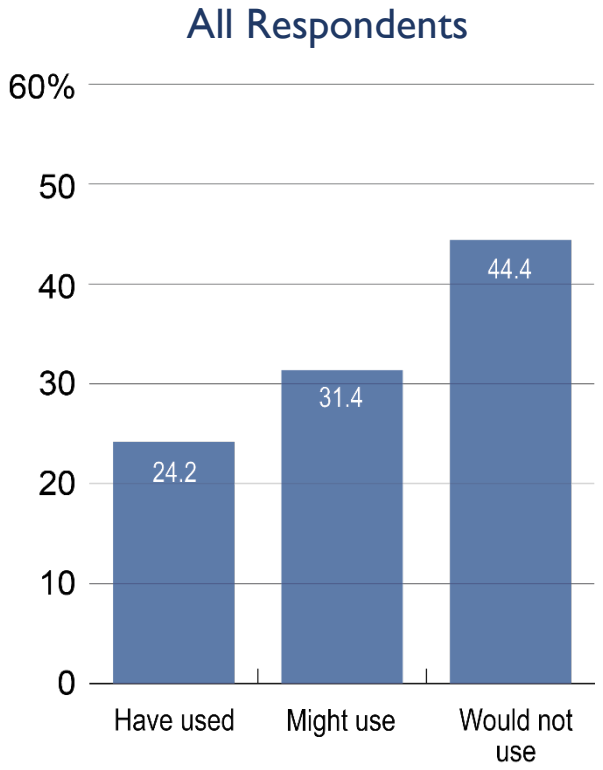
Q1c/d. What would encourage you to use transit (or use it more frequently for non-rider respondents



Alternative Modes

Q2. Have you used or would you use: Bike share or scooter share

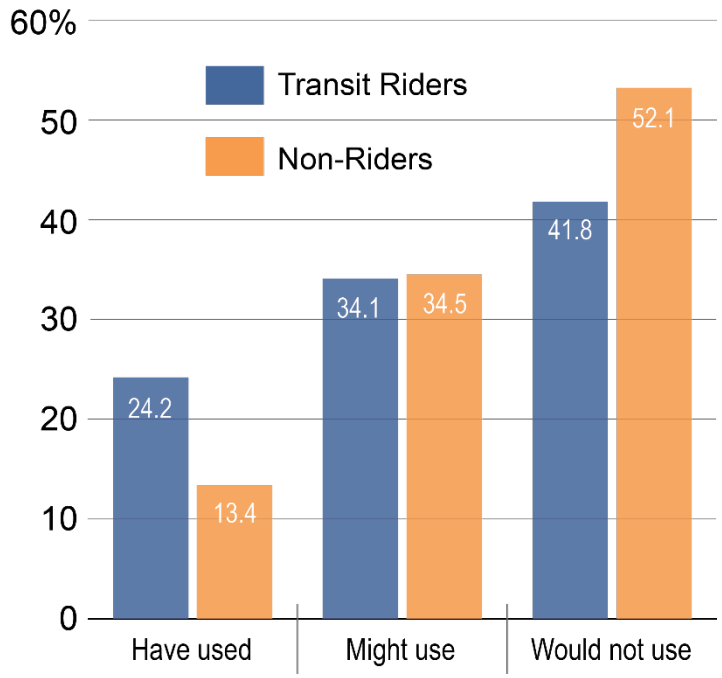




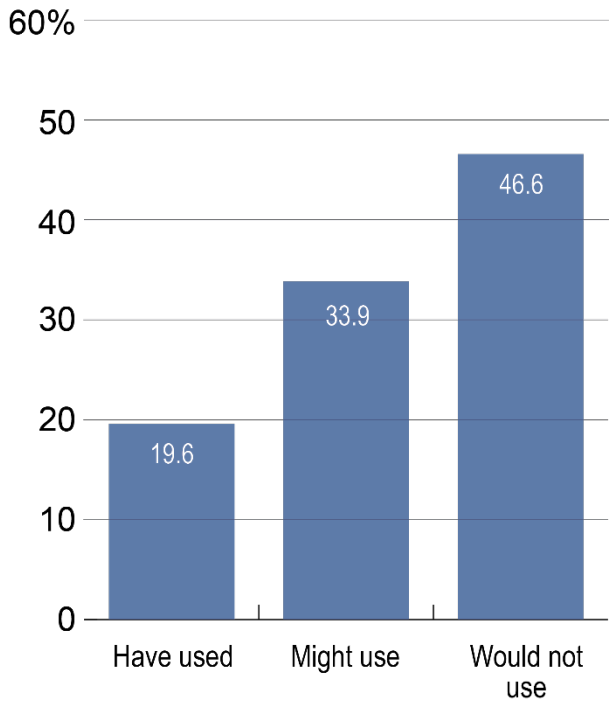
Alternative Modes

Q2. Have you used or would you use: Carsharing

Transit Riders vs Non-Riders



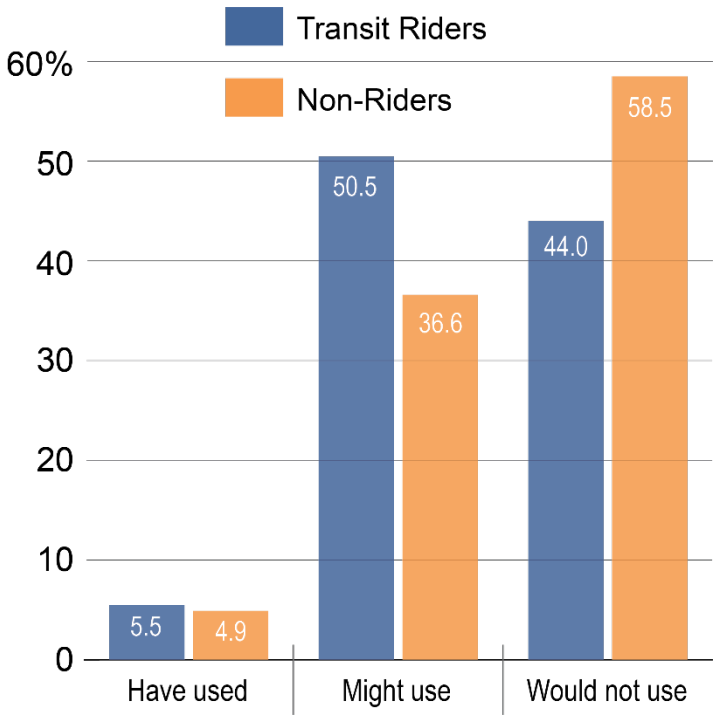
All Respondents



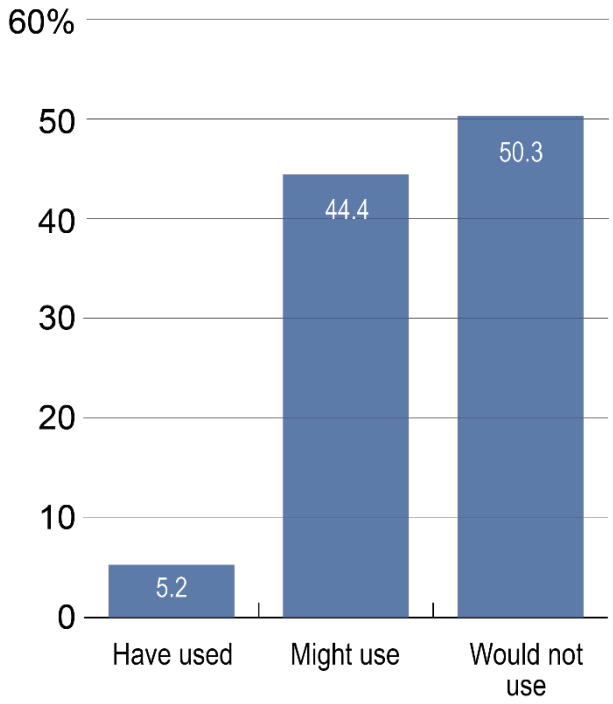
Alternative Modes

Q2. Have you used or would you use: Ridesharing

Transit Riders vs Non-Riders



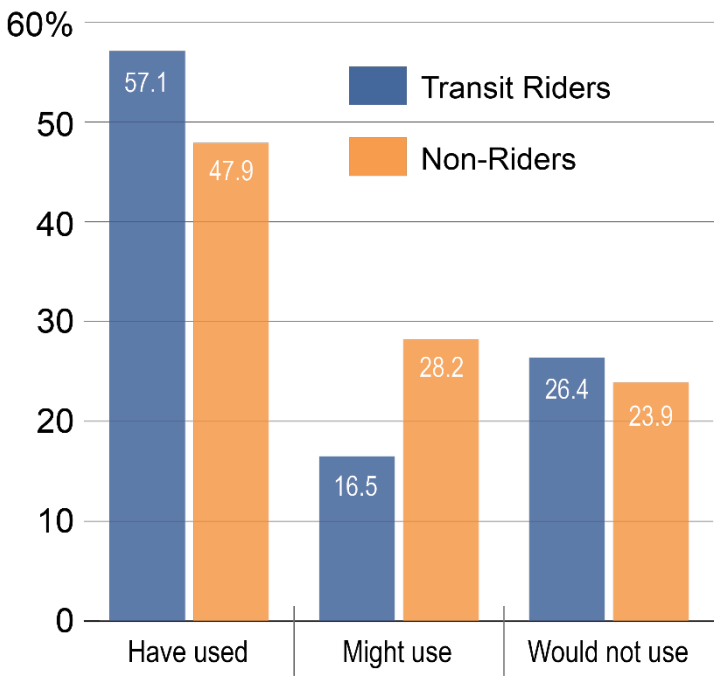
All Respondents



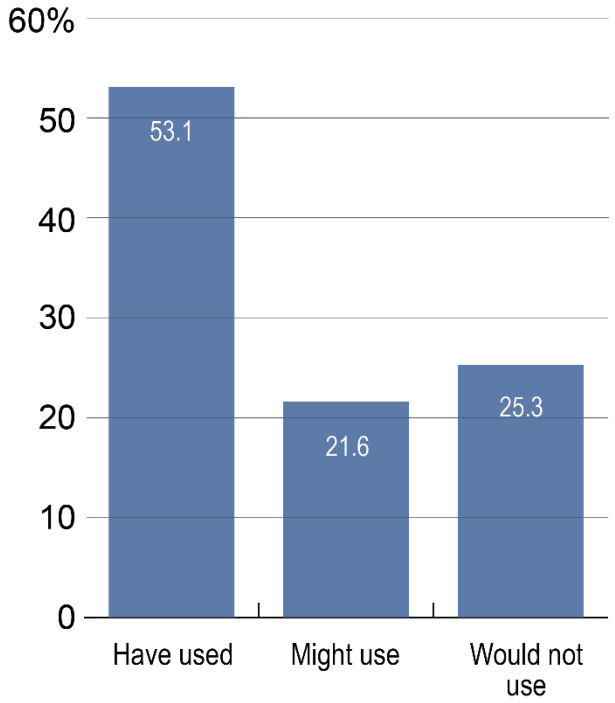
Alternative Modes

Q2. Have you used or would you use: Ridehailing

Transit Riders vs Non-Riders



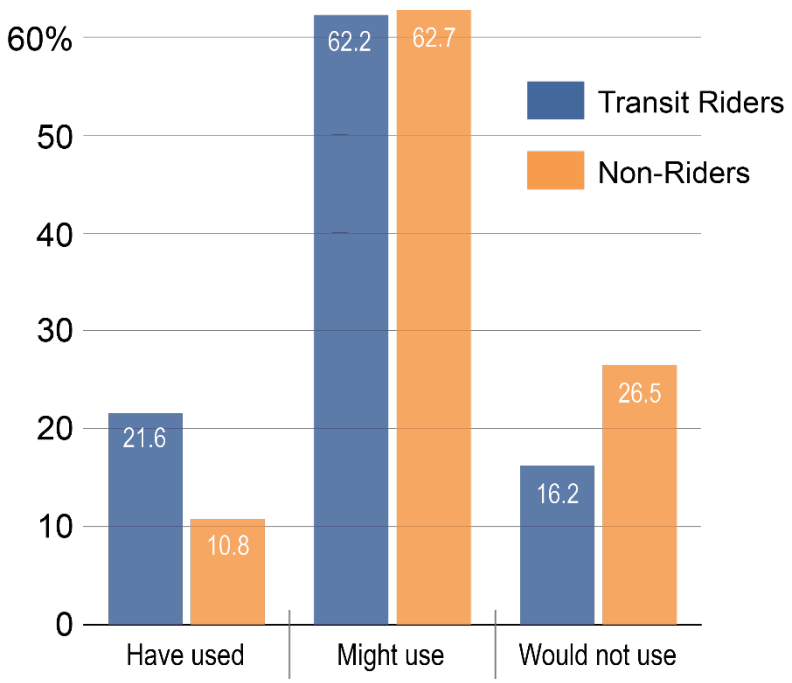
All Respondents



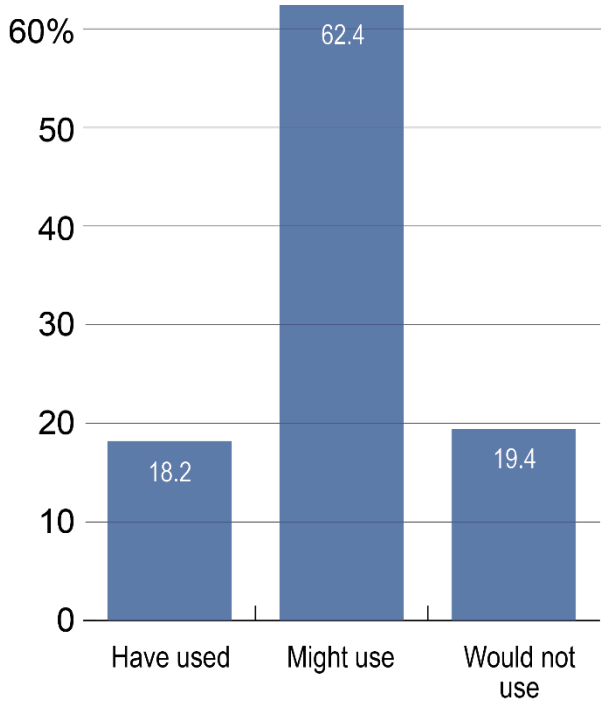
Alternative Modes

Q2. Have you used or would you use: Shuttles

Transit Riders vs Non-Riders

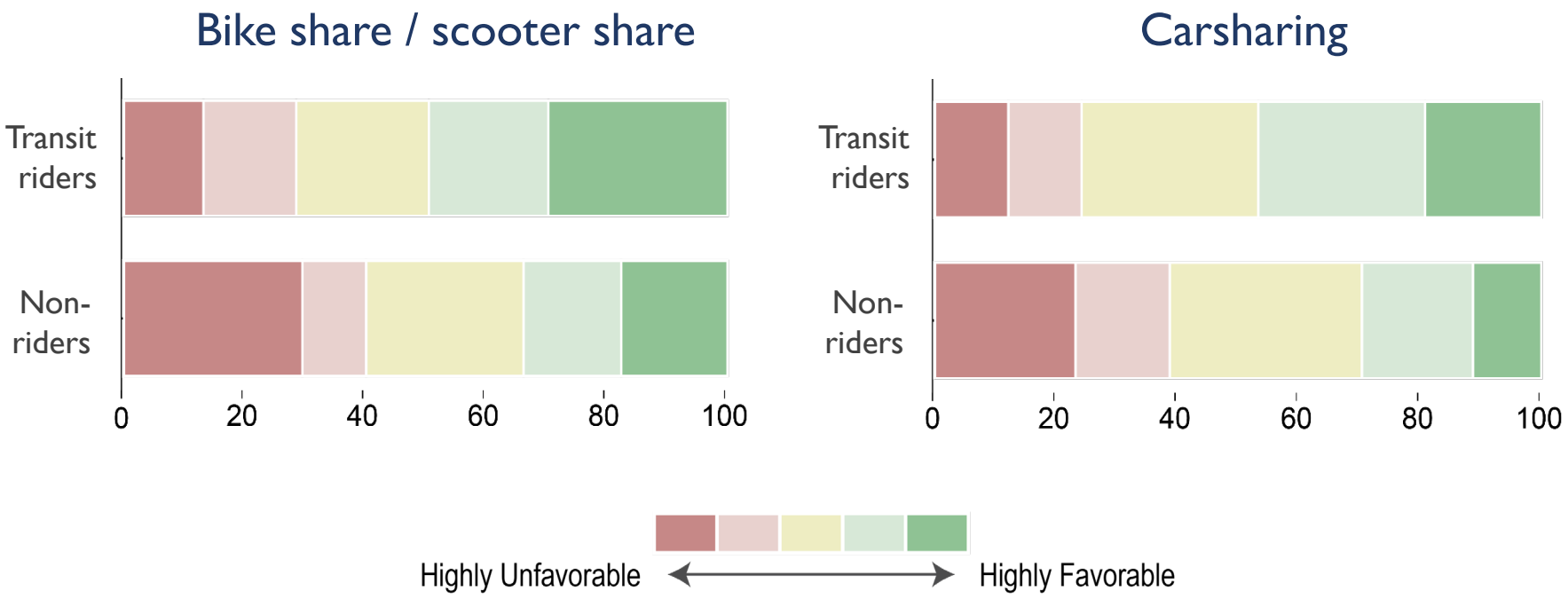


All Respondents



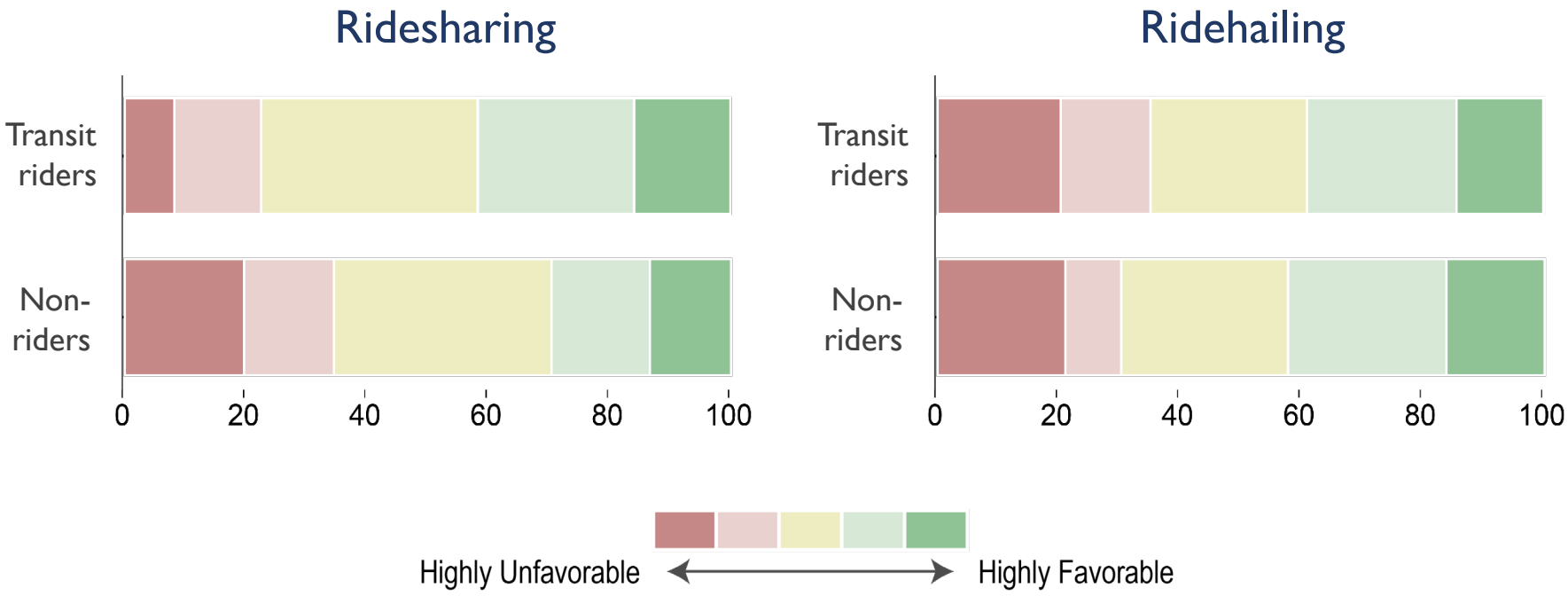
Alternative Modes

Q3. What is your view of:



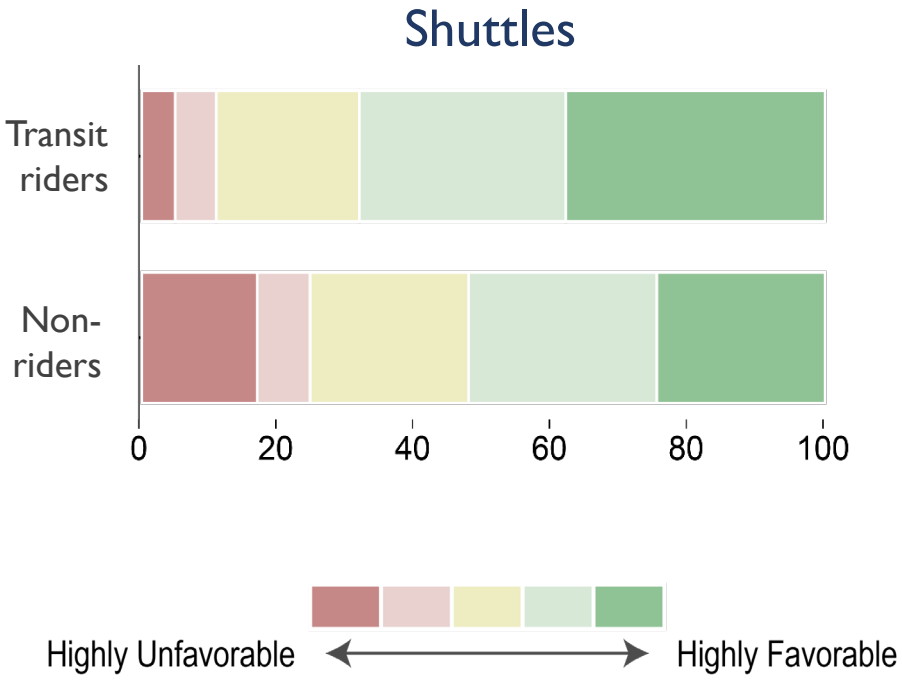
Alternative Modes

Q3. What is your view of:



Alternative Modes

Q3. What is your view of:



Alternative Modes

Overall favorability levels

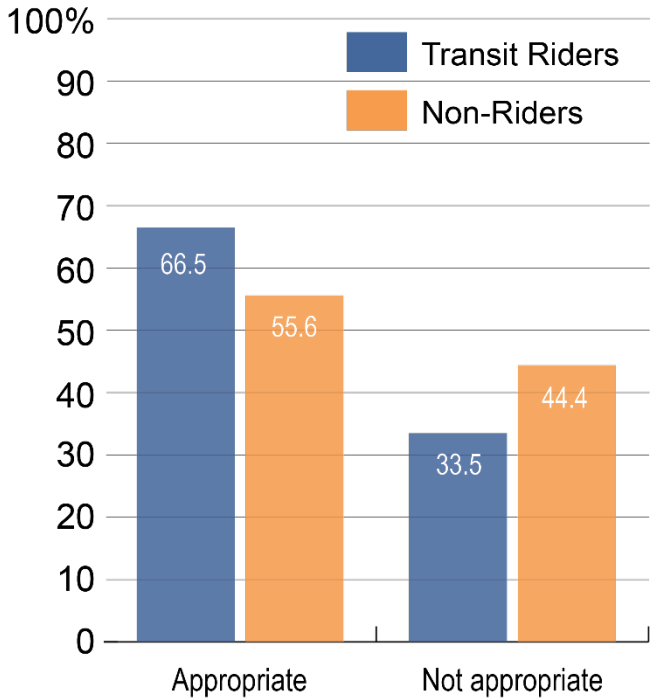
Net Favorability
(highly/somewhat favorable – highly/somewhat unfavorable)

	Bike share / scooter share	Carsharing	Ridesharing	Ridehailing	Shuttles
Transit riders	+20.9	+22.5	+19.2	+3.8	+57.1
Non Riders	-6.3	-9.2	-4.9	+12.0	+27.5

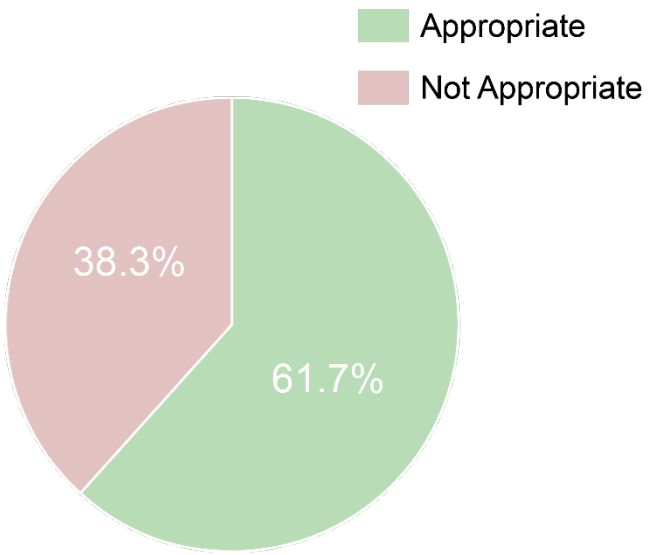
Alternative Modes

Q4. Is bike share and scooter share appropriate for Washington County?

Transit Riders vs Non-Riders



All Respondents



Alternative Modes

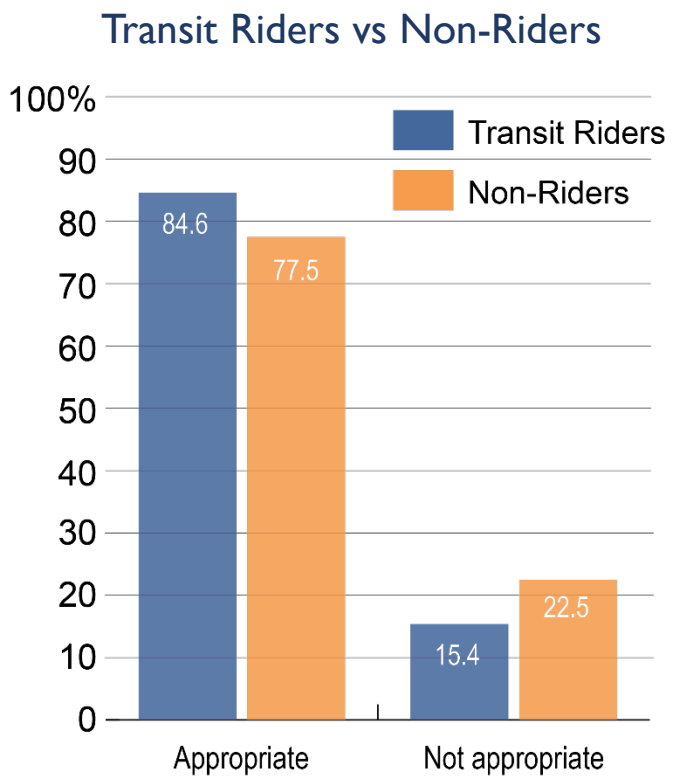
Q4a. Why do you think bike share and scooter share are not appropriate for Washington County?

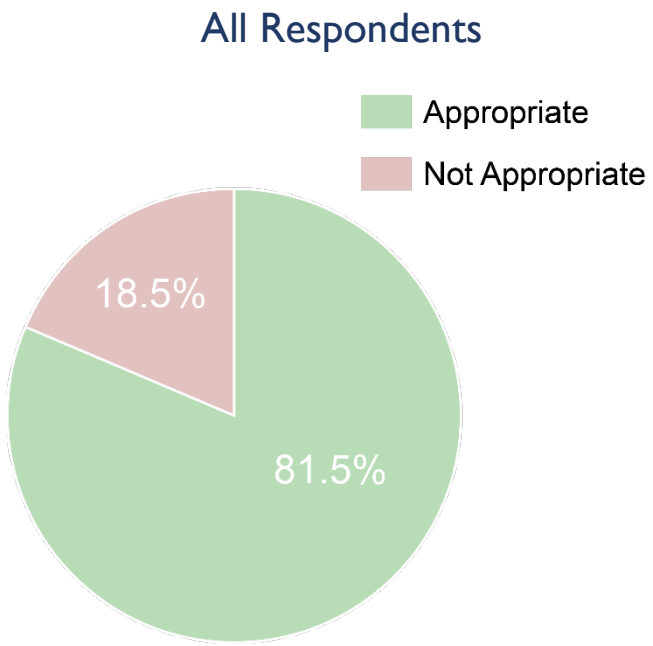
Primary themes:

- Trip distances are too long
- Safety concerns – existing infrastructure doesn't protect users
- Safety concerns – conflicts between users and pedestrians
- Poor connectivity – existing infrastructure has significant gaps
- Not dense enough to provide enough users
- Users may not comply with the rules

Alternative Modes

Q4. Is carsharing appropriate for Washington County?





Alternative Modes

Q4a. Why do you think carsharing is not appropriate for Washington County?

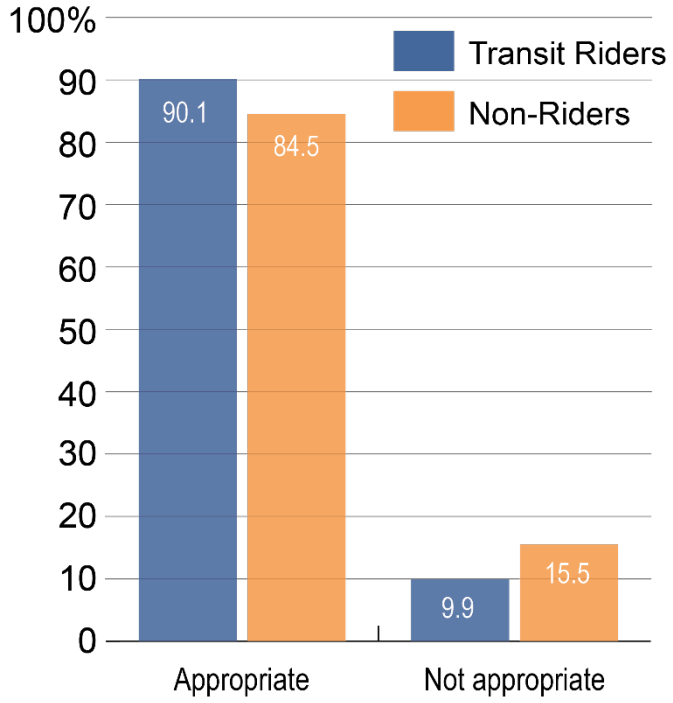
Primary themes:

- Doesn't solve the problem of too many SOVs on the road
- Membership might be too expensive
- Not enough population density in much of the county
- Should focus on larger vehicles (shuttles, transit) and shared rides

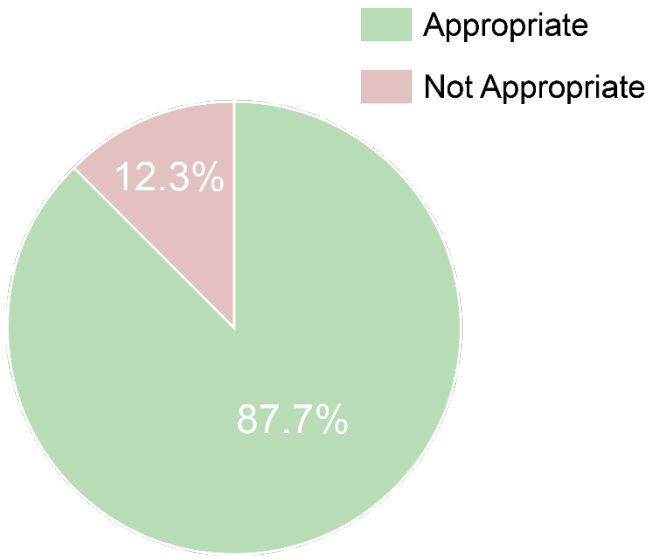
Alternative Modes

Q4. Is ridesharing appropriate for Washington County?

Transit Riders vs Non-Riders



All Respondents



Alternative Modes

Q4a. Why do you think ridesharing is not appropriate for Washington County?

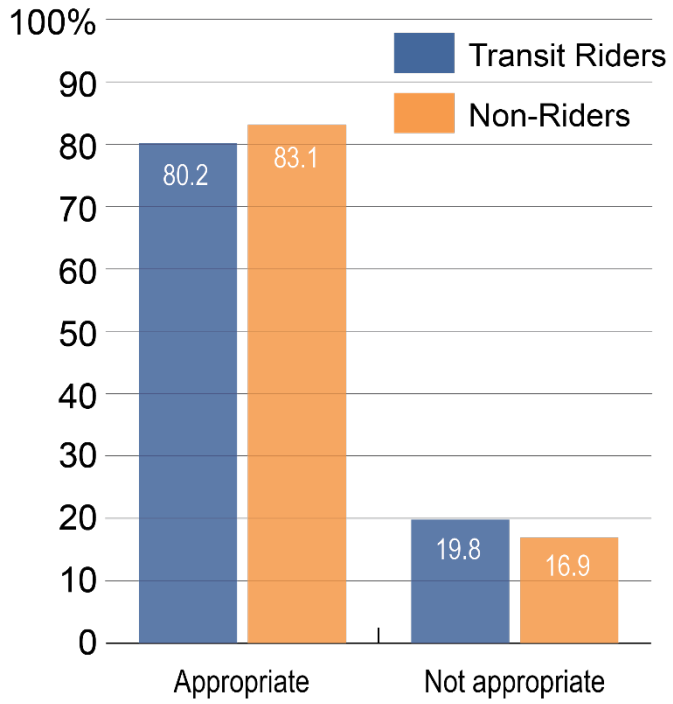
Primary themes:

- Potential safety concerns
- Not realistic for people with children
- Difficult to coordinate
- Difficult to arrange efficient trips – people going in various directions
- Not as reliable as transit

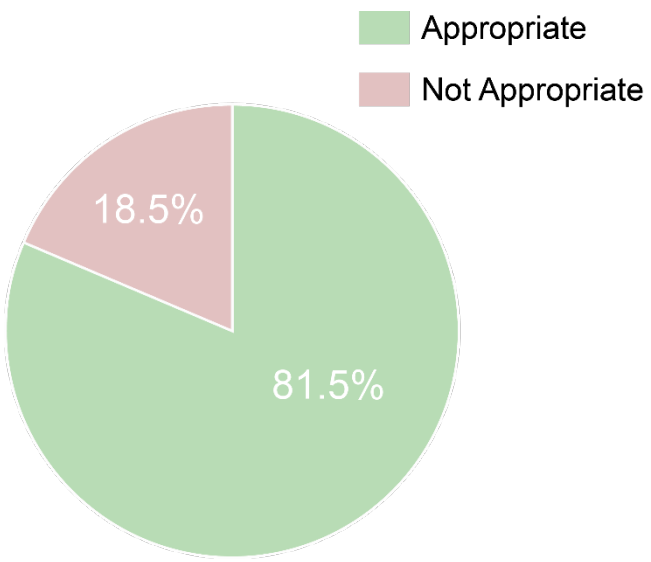
Alternative Modes

Q4. Is ridehailing appropriate for Washington County?

Transit Riders vs Non-Riders



All Respondents



Alternative Modes

Q4a. Why do you think ridehailing is not appropriate for Washington County?

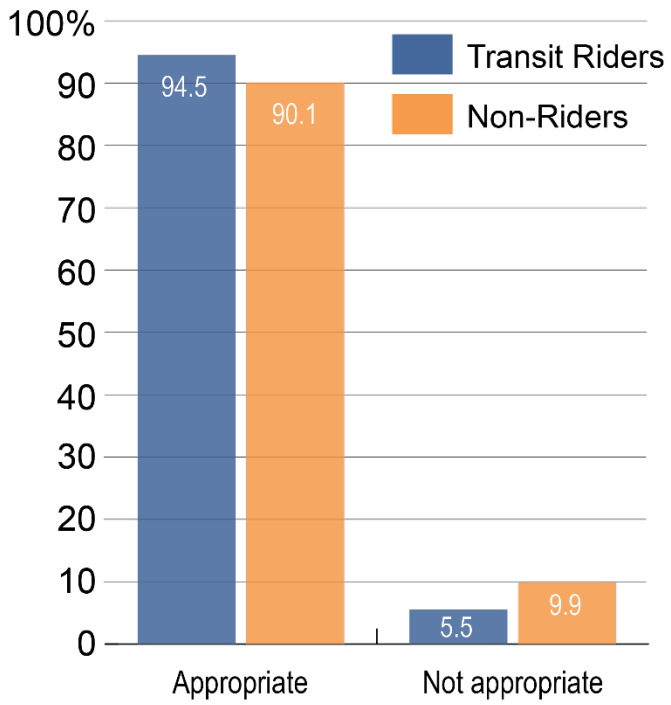
Primary themes:

- Ridehailing increases overall VMT
- Can increase congestion
- Should focus on expanding transit and increasing service
- TNCs often have problematic corporate cultures – should not subsidize
- Inefficient – potential for deadheading

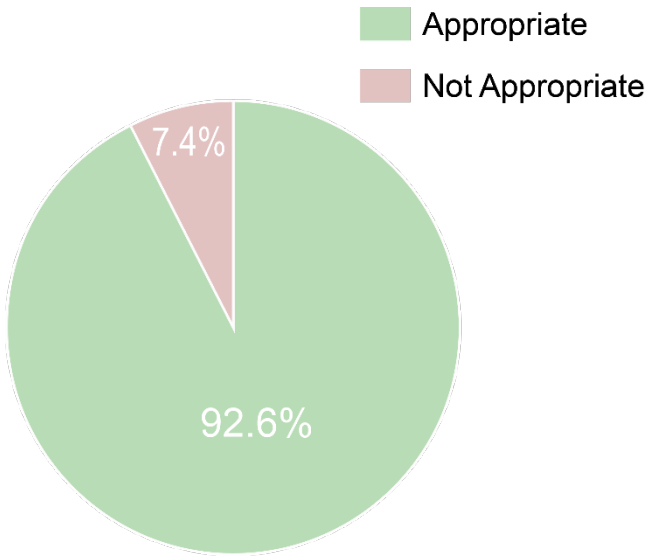
Alternative Modes

Q4. Are shuttles appropriate for Washington County?

Transit Riders vs Non-Riders



All Respondents



Alternative Modes

Q4a. Why do you think shuttles are not appropriate for Washington County?

Primary themes:

- Do not encourage sustainable transit use
- Shuttle is often too slow – people will simply use their own cars
- May not be many opportunities for this outside of the big companies (some of which are already providing them)
- Inequitable – often only help those with a job at a good company

Additional Comments

Q11. Do you have any comments you would like to share?

Bike/ped:

- Need safer infrastructure for bikes and peds – particularly connecting to transit
- Not enough options for pedestrians
- Connectivity is a big problem
- Dockless scooters are a great first/last mile solution

Safety

- Safer streets should be a top priority

Transit

- Should focus on expanding routes and increasing service
- Would be great to have an option b/t small communities and Hillsboro/Beaverton
- Need more alternative options for non-day shift employees

Appendix B
Infrastructure Improvements Project List

Project	Notes	Station	Category	Location
1	Add marked crossing across 10th	Adair/Baseline & 10th Ave	Crosswalk improvement	10th & Clark
2	Add marked crossing across Adair	Adair/Baseline & 10th Ave	Crosswalk improvement	Adair & 7th
3	Add marked crossing across Adair	Adair/Baseline & 10th Ave	Crosswalk improvement	Adair & 13th
4	Add marked crossing across Adair	Adair/Baseline & 10th Ave	Crosswalk improvement	Adair & 12th
5	Improve sidewalk access/crossing over railroad tracks.	Adair/Baseline & 10th Ave	Sidewalk improvement	4th south of Baseline
6	Add wayfinding information at the bus stop	Adair/Baseline & 10th Ave	Wayfinding	Adair & 10th
7	Add wayfinding information at the bus stop	Adair/Baseline & 10th Ave	Wayfinding	Baseline & 10th
8	Install curb extensions to slow down westbound traffic turning north on 10th, and southbound traffic turning west on Adair	Adair/Baseline & 10th Ave	Intersection improvement	Adair & 10th
9	Improve curb ramps to ADA standards	Adair/Baseline & 10th Ave	Curb ramp improvement	10th & Cherry
10	Add ADA ramps on sidewalks.	Adair/Baseline & 10th Ave	Curb ramp improvement	Adair & 9th
11	Improve sidewalk access/crossing over railroad tracks.	Adair/Baseline & 10th Ave	Sidewalk improvement	4th north of Davis
12	Add sidewalk access/crossing over railroad tracks.	Adair/Baseline & 10th Ave	Crosswalk improvement	19th north of Davis
13	Improve sidewalk access/crossing over railroad tracks.	Adair/Baseline & 10th Ave	Crosswalk improvement	14th between Davis and Fremont
14	Add marked crossing across Baseline	Adair/Baseline & 10th Ave	Crosswalk improvement	Baseline & 12th
15	Add marked crossing across Baseline	Adair/Baseline & 10th Ave	Crosswalk improvement	Baseline & 11th
16	Add midblock crossings across Baseline to access eastbound bus stops.	Adair/Baseline & 10th Ave	Crosswalk improvement	Baseline & 9th
17	Add midblock crossings across Baseline to access westbound bus stops.	Adair/Baseline & 10th Ave	Crosswalk improvement	Adair & 9th
18	Add marked crossing across Adair	Adair/Baseline & 10th Ave	Crosswalk improvement	Adair & 11th
19	Add marked crossing across Adair	Adair/Baseline & 10th Ave	Crosswalk improvement	Adair & 17th
20	Add marked crossing across Baseline	Adair/Baseline & 10th Ave	Crosswalk improvement	Baseline & 17th
21	Add marked crossing across Baseline	Adair/Baseline & 10th Ave	Crosswalk improvement	Baseline & 13th
22	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	4th, from the tracks to Barlow
23	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	Baseline, from 9th to Yew
24	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	Adair & 4th
25	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	4th, from the tracks to Holladay
26	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	19th, south of Holladay
27	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	8th, from Alpine to Dogwood
28	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	Alpine, from 8th to 14th
29	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	17th & Barlow
30	Install bike lanes	Adair/Baseline & 10th	Bicycle facilities	10th, from Alpine to Nectarine
31	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	12th, from Alpine to Dogwood
32	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	Ginger, from 10th to 12th
33	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	Healther & Harleman Park
34	Infill sidewalk gap	Adair/Baseline & 10th	Sidewalk improvement	8th, from Dogwood to Heather
35	Work with New Seasons to create a street-facing entrance to facilitate easier bike/ped access	Barrows & Horizon	Frontage	Barrows & Horizon
36	Add wayfinding along Westside Trail to help bike/ped locate nearby destinations and current/future transit stops	Barrows & Horizon	Wayfinding	Horizon & Westside Trail
37	Install marked crosswalk	Barrows & Horizon	Crosswalk improvement	135h & Brittany
38	Install marked crosswalk	Barrows & Horizon	Crosswalk improvement	135th & Rosemary
39	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	Walnut & Northview
40	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	Walnut & Wilton
41	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	Barrows & Springbrook
42	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	Barrows & Mallard
43	Re-stripe crosswalks to enhance visibility	Barrows & Horizon	Crosswalk improvement	Horizon & Scholls Ferry
44	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	Horizon & entrance to shopping area
45	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	Horizon & entrance to shopping area
46	Create bike/ped trail for thru passage to/from Scholls Ferry Rd	Barrows & Horizon	Transit access	Winterhawk & Sheldrake
47	Install flashing beacon or HAWK signal to help trail users cross Horizon Blvd	Barrows & Horizon	Crosswalk improvement	Horizon & Westside Trail
48	Add wayfinding along Westside Trail to help bike/ped locate nearby destinations and current/future transit stops	Barrows & Horizon	Wayfinding	Scholls Ferry & Westside Trail
49	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	Barrows & 160th
50	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	Barrows & 157th
51	Install marked crosswalk	Barrows & Horizon	Crosswalk improvement	Barrows & Scholls Ferry
52	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	135th & Walnut
53	Install marked crosswalks	Barrows & Horizon	Crosswalk improvement	135th & Morning Hill
54	Install flashing beacon to help trail users cross Horizon Blvd	Barrows & Horizon	Crosswalk improvement	Mentor & Westside Trail
55	Install bike lanes to complete the connection on Barrows to Scholls Ferry	Barrows & Horizon	Bicycle facilities	Barrows, from Walnut to Scholls Ferry
56	Install bike lanes to close the gap along Barrows	Barrows & Horizon	Bicycle facilities	Barrows, from 154th to 160th
57	Consider building a new bike/ped trail extension, south from the intersection of Barrows & Westside	Barrows & Horizon	Trail improvement	South from Barrows
58	Infill sidewalk gap on one side of Barrows	Barrows & Horizon	Sidewalk improvement	Barrows, from Westside Trail to Walnut
59	Add wayfinding for trail users, directing to amenities and nearby transit stops	Bethany & Laidlaw	Wayfinding	Laidlaw & Westside Trail
60	Add wayfinding for trail users, directing to amenities and nearby transit stops	Bethany & Laidlaw	Wayfinding	

61	Add wayfinding for trail users, directing to amenities and nearby transit stops	Bethany & Laidlaw	Wayfinding	
62	Add wayfinding info for nearby amenities and destinations	Bethany & Laidlaw	Wayfinding	Bethany & Laidlaw
63	Add marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & 149th
64	Add N/S and E/W marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & 153rd
65	No ADA sidewalk ramps at intersection.	Bethany & Laidlaw	Curb ramp improvement	Kaiser & Purvis
66	No ADA sidewalk ramps at intersection.	Bethany & Laidlaw	Curb ramp improvement	Kaiser & Mitchell
67	Add N/S and E/W marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & Spartan
68	Add marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & Central
69	Add marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & Central
70	Remove mid-crossing obstacle and install curb extensions to slow turning vehicles	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & south shopping entrance east of Bethany
71	Add N/S and E/W marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & Argyle
72	Add marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & Waterford
73	Add wayfinding for trail users, directing to amenities and nearby transit stations	Bethany & Laidlaw	Wayfinding	Laidlaw & Morgan's Run Park
74	Add marked crosswalk for the trail running N-S across Laidlaw	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & Morgan's Run Park
75	Add N/S and E/W marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Kaiser & Twoponds
76	Add N/S and E/W marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Kaiser & Snowlily
77	Add N/S and E/W marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	West Union & Charlais St
78	Add N/S and E/W marked crosswalk	Bethany & Laidlaw	Crosswalk improvement	Laidlaw & Holcomb
79	No ADA sidewalk ramps at intersection.	Bethany & Laidlaw	Curb ramp improvement	Laidlaw & 149th
80	No ADA sidewalk ramps at intersection.	Bethany & Laidlaw	Curb ramp improvement	Laidlaw & 146th
81	No ADA sidewalk ramps at intersection. Marked crossings do not exist on the south and west sides of intersection.	Bethany & Laidlaw	Curb ramp improvement	Laidlaw & Skycrest
82	No ADA sidewalk ramps at intersection.	Bethany & Laidlaw	Curb ramp improvement	Kaiser & Twoponds
83	No ADA sidewalk ramps at intersection.	Bethany & Laidlaw	Curb ramp improvement	Kaiser & Snowlily
84	No ADA sidewalk ramp at intersection.	Bethany & Laidlaw	Curb ramp improvement	Bethany & Claremont
85	No ADA sidewalk ramps at intersection.	Bethany & Laidlaw	Curb ramp improvement	Laidlaw & 133rd
86	Infill bike lane gap on both sides of street	Bethany & Laidlaw	Bicycle facilities	Kaiser, from Bethany to Manresa
87	Install bike lane on both sides of street	Bethany & Laidlaw	Bicycle facilities	Laidlaw from West Union to 149th
88	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tanka & Warm Springs
89	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood
90	Restripe crosswalks to improve visibility	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood
91	Install marked crosswalks on north and south end of Mohave	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood & Mohave
92	Close slip lanes	Boones Ferry & Nyberg/Seneca	Intersection improvement	Tualatin-Sherwood & Mohave
93	Straighten crosswalks to reduce crossing distance	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Boones Ferry & Sagert
94	Install marked crosswalk across Boones Ferry	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Boones Ferry & Nasoma
95	Restripe crosswalks to improve visibility	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood & 90th
96	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	
97	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Sagert & Martinazzi
98	Straighten crosswalks to reduce crossing distance	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Sagert & Martinazzi
99	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Sagert & Tillamook
100	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Sagert & 86th
101	Add wayfinding for trail users to reach WES, other transit stops, and other destinations	Boones Ferry & Nyberg/Seneca	Wayfinding	Tualatin & Tualatin Community Park
102	Add wayfinding for trail users to reach WES, other transit stops, and other destinations	Boones Ferry & Nyberg/Seneca	Wayfinding	Sweek & Tualatin
103	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Boones Ferry & Tualatin
104	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood & Nyberg
105	Install ADA ramps over train tracks	Boones Ferry & Nyberg/Seneca	Curb ramp improvement	Boones Ferry & tracks north of Tualatin River
106	Re-stripe crosswalks to improve visibility	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood & Martinazzi
107	Install ADA ramps and sidewalks over train tracks	Boones Ferry & Nyberg/Seneca	Curb ramp improvement	Tualatin & 90th
108	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin & Tualatin Community Park
109	Install marked crosswalk	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Nybert & Martinazzi
110	Straighten crosswalks to reduce crossing distance	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood & Martinazzi
111	Consider building crossing over train tracks to connect neighborhoods to the south with commercial areas	Boones Ferry & Nyberg/Seneca	Pedestrian access	
112	Install marked crosswalks	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	90th & Sweek
113	Install marked crosswalk on south side of intersection	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood & Boones Ferry
114	Restripe crosswalks to improve visibility	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood & Boones Ferry
115	Install flashing beacon or HAWK signal to help pedestrians cross the wide street	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood, east of Boones Ferry
116	Restripe crosswalk to improve visibility	Boones Ferry & Nyberg/Seneca	Crosswalk improvement	Tualatin-Sherwood, east of Boones Ferry
117	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin-Sherwood
118	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin-Sherwood
119	Increase protection for bike lanes, and improve visibility	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Nyberg, from Tualatin-Sherwood to Nyberg Ln
120	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Nyberg & I-5
121	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin-Sherwood

122	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin-Sherwood
123	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin-Sherwood
124	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin-Sherwood
125	Increase protection and/or create more separation between bike lanes and high-speed traffic	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin-Sherwood, from Boones Ferry to Teton
126	Infill missing sidewalk on west side of the street	Boones Ferry & Nyberg/Seneca	Sidewalk improvement	Boones Ferry from Tonka to Tualatin
127	Infill missing sidewalk	Boones Ferry & Nyberg/Seneca	Sidewalk improvement	Tualatin, from Week to Herman, Herman to Teton
128	Infill missing sidewalk	Boones Ferry & Nyberg/Seneca	Sidewalk improvement	Tualatin
129	Infill missing sidewalk	Boones Ferry & Nyberg/Seneca	Sidewalk improvement	Nyberg, from Martinazzi to Tualatin-Sherwood
130	Infill missing sidewalk	Boones Ferry & Nyberg/Seneca	Sidewalk improvement	Tualatin-Sherwood, from Martinazzi to Nyberg
131	Install bike lanes to complete connection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Martinazzi, from Nyberg to Tualatin-Sherwood
132	Install bike lanes to complete connection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin-Sherwood, from Boones Ferry to Nyberg
133	Install bike lane / sharrows to complete connection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Nyberg, from Martinazzi west
134	Install bike lane to complete connection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Boones Ferry, from Mohawk to Tualatin-Sherwood
135	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Nyberg & I-5
136	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Nyberg & I-5
137	Install striped green paint to increase visibility of bike lane across the intersection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Nyberg & I-5
138	Install bike lanes to complete connection	Boones Ferry & Nyberg/Seneca	Bicycle facilities	Tualatin, Boones Ferry to Tualatin Community Park
139	Install safe pedestrian crossing with ADA-compliant ramp over railroad tracks	Hillsboro Transit Center	Crosswalk improvement	3rd, across the tracks
140	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	TV Hwy & 4th
141	Install marked crosswalk	Hillsboro Transit Center	Crosswalk improvement	Washington & Adams
142	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Oak & 6th
143	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Oak & 8th
144	Install marked N/S and E/W crosswalk	Hillsboro Transit Center	Crosswalk improvement	Walnut & Adams
145	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Walnut & Balley
146	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Baseline & 4th
147	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	TV & Adams
148	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Oak & Adams
149	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Oak & 2nd
150	Install marked E/W crosswalk on north and south side of intersection	Hillsboro Transit Center	Crosswalk improvement	Washington & 3rd
151	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Oak & 9th
152	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Baseline & 9th
153	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	Baseline & 6th
154	Restripe fading crosswalks at intersection	Hillsboro Transit Center	Crosswalk improvement	1st & Main
155	Install marked E/W crosswalk on north and south side of intersection	Hillsboro Transit Center	Crosswalk improvement	Washington & 1st
156	Install marked E/W crosswalk on north and south side of intersection	Hillsboro Transit Center	Crosswalk improvement	Washington & 2nd
157	Install marked E/W crosswalk on north and south side of intersection	Hillsboro Transit Center	Crosswalk improvement	Washington & 4th
158	Install marked crosswalks at intersection	Hillsboro Transit Center	Crosswalk improvement	Adams & Lincoln
159	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	9th & Main
160	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	8th & Main
161	Install marked N/S crosswalk	Hillsboro Transit Center	Crosswalk improvement	7th & Main
162	Provide enhanced transit stop amenities, bike parking, wayfinding, and pick-up / drop-off areas	Hillsboro Transit Center	Station amenities	Hillsboro TC
163	Install bike lane	Hillsboro Transit Center	Bicycle facilities	1st Ave
164	Install protected bike lane	Hillsboro Transit Center	Bicycle facilities	Oak St
165	Install protected bike lane	Hillsboro Transit Center	Bicycle facilities	Baseline St
166	Infill sidewalk on west side of the street	Hillsboro Transit Center	Sidewalk improvement	Adams Ave
167	Install bike lane	Hillsboro Transit Center	Bicycle facilities	3rd Ave
168	Install bike lane	Hillsboro Transit Center	Bicycle facilities	4th Ave
169	Install bike lane	Hillsboro Transit Center	Bicycle facilities	Lincoln St
170	Install bike lane	Hillsboro Transit Center	Bicycle facilities	Main St
171	Infill missing sidewalk	Hillsboro Transit Center	Sidewalk improvement	3rd Ave
172	Improve sidewalk on the north side of the street	Hillsboro Transit Center	Sidewalk improvement	Washington St
173	Widen sidewalks on both sides of the street	Hillsboro Transit Center	Sidewalk improvement	Washington St
174	Widen sidewalk on south side of the street	Hillsboro Transit Center	Sidewalk improvement	Washington St
175	Infill sidewalk on west side of the street	Hillsboro Transit Center	Sidewalk improvement	Adams Ave
176	Infill sidewalk on east side of the street	Hillsboro Transit Center	Sidewalk improvement	Adams Ave
177	Infill missing sidewalk	Hillsboro Transit Center	Sidewalk improvement	2nd Ave
178	Infill missing sidewalk	Hillsboro Transit Center	Sidewalk improvement	4th Ave
179	Add marked crosswalk	Merlo & 158th	Crosswalk improvement	Jenkins & 162nd
180	Add N/S and E/W marked crosswalks	Merlo & 158th	Crosswalk improvement	Jay & Burlington
181	Add N/S marked crosswalks	Merlo & 158th	Crosswalk improvement	Merlo Rd & Merlo Ct
182	Restripe the marked crosswalks at intersection -- high visibility crosswalks	Merlo & 158th	Crosswalk improvement	Merlo & Jenkins

183	Infill bike lane gap on east side of Merlo	Merlo & 158th	Bicycle facilities	Merlo south of Jenkins
184	Infill missing sidewalk on east side of street	Merlo & 158th	Sidewalk improvement	170th, from Vendla to Merlo
185	Infill missing sidwalk on south side of the street	Merlo & 158th	Sidewalk improvement	Jenkins & 153rd
186	Add bike lane to east side of 170th	Merlo & 158th	Bicycle facilities	170th from Merlo to MAX tracks
187	Add physical protection to bike lanes along 158th	Merlo & 158th	Bicycle facilities	158th from Jenkins to Walker
188	Install bike facilities to connect to MAX station	Merlo & 158th	Bicycle facilities	Merlo from 170th to MAX
189	Infill sidewalk gap	Orenco MAX	Sidewalk improvement	64th & Oelrich
190	Add marked crosswalk, possible curb extensions to shorten crossing distance or flashing beacons to slow/stop traffic	Orenco MAX	Crosswalk improvement	Baseline & 69th
191	Add marked crosswalk, possible curb extensions to shorten crossing distance or flashing beacons to slow/stop traffic	Orenco MAX	Crosswalk improvement	58th & Main
192	Add marked crosswalk, possible curb extensions to shorten crossing distance or flashing beacons to slow/stop traffic	Orenco MAX	Crosswalk improvement	Cornell & Ray
193	Add marked crosswalk	Orenco MAX	Crosswalk improvement	60th & Main
194	Add marked crosswalk	Orenco MAX	Crosswalk improvement	55th & Main
195	Add marked crosswalk	Orenco MAX	Crosswalk improvement	231st & Birch
196	Infill sidewalk gap	Orenco MAX	Sidewalk improvement	Century south of Dogwood
197	Add marked crosswalk	Orenco MAX	Crosswalk improvement	61st & Cornell
198	Add marked crosswalk	Orenco MAX	Crosswalk improvement	231st & Deer Run
199	Add marked crosswalk	Orenco MAX	Crosswalk improvement	Century & Main
200	Add marked crosswalk	Orenco MAX	Crosswalk improvement	63rd & Main
201	Add marked crosswalk	Orenco MAX	Crosswalk improvement	53rd & Hidden Creek
202	Add marked crosswalk	Orenco MAX	Crosswalk improvement	231st & Marina
203	Add marked crosswalk	Orenco MAX	Crosswalk improvement	231st & Oelrich
204	Add marked crosswalk	Orenco MAX	Crosswalk improvement	231st & Dogwood
205	Infill missing sidewalk	Orenco MAX	Sidewalk improvement	Elam Young, from 53rd to MAX tracks
206	Infill missing sidewalk on west side of street	Orenco MAX	Sidewalk improvement	Elam Young, from MAX tracks to Cornell
207	Infill missing sidewalk on east side of street	Orenco MAX	Sidewalk improvement	Century, north of Sherborne
208	Infill missing sidewalk on east side of street	Orenco MAX	Sidewalk improvement	Century, north of Delrich
209	Infill missing sidewalk on east side of street	Orenco MAX	Sidewalk improvement	Century, north of Deer Run
210	Install bike lane on both sides	Orenco MAX	Bicycle facilities	Shute, north of Cornell, and Tandem, east of Shute
210	Install bike lane on both sides	Orenco MAX	Bicycle facilities	Shute, north of Cornell, and Tandem, east of Shute
211	Install bike lane on both sides of Elam Young	Orenco MAX	Bicycle facilities	Elam Young
212	Install bike/ped wayfinding to/from MAX	Orenco MAX	Bicycle facilities	Orenco Station Parkway, from Cherry to Butler
213	Close slip lane to increase pedestrian safety and access to the transit stop	Pacific Hwy & 68th	Intersection improvement	Pac Hwy & 68th
214	Increase crossing interval for pedestrians and install curb extensions to slow vehicle turning movements and reduce crossing	Pacific Hwy & 68th	Intersection improvement	Pac Hwy & 68th
215	Install marked crosswalk	Pacific Hwy & 68th	Crosswalk improvement	Pac Hwy & 71st
216	Increase crossing interval for pedestrians and install curb extensions to slow vehicle turning movements and reduce crossing	Pacific Hwy & 68th	Intersection improvement	Pac Hwy & 72nd
217	Add wayfinding to nearby destinations	Pacific Hwy & 68th	Wayfinding	Pac Hwy & 68th
218	Install marked crosswalk	Pacific Hwy & 68th	Crosswalk improvement	Pac Hwy, between 71st and 68th
219	Straighten sidewalk to remove informal turn lane and slow vehicle turning movements	Pacific Hwy & 68th	Sidewalk improvement	Pac Hwy, between 71st and 68th
220	Straighten crosswalk to more directly access the transit stop	Pacific Hwy & 68th	Intersection improvement	Pac Hwy & 68th
221	Install marked crosswalk	Pacific Hwy & 68th	Crosswalk improvement	Pac Hwy & Dartmouth
222	Install marked crosswalk	Pacific Hwy & 68th	Crosswalk improvement	Pac Hwy & 74th
223	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	69th & Franklin
224	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	68th & Franklin
225	Install E/W and N/S marked crosswalks	Pacific Hwy & 68th	Crosswalk improvement	68th & Elmhurst
226	Install E/W and N/S marked crosswalks	Pacific Hwy & 68th	Crosswalk improvement	Lesser & Haines
227	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	Pac Hwy, east of 72nd
228	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	Pac Hwy & 72nd
229	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	69th & Beveland
230	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	68th & Beveland
231	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	Pac Hwy & 68th
232	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	Pac Hwy, between 71st and 68th
233	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	Pac Hwy & 71st
234	Install ADA curb ramps	Pacific Hwy & 68th	Curb ramp improvement	Pac Hwy & entrance to Fred Meyer shopping center
235	Install N/S marked crosswalk on west side of intersection	Pacific Hwy & 68th	Crosswalk improvement	Pac Hwy & 72nd
236	Install E/W and N/S marked crosswalks	Pacific Hwy & 68th	Crosswalk improvement	68th & Franklin
237	Install E/W and N/S marked crosswalks	Pacific Hwy & 68th	Crosswalk improvement	69th & Franklin
238	Improve bus stops with curb waiting area	Pacific Hwy & 68th	Bus stop improvement	80th & Locust
239	Install E/W and N/S marked crosswalks	Pacific Hwy & 68th	Crosswalk improvement	65th & Haines
240	Redesign intersection to enhance safety for pedestrians and slow vehicle turning movements	Pacific Hwy & 68th	Crosswalk improvement	68th & Haines
241	Install ped/bike path through cul-de-sac to enhance access to transit on Pac Hwy	Pacific Hwy & 68th	Transit access	68th & Baylor
242	Install striped green bike lanes through the intersection to increase visibility	Pacific Hwy & 68th	Bicycle facilities	Pac Hwy & 68th

243	Install westbound bike lane to address gap	Pacific Hwy & 68th	Bicycle facilities	Pac Hwy & 68th
244	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Clinton, from 72nd to 68th
245	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Pac Hwy, bridge over 217
246	Install striped green bike lanes through the intersection to increase visibility	Pacific Hwy & 68th	Bicycle facilities	Pac Hwy & 74th
247	Install striped green bike lanes through the intersection to increase visibility	Pacific Hwy & 68th	Bicycle facilities	Pac Hwy & 72nd
248	Install striped green bike lanes through the intersection to increase visibility	Pacific Hwy & 68th	Bicycle facilities	Pac Hwy & 72nd
249	Install bike lanes to complete connection to Pac Hwy	Pacific Hwy & 68th	Bicycle facilities	68th, south of Pac Hwy
250	Install bike lanes to complete connection to Pac Hwy	Pacific Hwy & 68th	Bicycle facilities	72nd, from Dartmouth to Pac Hwy
251	Install bike lanes to complete connection to Pac Hwy	Pacific Hwy & 68th	Bicycle facilities	Dartmouth, south of Pac Hwy
252	Install striped green bike lanes through the intersection to increase visibility	Pacific Hwy & 68th	Bicycle facilities	Pac Hwy & Dartmouth
253	Install striped green bike lanes through the intersection to increase visibility	Pacific Hwy & 68th	Bicycle facilities	Pac Hwy & Dartmouth
254	Widen and improve sidewalk to improve safety and buffer from high speed traffic	Pacific Hwy & 68th	Sidewalk improvement	Pac Hwy, from Dartmouth to 74th
255	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Palatine, 63rd
256	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	64th, from Pac Hwy to Dickinson
257	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Pine, from Hall to east of 69th
258	Infill sidewalk gaps	Pacific Hwy & 68th	Sidewalk improvement	72nd, from Spruce to Ventura
259	Infill sidewalk gaps	Pacific Hwy & 68th	Sidewalk improvement	Oak, from 71st to Hall
260	Infill sidewalk gaps	Pacific Hwy & 68th	Sidewalk improvement	Spruce, from 78th to 71st
261	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Pac Hwy, west of 65th
262	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	65th, from Pac Hwy to Locust
263	Infill sidewalk gap to provide connection with bus stops on Pac Hwy	Pacific Hwy & 68th	Sidewalk improvement	69th, from Pac Hwy to Oak
264	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Oak, from 71st to 65th
265	Infill sidewalk gaps	Pacific Hwy & 68th	Sidewalk improvement	71st, from Spruce to Oak
266	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	80th, from Spruce to Cedarcrest
267	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Locust, from 85th to 72nd
268	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	61st, 62nd
269	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Pomona, Pasadena, and 55th
270	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Jefferson, Lesser
271	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Ventura, Alfred, 69th
272	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Taylors Ferry
273	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	74th, from Barbara to Taylors Ferry
274	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Pfaffle, from Pac Hwy to 78th
275	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	68th, from Dartmouth to Baylor
276	Identify opportunities to provide safe access across I-5, which is a major obstacle for accessing tr	Pacific Hwy & 68th	Transit access	I-5
277	Infill sidewalk gaps	Pacific Hwy & 68th	Sidewalk improvement	Haines, east of 68th
278	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	72nd, from Pac Hwy to Dartmouth
279	Install eastbound bike lane to address gap	Pacific Hwy & 68th	Bicycle facilities	Pac Hwy & 68th
280	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Baylor, from 72nd to 68th
281	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	68th & Baylor
282	Infill sidewalk gap	Pacific Hwy & 68th	Sidewalk improvement	Beveland, from 72nd to 69th
283	Add wayfinding information for transit riders	TV Hwy & Murray Blvd	Wayfinding	TV & Murray
284	Add E/W marked crosswalk on north side of TV	TV Hwy & Murray Blvd	Crosswalk improvement	TV & 144th
285	Improve pedestrian crossing over train tracks	TV Hwy & Murray Blvd	Crosswalk improvement	TV & Hocken
286	Add ADA-compliant pedestrian crossing over train tracks on 142nd	TV Hwy & Murray Blvd	Crosswalk improvement	TV & southside entrance east of 142nd
287	Remove slip lane	TV Hwy & Murray Blvd	Intersection improvement	TV & Millikan
288	Add E/W marked crosswalk on north side of TV	TV Hwy & Murray Blvd	Crosswalk improvement	TV and northside entrance west of Murray
289	Add wayfinding information for transit riders	TV Hwy & Murray Blvd	Wayfinding	TV & Murray
290	Add wayfinding information for transit riders	TV Hwy & Murray Blvd	Wayfinding	TV & Murray
291	Add marked crosswalk	TV Hwy & Murray Blvd	Crosswalk improvement	Murray & west entrance south of Millikan
292	Remove slip lane	TV Hwy & Murray Blvd	Intersection improvement	TV & Millikan
293	Change signal timing to allow for longer crossing intervals	TV Hwy & Murray Blvd	Intersection improvement	TV & Murray
294	Remove slip lane	TV Hwy & Murray Blvd	Intersection improvement	TV & Murray
295	Add ADA-compliant pedestrian crossing over train tracks on 142nd	TV Hwy & Murray Blvd	Crosswalk improvement	TV & 142nd
296	Add E/W marked crosswalk on north side of TV	TV Hwy & Murray Blvd	Crosswalk improvement	TV & Tualaway
297	Add E/W marked crosswalk on north side of TV	TV Hwy & Murray Blvd	Crosswalk improvement	TV & 141st
298	Add N/S and E/W marked crosswalks, along with flashing beacons	TV Hwy & Murray Blvd	Crosswalk improvement	TV & 139th
299	Infill bike lane gap on east side of Murray, south of TV. Install green-striped N/S bike lane crossi	TV Hwy & Murray Blvd	Bicycle facilities	TV & Murray
300	Infill sidewalk on south side of TV Hwy	TV Hwy & Murray Blvd	Sidewalk improvement	TV from Murray to Hocken
301	Infill missing sidewalk	TV Hwy & Murray Blvd	Sidewalk improvement	Millikan, from Murray to Hocken
302	Infill missing sidewalk	TV Hwy & Murray Blvd	Sidewalk improvement	TV from 160th to 153rd
303	Install protection for bikelanes along stretches of roadway with no curbcuts (plastic bollards, etc)	TV Hwy & Murray Blvd	Bicycle facilities	Murray from Jenkins to Allen

304	Install green-striped N/S bike lane crossing intersection with Farmington	TV Hwy & Murray Blvd	Bicycle facilities	TV & Farmington
305	Install green-striped N/S bike lane crossing intersection with Farmington	TV Hwy & Murray Blvd	Bicycle facilities	TV & Farmington
306	Install green-striped N/S bike lane crossing intersection with TV Hwy	TV Hwy & Murray Blvd	Bicycle facilities	TV & Murray
307	Install green-striped N/S bike lane crossing intersection with Millikan Way	TV Hwy & Murray Blvd	Bicycle facilities	Murray & Millikan
308	Install green-striped N/S bike lane crossing intersection with Millikan Way	TV Hwy & Murray Blvd	Bicycle facilities	Murray & Millikan
309	Install ADA-compliant curb ramp	Washington Square TC	Curb ramp improvement	Palmblad, north of Summit
310	Improve crosswalk	Washington Square TC	Crosswalk improvement	Station
311	Add signage to alert drivers to pedestrian crossing, and add curb extension to slow vehicle turns	Washington Square TC	Crosswalk improvement	Blum & Eliander
312	Install curb extensions to reduce crossing distance	Washington Square TC	Intersection improvement	Hall & Eliander
313	Install ADA-compliant curb ramp	Washington Square TC	Curb ramp improvement	Blum, east of Washington Sq Rd
314	Install high-visibility marked crosswalk, with flashing beacon	Washington Square TC	Crosswalk improvement	Blum, north of TC
315	Install marked crosswalk	Washington Square TC	Crosswalk improvement	Hall & Eliander
316	Install marked crosswalk	Washington Square TC	Crosswalk improvement	Palmbled & Summit
317	Install high-visibilityN/S and E/W marked crosswalks, with flashing beacon	Washington Square TC	Crosswalk improvement	Greenburg & Summit
318	Straighten marked crosswalk and add flashing beacon	Washington Square TC	Crosswalk improvement	Blum, east of Washington Sq Rd
319	Add wayfinding info to navigate to areas outside of the transit center	Washington Square TC	Wayfinding	Washington Sq TC
320	Install curb extensions to slow vehicle turning movements	Washington Square TC	Intersection improvement	Greenburg & Summit
321	Install ADA-compliant curb ramp	Washington Square TC	Curb ramp improvement	Hall & Eliander
322	Straighten crosswalk	Washington Square TC	Crosswalk improvement	Palmblad, north of Summit
323	Install marked crosswalk	Washington Square TC	Crosswalk improvement	Greenburg & Coral
324	Install marked crosswalk	Washington Square TC	Crosswalk improvement	Greenburg & Lehman
325	Install marked crosswalk	Washington Square TC	Crosswalk improvement	Eliander, westside entrance north of Blum
326	Lightpost obstructing sidewalk -- expand sidewalk to increase accessibility	Washington Square TC	Sidewalk improvement	Eliander, north of Blum
327	Straighten crosswalk, add marked crosswalk on south side of intersection	Washington Square TC	Crosswalk improvement	Greenburg & Locust
328	Install marked crosswalk	Washington Square TC	Crosswalk improvement	Greenburg, north of Locust
329	Install E/W crosswalk to connect with residential areas to the east, and N/S crosswalk along Wash Sq Rd	Washington Square TC	Crosswalk improvement	Greenburg & Wash Sq Rd
330	Install curb extension to slow vehicle turning movements	Washington Square TC	Intersection improvement	Hall & Greenburg
331	Install pedestrian/bicycle path connecting residential areas to Greenburg (and up to the TC)	Washington Square TC	Transit access	Greenburg & Summit, to the east
332	Install bike lanes, to provide connection with lanes on Greenburg and access to mall area	Washington Square TC	Bicycle facilities	Washington Sq Rd
333	Install bike lanes	Washington Square TC	Bicycle facilities	Palmbled, from Hall to Washington Sq Rd
334	Infill missing sidewalk	Washington Square TC	Sidewalk improvement	Eliander, south of Hall
335	Install pedestrian/bicycle path to/from transit center, through the parking lot for more direct/safe	Washington Square TC	Transit access	Palmbled, west to TC
336	Infill missing sidewalk	Washington Square TC	Sidewalk improvement	Greenburg & Wash Sq Rd
337	Infill missing sidewalk	Washington Square TC	Sidewalk improvement	Westside entrance off Greenburg
338	Install bike lanes to complete the connection along Greenburg north to Hall	Washington Square TC	Bicycle facilities	Greenburg, from Wash Sq Rd to Hall
339	Infill missing sidewalk	Washington Square TC	Sidewalk improvement	Greenburg & Summit
340	Widen sidewalk	Washington Square TC	Sidewalk improvement	Eliander, from Hall to Blum
341	Infill missing sidewalk on west side of the street	Washington Square TC	Sidewalk improvement	Palmbled, from Hall to Blum
342	Infill missing sidewalk on one side of the street	Washington Square TC	Sidewalk improvement	Palmbled, from Blum to Summit
343	Widen sidewalk and trim landscaping to improve accessibility	Washington Square TC	Sidewalk improvement	Blum, from Eliander to Palmbled
344	Infill missing sidewalk	Washington Square TC	Sidewalk improvement	
345	Infill missing sidewalk	Washington Square TC	Sidewalk improvement	
346	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
347	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
348	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
349	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
350	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
351	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
352	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
353	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities	
354	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities	
355	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities	
356	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
357	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
358	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
359	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities	
360	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
361	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
362	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities	
363	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	
364	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities	

365	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
366	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
367	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
368	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
369	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
370	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
371	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
372	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
373	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
374	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
375	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
376	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
377	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
378	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
379	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
380	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
381	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
382	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
383	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
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385	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
386	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
387	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
388	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
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390	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
391	Build out bike facilities to jurisdiction standards	Orenco MAX	Bicycle facilities
392	Build out bike facilities to jurisdiction standards	Orenco MAX	Bicycle facilities
393	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
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411	Build out bike facilities to jurisdiction standards	Bethany & Laidlaw	Bicycle facilities
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418	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
419	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
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421	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
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446	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
447	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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453	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
454	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
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457	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
458	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
459	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
460	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
461	Build out bike facilities to jurisdiction standards	Boones Ferry & Nyberg/Seneca	Bicycle facilities
462	Build out bike facilities to jurisdiction standards	Boones Ferry & Nyberg/Seneca	Bicycle facilities
463	Build out bike facilities to jurisdiction standards	Boones Ferry & Nyberg/Seneca	Bicycle facilities
464	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
465	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
466	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
467	Build out bike facilities to jurisdiction standards	Barrows & Horizon	Bicycle facilities
468	Build out bike facilities to jurisdiction standards	Barrows & Horizon	Bicycle facilities
469	Build out bike facilities to jurisdiction standards	Barrows & Horizon	Bicycle facilities
470	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
471	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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476	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
477	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
478	Build out bike facilities to jurisdiction standards	Washington Square TC	Bicycle facilities
479	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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481	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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483	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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487	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
488	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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493	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
494	Build out bike facilities to jurisdiction standards	Washington Square TC	Bicycle facilities
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498	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
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502	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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508	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
509	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
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515	Build out bike facilities to jurisdiction standards	Washington Square TC	Bicycle facilities
516	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
517	Build out bike facilities to jurisdiction standards	Barrows & Horizon	Bicycle facilities
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520	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
521	Build out bike facilities to jurisdiction standards	Boones Ferry & Nyberg/Seneca	Bicycle facilities
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523	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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528	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
529	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
530	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
531	Build out bike facilities to jurisdiction standards	Merlo & 158th	Bicycle facilities
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537	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
538	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
539	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
540	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
541	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
542	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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545	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
546	Build out bike facilities to jurisdiction standards	Washington Square TC	Bicycle facilities
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550	Build out bike facilities to jurisdiction standards	Barrows & Horizon	Bicycle facilities
551	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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554	Build out bike facilities to jurisdiction standards	Barrows & Horizon	Bicycle facilities
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563	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
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567	Build out bike facilities to jurisdiction standards	Pacific Hwy & 68th	Bicycle facilities
568	Build out bike facilities to jurisdiction standards	Washington Square TC	Bicycle facilities
569	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
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576	Build out bike facilities to jurisdiction standards	Merlo & 158th	Bicycle facilities
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585	Build out bike facilities to jurisdiction standards	TV Hwy & Murray Blvd	Bicycle facilities
586	Build out bike facilities to jurisdiction standards	Bethany & Laidlaw	Bicycle facilities
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599	Build out bike facilities to jurisdiction standards	Hillsboro Transit Center	Bicycle facilities
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601	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
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631	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
632	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
633	Build out bike facilities to jurisdiction standards	Adair/Baseline & 10th Ave	Bicycle facilities
634	Enhance Lighting	Washington Square TC	Trail improvement
635	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
636	Enhance Lighting	Adair/Baseline & 10th Ave	Trail improvement
637	Enhance Lighting	Adair/Baseline & 10th Ave	Trail improvement
638	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
639	Enhance Lighting	Barrows & Horizon	Trail improvement
640	Enhance Lighting	Barrows & Horizon	Trail improvement
641	Enhance Lighting	Washington Square TC	Trail improvement
642	Enhance Lighting	Pacific Hwy & 68th	Trail improvement
643	Enhance Lighting	Orenco MAX	Trail improvement
644	Enhance Lighting	TV Hwy & Murray Blvd	Trail improvement
645	Enhance Lighting	Adair/Baseline & 10th Ave	Trail improvement
646	Enhance Lighting	Pacific Hwy & 68th	Trail improvement
647	Enhance Lighting	Adair/Baseline & 10th Ave	Trail improvement
648	Enhance Lighting	Merlo & 158th	Trail improvement
649	Enhance Lighting	Pacific Hwy & 68th	Trail improvement
650	Enhance Lighting	Bethany & Laidlaw	Trail improvement
651	Enhance Lighting	Barrows & Horizon	Trail improvement
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658	Enhance Lighting	Orenco MAX	Trail improvement
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660	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
661	Enhance Lighting	Merlo & 158th	Trail improvement
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667	Enhance Lighting	Barrows & Horizon	Trail improvement
668	Enhance Lighting	Merlo & 158th	Trail improvement
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671	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
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687	Enhance Lighting	Bethany & Laidlaw	Trail improvement
688	Enhance Lighting	Washington Square TC	Trail improvement
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691	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
692	Enhance Lighting	Orenco MAX	Trail improvement
693	Enhance Lighting	Bethany & Laidlaw	Trail improvement
694	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
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704	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
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707	Enhance Lighting	Orenco MAX	Trail improvement
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711	Enhance Lighting	Merlo & 158th	Trail improvement
712	Enhance Lighting	Bethany & Laidlaw	Trail improvement
713	Enhance Lighting	Orenco MAX	Trail improvement
714	Enhance Lighting	Pacific Hwy & 68th	Trail improvement
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717	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
718	Enhance Lighting	Pacific Hwy & 68th	Trail improvement
719	Enhance Lighting	Orenco MAX	Trail improvement
720	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
721	Enhance Lighting	Pacific Hwy & 68th	Trail improvement
722	Enhance Lighting	Adair/Baseline & 10th Ave	Trail improvement
723	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
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725	Enhance Lighting	Merlo & 158th	Trail improvement
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727	Enhance Lighting	Washington Square TC	Trail improvement
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730	Enhance Lighting	Pacific Hwy & 68th	Trail improvement

731	Enhance Lighting	Orenco MAX	Trail improvement
732	Enhance Lighting	Merlo & 158th	Trail improvement
733	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
734	Enhance Lighting	Washington Square TC	Trail improvement
735	Enhance Lighting	Merlo & 158th	Trail improvement
736	Enhance Lighting	Merlo & 158th	Trail improvement
737	Enhance Lighting	Barrows & Horizon	Trail improvement
738	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
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918	Enhance Lighting	Boones Ferry & Nyberg/Seneca	Trail improvement
919	WashCo TSP Ped Map Trail Crossing	Washington Square TC	Trail improvement
920	WashCo TSP Proposed Collector	Washington Square TC	Transit access
921	WashCo Bike facility conencto to Greenburg	Washington Square TC	Transit access
922	WashCo connection to Wash. Sq.	Washington Square TC	Bicycle facilities
923	Taylors Ferry Extension	Washington Square TC	Bicycle facilities
924	Build out bike facilities to jurisdiction standards	Washington Square TC	Bicycle facilities

Appendix C
TM1: Background and Policy Summary Report

To access click on the link below:

https://s3.amazonaws.com/washcomultimedia/CMSBigFiles/FlmFlipbook/index.html

Appendix D
TM2: Transit Access Strategies Toolbox

To access click on the link below:

https://www.co.washington.or.us/LUT/Divisions/LongRangePlanning/PlanningPrograms/TransportationPlanning/upload/WA_Co_FMLM_TM_2_FMLMToolkit_Final-003.pdf

Appendix E
TM3: FLM Access Network — Methodology

Technical Memorandum #3: First and Last Mile Access Network – Methodology

April 10, 2019

First and Last Mile Access Network – Methodology

Date: April 10, 2019

Prepared for: Dyami Valentine, Washington County

Copy to: Talia Jacobson, ODOT
Reza Farhoodi, Washington County
Joseph Hayes, Washington County

Prepared by: Eddie Montejo, Jacobs
Sarah Jenniges, Jacobs
Scott Richman, Jacobs

1.0 Introduction

This memorandum describes the spatial analysis methodology that applied Geographic Information System (GIS) tools to evaluate the existing multimodal transportation access network surrounding 40 major transit stops/stations in Washington County.[1] The purpose of this analysis is to establish baseline transportation network conditions around transit station access and connectivity to identify network gaps and facilitate development of potential network improvements. The utilized GIS methodology for this phase of the work is summarized in the five steps below:

1. Identify existing transportation infrastructure within each major transit stop/station service area;
2. Define the analysis methods based on previously developed projects and best practices;
3. Assemble and produce data inputs;
4. Incorporate data inputs into ArcMap Network;
5. Analyze and run network model;
6. Package and display results

2.0 Connectivity Analysis Method: Access to Destinations

The Federal Highway Administration (FHWA) *Guidebook for Measuring Multimodal Network Connectivity* establishes best analysis practices to determine whether people can use the bicycle and pedestrian network to reach certain destinations such as transit

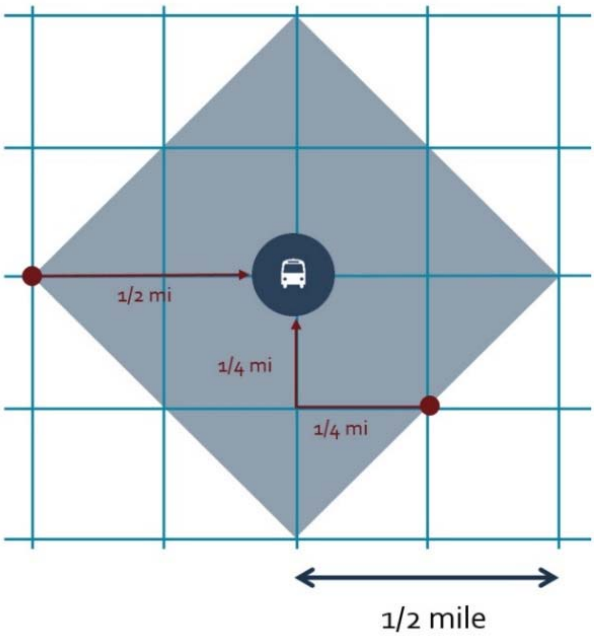


Figure 1. Ideal service area configuration on a grid-network. A diamond-shape or concave polygon represents a highly connected existing network between the transit station and destinations within the established distance.

[1] *Planned* infrastructure was also included if the available data indicated *committed funding* or *construction*.

stations. Travel Shed or Service Area analysis quantifies the area currently accessible by foot or bike within the existing network from a point destination. For instance, the 0.5-mile service area for a point on a network includes all the streets or trails that can be reached within 0.5 mile from that point (Figure 1). It allows for the identification of existing gaps in the network and for fine scale network improvement suggestions.

A well-connected network is typically represented as a diamond-shaped or concave polygon. Diamond-shaped service areas are common in complete grid networks, whereas variations of concave polygons can represent high-connectivity in other street configurations. Irregular or convex polygons usually represent low-connectivity or a high number of gaps within a pedestrian or bicycle network (Figure 2).

The Federal Transit Administration (FTA) final policy statement on the eligibility of pedestrian and bicycle improvements states that pedestrian improvements located within 0.5 mile, and bicycle improvements located within 3 miles of transit stations have a functional relationship to public transportation, regardless of whether such improvements are funded as capital projects or public transportation enhancements. Separate analysis for bicycle and pedestrian networks will be developed in order to determine specific needs and improvements for each mode.

Figure 2. Representation of poor and ideal pedestrian travel sheds (walkshed). (Source: Provo/Orem Bus Rapid Transit Corridor Transit Oriented Development Study)

2.1 Pedestrian Service Area Analysis (Walkshed)

Existing pedestrian access and connectivity infrastructure (e.g., sidewalks and multiuse paths) to transit stations were assessed within a 0.5-mile radius from each transit stop to identify the current "walkshed" serviced by the stations.[2] The following data inputs and assumptions were utilized to build an initial Pedestrian Transit Access Network (PTAN) for the 40 stops being analyzed as part of the project:

[2] For the purposes of this analysis, a "walkshed" refers to the land area within a 0.5-mile walking range based on existing pedestrian infrastructure.

Sidewalk Centerline

- Washington County has provided the most current sidewalk centerline layer, *Sidewalk_OPS_WashCo*. This layer will be the starting point for the PTAN. The County also provided the *Sidewalk Inventory Centerline Network,* which was used as a guide and reference in refining the PTAN.

Trails

- *Existing Regional Pedestrian* and *Multi-Use Trails* with a hard surface designation type were added to Pedestrian Network and connected end-point to end-point.[3]
- *On-Street Connection Trails* were added to Pedestrian Network and connected end-point to end-point
- *Existing Trail (non-regional)* with a hard surface designation type were added to Pedestrian Network and connected end-point to end-point

Crosswalks/Signals

- For the purposes of this analysis, signalized intersections were used as a proxy for pedestrian crossings – and were regarded as "good" in the context of pedestrian network access to transit. The current dataset provides signalized intersections as points; points were converted to polylines connecting end-point to end-point in PTAN for analysis purposes only for facilities along main roads. A fine-scale review and completion of the existing pedestrian network, including any needed digitization of existing sidewalks, trails or crosswalk features, will be done for the final 10 selected transit locations.
- Crosswalks are currently not defined in spatial data. Aerial imagery was reviewed, and crosswalks were delineated as lines connecting end-point to end-point in the PTAN, as practicable, only for facilities along main roads. As previously stated, a more rigorous digitization of existing crosswalk features on all streets will be performed for the final 10 selected transit locations.

Intersections

- Intersection treatments on all roads were also taken into consideration when analyzing connectivity. Local road intersections were considered walkable if containing curb ramps or easily-identifiable crosswalks via GIS imagery. All roads crossing major roads were considered walkable if crosswalks and/or signals were present. A fine-scale review and crosswalk/intersection completion will be done for final 10 selected transit locations.

The final pedestrian network was also run through topology network rules to verify network integrity. Additional fine-scale review and network refinement will be completed for the final 10 selected transit locations.

[3] Proper and complete end-point connections are required inputs when running ArcMap Network Analyst.

2.2 Bicycle Service Area Analysis (Bikeshed)

Existing bicycle connectivity to transit stations was assessed within a 3-mile radius from each transit stop in order to identify the current "bikeshed" serviced by the stations.[4] The following data inputs and assumptions were utilized to build an initial Bicycle Transit Access Network (BTAN) for the 40 stops analyzed as part of the project:

Existing On-Street Bikeways

- The Bicycle Network was built upon the road centerline file to capture all existing streets in the project area. Attributes were added to denote streets with bike facilities based on Washington County provided *Bike Lanes WashCop* layer with the following assumptions:
    - Roadways were considered bikeable if both sides of street were classified as "standard - Facility exists and is up to standard"
    - Roadways were considered not bikeable if one or both sides of streets are classified as "no facility" or "suitable conditions or substandard facility")
    - Pending direction from Washington County, additional bike facility-specific data for Tigard, Tualatin, and/or the Washington County TSP can be incorporated into the analysis if needed.
- Intersection treatments on major roads (arterials) were also taken into consideration to analyze connectivity. Major road intersections were considered bikeable if containing signals or crosswalks.

Existing Regional Pedestrian and Multi-Use Trails

- *Existing Regional Pedestrian* and *Multi-Use Trails* with a hard surface designation type were added to Bicycle Network and connected end-point to end-point only for trails with surface type of "hard surface"
- *On-Street Connection Trails* were added to Bicycle Network and connected end-point to end-point for trails approved for "road bikes"
- *Existing Trail (non-regional)* with a hard surface designation type were added to the Bicycle Network and connected end-point to end-point for trails with surface types classified as "hard surface"

To compensate for non-existent or incomplete datasets, the project team digitized some aspects of the networks based on up-to-date aerial imagery of the study area (e.g. linear bicycle crossings). The final bicycle network was also run through topology network rules to verify network integrity. Additional fine-scale review and network refinement will be completed for the final 10 selected transit locations.

[4] For the purposes of this analysis, a "bike" refers to the land area within a 3-mile biking range based on existing bicycle infrastructure.

3.0 Results Packaging and Presentation

Once all the data inputs and assumptions were built into the model, the GIS team ran ArcGIS Network Analyst and calibrated the model as necessary. Subsequently, the GIS team produced a series of maps displaying the resulting bicycle and pedestrian access networks for the 40 major stops identified by Washington County. The mapping outputs will be used as the basis for identifying access route needs, constraints, and opportunities based on GIS land use and transportation factors. The model outputs will also be used as a basis for future work to assess transit markets within these service areas (to be documented in Technical Memorandum #4) and evaluation of first/last mile improvement concepts in Washington County.

4.0 Looking Ahead: Network Model and Alternatives Analysis

Service area analyses were produced for both pedestrian and bicycle networks on the existing modeled conditions. Future work will comprise a station-by-station analysis of the 40 stations to assess first/last mile access gaps, opportunities, and constraints. This station-by-station analysis will serve as the basis for a prioritization framework to identify 10 representative stops for further in-depth analysis, including an assessment of potential first/last mile improvements.

Future work (to be documented in Technical Memorandum #4) will identify gaps in the network that interfere with the overall experience of people accessing transit on foot or by bike. A transit market assessment will also consider the overall "walkability and bikeability" of these service areas as they relate to bicycle and pedestrian convenience and comfort in travelling to and from transit stations. This work will set the foundation for further work to identify potential first/last mile improvements to the access network, including but not limited to new and improved sidewalk facilities, bikeway treatments, intersection controls, etc. As these improvement ideas are developed, the GIS team will concurrently incorporate improvements into the baseline bicycle and pedestrian transit access network models. This will allow the team to re-run the model on an on-going basis to test potential impacts to service areas around transit stations and will ultimately inform the project's final recommendations.

5.0 Stakeholder Advisory Committee Feedback

Washington County and the consultant team meet with the project Stakeholder Advisory Committee (SAC) on March 21, 2019 to gather feedback on the access network analysis. Stakeholder suggestions for future refinements to the access network included consideration of walksheds for people with disabilities or mobility issues, accounting for potential barriers to transit such as pavement grades, ADA environment, pedestrian safety. The SAC also asked the project team to consider additional walk and bikeshed refinements in rural areas to inform the feasibility of first/last mile strategies such rural

vanpools, which are currently included in the project toolbox. Suggested refinements to the access network methodology will be considered moving forward as the technical team identifies 10 representative stops. In this future phase, the team will ensure that project recommendations acknowledge access issues that disproportionately impact people with mobility challenges, those living or needing to travel to rural areas, and other underserved groups in Washington County.

Appendix F
TM4: FLM Market Analysis

MEMORANDUM

Date: May 31, 2019

To: Dyami Valentine, Washington County

From: Sarah Peters, Briana Calhoun, and Chris Breiland

Subject: Washington County Strategic Solutions for First/Last Mile Transit Connections: Technical Memorandum #4, First and Last Mile Market Analysis

PT18-0019

This technical memorandum assesses market conditions and priority markets for 40 Major Transit Stops in Washington County that could be served by a broad range of first/last mile access and mobility programs and services. This memorandum also identifies market typologies for transit stops and stations based on ridership, land use characteristics, and existing access networks to transit assessed in *Technical Memorandum #3: Transit Access Network Analysis*. Transit stop market typologies will inform future work to identify 10 Representative Major Transit Stops for further analysis in Task 4 *(Identify Evaluation Criteria and Draft First and Last Mile Projects, Programs, and Strategies*). Lastly, this memorandum also identifies an initial list of access and mobility strategies to consider for each market type. Initial access and mobility strategies will be refined in Task 5 (*Evaluate First and Last Mile Projects, Programs, and Strategies*).

Methods

As part of the update to the Transit Element of the Washington County Transportation System Plan (TSP), Washington County identified 40 Major Transit Stops to be used as the basis for the *Strategic Solutions for First/Last Mile Transit Connections Plan*. The County selected stops based on several factors, including locations with relatively high ridership and places where service improvements are currently or potentially planned.

The 40 County-identified Major Transit Stops were assessed to understand transportation and land use characteristics within a one-mile service area around each transit stop.[1] This process followed three steps:

1. **Transit demand assessment**, based on:
    a. Transit ridership at the stop level
    b. Transit propensity for residential and employment uses
2. **Bicycle and pedestrian access network assessment**, based on:
    a. Pedestrian access network within ½ mile service area of stops
    b. Bicycle access network within a one-mile service area of stops
3. An assessment of **additional factors**, such as transit service type (MAX and/or WES service, Frequent Service bus lines, etc.), as defined during the selection of the 40 Major Transit Stops[2] evaluated in this study, transit service improvements identified in TriMet's Service Enhancement Plans, and the presence of nearby community facilities, that may affect transit usage/

Through this approach, the project team identified six general transit market types that encompass a range of transportation and land use characteristics. By identifying common transportation and land use characteristics among the 40 Major Transit Stops, this typology can streamline the process of identifying first mile/last mile solutions for locations that face similar access and mobility issues. The typology will inform the selection of 10 stops to be evaluated in depth in Technical

[1] TM#3 evaluated land uses and transportation access for a ½ mile radius and 3-mile radius around each stop. Since many of the 40 Major Transit Stops are near one another, 3-mile service areas were found to substantially overlap each other. A one-mile area was selected to identify transit market stops to better reflect the unique characteristics and land use context around each stop.

[2] The 40 stops selected for this study were chosen from a larger grouping of Major Transit Stops that include MAX and WES stations (including proposed Southwest Corridor stations), transit centers, and major bus stops. Major bus stops are defined as: stops served by two Frequent Service lines (15 minutes or better, 7 days a week), stops served by one Frequent Service line and a Tier 2 bus line (at least 20 minute peak and 30 minute off-peak service, 7 days a week), high ridership stops with over 100 boardings and alightings per day, or stops that provide other strategic connection opportunities to local shuttles, interregional service providers and other lines in TriMet's network.

Memorandum #5 and will provide a model for diagnosing problems and identifying viable improvement strategies for the remaining 30 stops in the study. The transit stop types and their associated first mile/last mile solutions provide a replicable template that the County can use to improve transit access in the future.

A more detailed description of analysis methods, transit stop market characteristics, typologies, and next steps are provided in the sections below.

Transit Demand Assessment

The first step of the transit market analysis was to assess existing transit demand, service levels, and land use factors that contribute to a greater "propensity" of transit use. The following measures were considered at this stage:

1. **Stop-level transit ridership** based on ridership data collected in Spring 2018, with ridership totaled from multiple stops within 500 feet of the designated stop
2. **Transit propensity** as developed in Washington County's Travel Options Assessment, which uses Census data to identify areas with residents likely to use transit (based on high concentrations of residents with low incomes, zero-vehicle households, young adults, and seniors) and workers likely to use transit (based on high concentrations of low-wage jobs, young workers, and older workers).[3]

This initial review of transit demand characteristics resulted in the identification of the following transit stop market types:

1. High ridership stops, with 1,500+ boardings and alightings per day
2. Both employment and residential propensity scores above the average score for the 40 Major Transit Stops (>10 points on a 16-point scale)
3. Residential propensity score above average
4. Employment propensity score above average
5. Both employment and residential propensity scores below average

With one exception, all the high ridership stops had either a high employment propensity score or had high propensity scores based on both employment and residential factors. The one exception is the Fair Complex/Hillsboro Airport MAX station, indicating that this station has high transit demand due to factors outside those used for the countywide transit propensity analysis. A chart showing the 40 Major Transit Stops by residential and employment propensity is presented in **Attachment A.**

[3] Details on the methods used in Washington County's Travel Options Assessment are provided in Technical Memo #1, Background and Policy Summary Report, January 2019. The Travel Options Assessment was conducted for Census tracts (employment propensity) and block groups (residential propensity). To evaluate transit propensities at the stop level, a weighted average was taken of the propensity scores from the Census tracts or block groups that intersected the ½ mile service area around each stop.

Access Evaluation

A second evaluation was conducted to assess bicycle and pedestrian network accessibility within the half-mile walking radius and one-mile bicycle radius of each stop. This assessment was based on the access analysis conducted for TM#3. Bicycle connectivity was evaluated based on the ratio of the bicycle network to the total street network within a 1-mile service area. The bicycle network is defined as streets with bicycle facilities, bicycle and multi-use trails, and intersections with traffic signals and/or crosswalks. Pedestrian connectivity was determined by the ratio of the station's ½ mile walkshed to the largest area that could fit inside the ½ mile service area (e.g. the area expected from a "perfect grid" of streets). Pedestrian facilities included sidewalks, pedestrian and multi-use trails, and crossing facilities.

The stops were categorized into two access groupings:

- **Well-Connected** stops have both bicycle and pedestrian networks that provide coverage above the median levels for the 40 Major Stops (above 43% for bicycle networks; above 59% for pedestrian networks)
- Stops with **Network Gaps** have one or both networks below the median levels for the 40 Major Stops (below 43% for bicycle networks; below 59% for pedestrian networks)

A few edge cases arose, where one network scored above or below the median level and the other scored within 2% of the median. For these stops, the grouping was based on the network with the low or high score. For example, Beaverton Transit Center has a pedestrian access score of 72% (above the median) and a bicycle access score of 42% (1% below the median); this stop was grouped as Well-Connected. While stops in the Well-Connected grouping have above-average pedestrian and bicycle connectivity, they should still be considered for potential access improvements.

Additional Factors

Several additional factors were evaluated in categorizing the stops and describing relevant characteristics:

- **Employee Commute Options employers**: The number of ECO employers within one mile of the stop was evaluated, since employer benefits can influence the decision to commute via transit (evaluated in TM#3)
- **Park & Ride:** The presence of a Park & Ride lot, including "unofficial" park and ride lots at shopping centers near major transit stops, can make transit attractive for commuters from nearby neighborhoods
- **High Frequency Network:** Stops on TriMet's High Frequency Network (service every 15 minutes or less) are likely to attract a higher number of riders (evaluated in TM#3)

- **Ridership/service population:** Transit ridership that is relatively low compared to the one-mile service population (defined as residents + jobs) may indicate unmet demand that could be addressed with improved access or increased transit service
- **Community facilities:** The total number of schools, parks, hospitals, urgent care centers, grocery stores, libraries, community centers, and city halls (evaluated in TM#3)
- **Zoning:** The percentage of the one-mile service area zoned for residential, commercial, and/or industrial uses, which can indicate whether transit demand is primarily for commute trips or would include household-serving and recreational trips as well (evaluated in TM#3)
- **Ride hailing operator service areas:** Ride hailing operator (Uber and Lyft) service areas were mapped; all the forty Major Transit Stops fall within these service areas, and are therefore potentially eligible for ride hailing-based First/Last Mile strategies

These additional factors are also presented in **Attachment B**.

Transit Stop Market Types

Using the methods discussed above, six transit stop market types were identified. These market types are described below, along with potential strategies to improve first/last mile access. The stops are shown on a map in **Figure 1**. A matrix with further detail for each of the Major Transit Stops is provided in **Attachment B**.

Type 1: Residential and industrial areas with future service improvements

Category 1 consists of six stops located in primarily residential areas where currently low ridership (less than 100 boardings + alightings per day) has the potential to rise once planned transit service improvements are in place. None of the stops in this category are currently on the high frequency network. Two stops are not currently in service: one will be served by a new bus line and the other will be a station on the Southwest Corridor MAX extension. Pedestrian and/or bicycle network gaps are present at four of these stops. Two stops have predominantly residential land uses within a one-mile radius, one has predominantly industrial land uses, and three have a mix of residential and industrial uses, including several large employment sites. The mix of land uses near these stops mean they have the potential to serve both residents and workers in the surrounding area. Relative to other Major Transit Stops, two have a high employment score (over 10), two have a high residential score (over 10), one is high (over 10) for both categories, and one is low (under 10) for both categories.

Potential FLM Strategies

- Fill bicycle/pedestrian network gap; time infrastructure investments to be ready when TriMet's service improvements come online

- Pilot FLM on-demand services to connect residents and workers to high speed/high frequency transit once service begins; this will build ridership in these areas that might have low initial ridership without the FLM pilot

Type 1 Stops

- 70th Ave and Beveland St MAX Station
- Barrows Rd and Horizon Blvd
- Baseline Rd and Cornelius Pass Rd
- Brookwood Pkwy and Evergreen Pkwy
- Century Blvd and Butler St
- Cornell Rd and 25th Ave

Type 2: Town Centers

Category 2 consists of nine stops located in town centers with low to medium ridership (up to 1,500 boardings + alightings per day). Several of these stops are transfer points between transit providers or a transfer point between one of TriMet's Frequent Service lines and a Tier 2 line. Four of the stops have predominantly residential uses in the surrounding one-mile radius (at least 75%); two (Boones Ferry Rd/Nyberg/Seneca St and Lower Boones Ferry Rd/Tualatin Rd) are dominated by a mix of commercial and industrial uses. Five of the nine stops have pedestrian and/or bicycle network gaps; the remaining four have somewhat complete bicycle and pedestrian networks.

Potential FLM Strategies

- Fill bicycle/pedestrian network gaps and leverage active transportation investments to support placemaking and wayfinding efforts in the town center
- Provide FLM on-demand services to connect transit riders to nearest high-frequency/high-speed line

Category 2 Stops

- 16200 Block & 16400 Block Langer Dr
- Pacific Ave and Quince St
- 19th Ave and Main St & Pacific Ave and College Way
- Adair/Baseline and 20th Ave & 2200 Block Baseline
- Murray Blvd and Scholls Ferry Rd
- Bethany Blvd and Laidlaw Rd
- Boones Ferry Rd and Nyberg/Seneca St
- Cornell Rd and Barnes Rd
- Lower Boones Ferry Rd and Tualatin Rd

Type 3: High ridership stops with limited biking and walking access

Type 3 consists of six rail stations or transit centers where the pedestrian and/or bicycle networks have gaps. All have high frequency transit and a park and ride lot onsite;[4] none have future transit service changes planned. All these stops have high ridership (over 1,500 boardings + alightings per day) and a high residential and/or employment transit propensity. These stops have few community facilities (grocery stores, hospitals, schools, etc.) within a one-mile radius, but the Beaverton Creek and Elmonica/SW 170th MAX stations have mixed use residential housing and Willow Creek is located at a Portland Community College campus.

Compared to other Major Transit Stops, stops in this group have high ridership when compared to the number of jobs and residents within a half-mile radius. Combined with the high transit propensity, this suggests a relatively high transit mode share compared to other portions of the study area. As a result, access improvements may not drive a substantial growth in ridership (since mode share is already high and service population is lower), but existing riders will have an improved experience accessing transit. However, using FLM services to connect to areas outside of the traditional walking/biking radius could allow people outside of the immediate station area to access the high-quality transit services in the area.

Potential FLM Strategies

- Fill bicycle/pedestrian network gaps, including treatments that add to or improve pedestrian crossing experience
- Enhance the bicycle and pedestrian environment to improve safety and comfort, with strategies such as traffic calming, pedestrian-scale lighting, enhanced pedestrian crossings, trees and landscaping
- Partner with TriMet to provide enhanced transit stop amenities, including additional bike parking and pickup/drop-off zones
- Pilot on-demand FLM services to expand stop access beyond walking/biking distance

Category 3 Stops

- Sunset Transit Center
- Washington Square Transit Center
- Beaverton Creek MAX Station
- Fair Complex MAX Station
- Willow Creek Transit Center
- Elmonica/SW 170th MAX Station

[4] The Washington Square Transit Center does not have an official TriMet Park and Ride lot but does have ample mall parking with no signed restrictions on using mall parking for transit access.

Type 4: High ridership stops with strong walking access

Type 4 consists of four transit centers or rail stations with high ridership (over 1,500 boardings + alightings per day) and relatively well-connected pedestrian and bicycle networks within a half mile radius of the station area. All four stops have well-connected pedestrian networks in the surrounding half-mile walkshed. Most lack fully connected bicycle facilities within the surrounding one-mile service area but have well-connected street networks that provide potential for improving bicycle access. All four stops have high overall transit propensity or high employment propensity in the surrounding one-mile service area. All are on TriMet's high frequency network and are served by multiple transit providers; two have a park and ride present. Three stops have predominantly residential land uses (75% or above) within a one-mile radius along with ten or more community facilities (schools, grocery stores, etc.). In short, these areas have robust transit service, complete pedestrian networks with strong potential for improved bicycling access, and land use/demographic characteristics that drive high ridership.

Potential FLM Strategies

- Fill bicycle network gaps
- Enhance bicycle/pedestrian environment to improve safety and comfort: traffic calming, pedestrian-scale lighting, enhanced pedestrian crossings, trees and landscaping
- Partner with TriMet to provide enhanced transit stop amenities, including additional bike parking and pickup/drop off zones
- Pilot on-demand FLM services to expand stop access beyond walking/biking distance
- At stops where bicycle and pedestrian networks are mostly complete, pilot shared micro-mobility services (e-scooters, dockless bikeshare, etc.)

Type 4 Stops

- Beaverton Transit Center
- Hillsboro Transit Center
- Tigard Transit Center
- Orenco MAX Station

Type 5: Suburban highway corridors

Type 5 consists of eleven stops with medium levels of ridership (between 100 and 1,500 boardings + alightings per day) located along suburban highway corridors. While the stops have some limited commercial and retail uses, the transit lines primarily serve to connect neighboring cities. Four stops have well-connected pedestrian and bicycle networks; seven have gaps in one or both networks. Eight of the stops have predominantly residential land uses (75% or more) within the surrounding one-mile radius and six have high populations around the stops. Nine of the stops are located on TriMet's High Frequency Network, and seven of the stops have planned transit service

improvements. In short, these stations have a high transit potential and FLM strategies might have a particularly strong benefit to increasing transit access and ridership, particularly as transit services are improved over time.

Potential FLM Strategies

- Fill any bicycle and/or pedestrian network gaps
- For stops where bicycle and pedestrian networks are fairly complete, pilot shared micro-mobility services (e-scooters, bikes)
- Pilot FLM on-demand services to connect residents and workers to high speed/high frequency transit until service improvements are online
- Reevaluate FLM access strategies when transit service improvements are online

Type 5 Stops

- Adair/Baseline and 10th Ave
- B-H Hwy and Scholls Ferry/Oleson Rd
- Pacific Ave and Quince St
- TV Hwy and 198th Ave
- 185th Ave and Kinnaman St
- TV Hwy and 170th Ave
- TV Hwy and 185th Ave
- TV Hwy and Murray Blvd
- Pacific Hwy and 68th Pkwy MAX Station
- Barnes Rd and Cedar Hills Blvd
- TV Hwy and Cypress St & Minter Bridge Rd

Type 6: Retail and job destinations served by transit

Type 6 consists of four stops that serve commercial and retail destinations. All four stops have medium levels of ridership (between 100 and 1,500 boardings + alightings per day) and three have bicycle and/or pedestrian network gaps. The one-mile radii around these stops include a mix of land uses, with predominantly residential (70% or more) uses at all four stops.

Potential FLM Strategies

- Fill bicycle/pedestrian network gaps
- Pilot FLM on-demand services to connect residents and workers to high speed/high frequency transit

Type 6 Stops

- 185th Ave and Cornell Rd
- Hall/Nimbus WES Station
- Cornell Rd and Murray Blvd
- Farmington Rd and Remington Dr & 17500 Block

Next steps

The transit stop market categories defined in this memorandum will inform the selection of 10 representative major transit stops for further analysis in Task 4 (Identify Evaluation Criteria and Draft First and Last Mile Projects, Programs, and Strategies). This memorandum also identifies an initial list of mobility strategies to consider for each market type. These initial lists will be refined in Task 5 (Evaluate First and Last Mile Projects, Programs, and Strategies).

Attachments

Attachment A: High level categorization

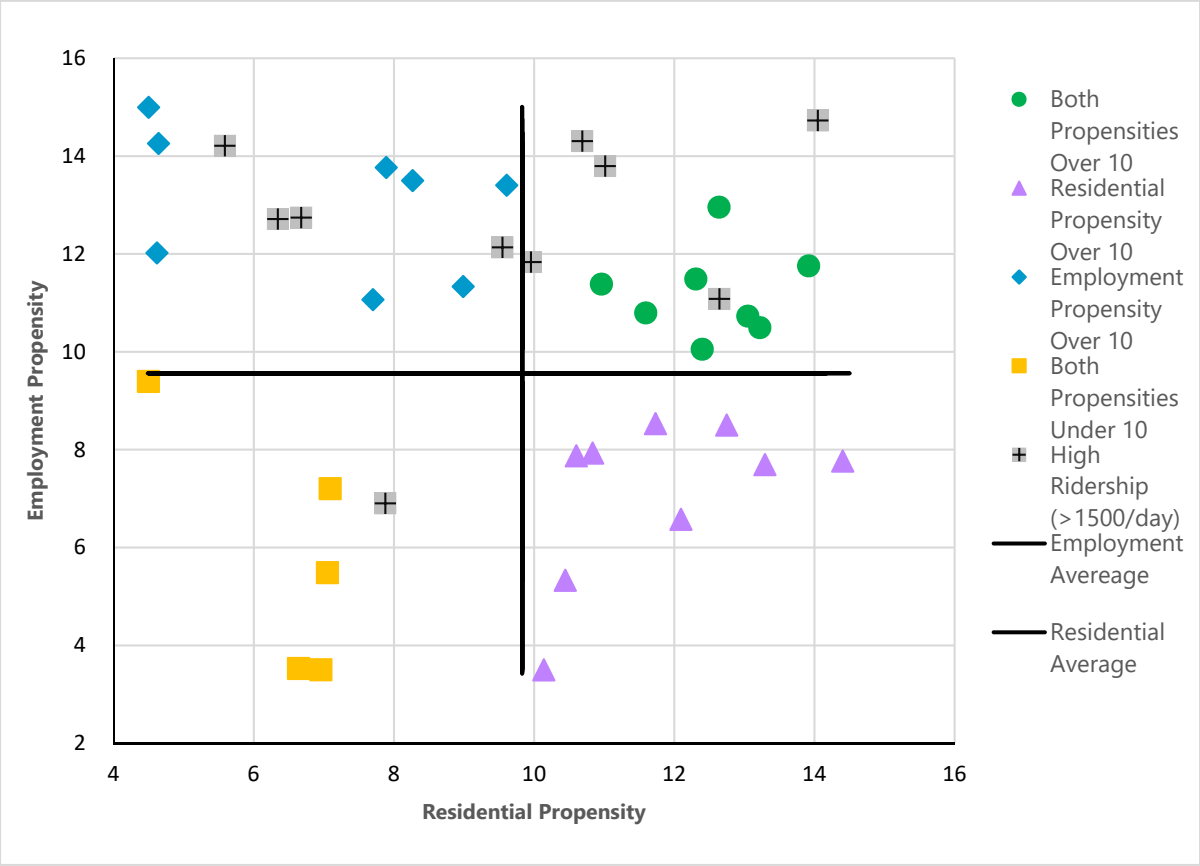
Attachment B: Categorized Major Transit Stops *(spreadsheet)*

Attachment A

An initial high-level categorization of the 40 Major Transit Stops was conducted based on transit ridership and stop-level transit propensity for residents and workers, as evaluated in Washington County's Travel Options Assessment. The Travel Options Assessment was conducted for Census tracts (employment propensity) and block groups (residential propensity). Details on the methods used in Washington County's Travel Options Assessment are provided in *Technical Memo #1, Background and Policy Summary Report*, January 2019.

To evaluate transit propensities at the stop level, a weighted average was taken of the propensity scores from the Census tracts or block groups that intersected the one mile service area around each stop. **Figure 1** shows the 40 Major Transit Stops sorted by employee and residential transit propensity.

Figure 1: Major Transit Stops by Employee and Residential Transit Propensity



Attachment B

			# Community Facilities within the Bike Service			Zoning Classification within Bike Service Area (1 mi)				Proportional Sum Analysis of Demographics provided by Washington County									Other Market Analysis Demand Variables									Final Categorization and Selection from 1 mile	
Transit Stop	Pecentage of Bike Service Area (1 mi) in Bike Shed	Pedestrian Connectivity (1/2 mile)	Numbr of Schools	Number of Parks/Natural Areas	Total Amenities	Parks and Open Spaces	Public Facilities	Residential	Commercial + Industrial	Total Population	Limited English Proficiency	People of Color	Population 200% below Poverty	Total Jobs	No-Vehicle Households	Residents under Age 29	Residents over Age 55	Jobs under 40k	Park and Ride within 500 feet of stop/designated for that location	Served by Multiple Transit Providers	Located on High Frequency Network	Spring 2018 TriMet Ridership	ECO sites in the service area	Residential Propensity	Employment Propensity	Future Network Change	Stop Selection Type	1 Mile Propensity Category	1 Mile descriptive stop category
Willow Creek Transit Center	34%	39%	9	22	9	0.0%	1.9%	86.3%	11.9%	71,365	2,640	7,254	23,244	12,455	1,781	15,073	15,696	6,397	1	2	1	5407	3	12.4	10.5	0	Transit Center	Both High	High-ridership stops with limited biking and walking access
Washington Square Transit Center	32%	42%	7	16	12	1.2%	9.4%	73.0%	16.4%	38,974	1,284	4,201	12,778	33,732	1,610	6,139	9,389	19,433	1	1	0	2213	9	11.6	13.1	0	Transit Center	Both High	High-ridership stops with limited biking and walking access
Sunset Transit Center	19%	41%	10	18	14	0.0%	8.3%	91.6%	0.1%	24,525	389	1,972	3,714	11,040	298	3,955	6,687	5,573	1	3	1	7669	0	9.3	10.6	0	Transit Center	Employment Focus	High-ridership stops with limited biking and walking access
Beaverton Creek MAX Station	32%	36%	13	10	14	0.0%	3.8%	47.9%	48.2%	35,629	1,482	4,689	17,054	46,467	1,514	8,082	4,111	15,803	1	1	1	1739	23	11.2	11.5	0	Rail Station	Both High	High-ridership stops with limited biking and walking access
Fair Complex MAX Station	41%	34%	9	19	10	0.0%	9.5%	55.1%	35.4%	57,217	1,574	4,980	17,862	8,412	837	9,975	10,278	5,332	1	1	1	1776	1	10.9	9.2	0	Rail Station	Residential Focus	High-ridership stops with limited biking and walking access
Elmonica/SW 170th MAX Station	20%	67%	13	20	14	0.0%	3.4%	78.2%	18.4%	48,477	2,060	6,235	17,402	11,178	1,239	10,046	8,305	6,145	1	1	1	2800	11	11.5	12.0	0	Rail Station	Both High	High-ridership stops with limited biking and walking access
Hillsboro Transit Center	51%	83%	18	16	28	0.0%	0.0%	74.0%	23.9%	65,932	1,965	5,770	33,435	38,012	2,709	11,597	12,753	17,965	0	3	1	3572	7	13.4	10.9	0	Transit Center	Both High	High-ridership stops with strong walking access
Tigard Transit Center	46%	76%	11	24	17	8.3%	0.0%	71.5%	20.3%	33,512	1,169	3,346	11,486	29,545	1,132	7,073	7,603	16,925	1	2	1	3540	4	10.7	12.8	0	Transit Center	Both High	High-ridership stops with strong walking access
Beaverton Transit Center	42%	72%	9	24	19	0.0%	0.7%	80.3%	19.0%	61,936	2,190	6,508	34,328	50,177	4,233	10,665	11,781	26,043	0	2	1	16958	15	13.1	11.9	0	Transit Center	Both High	High-ridership stops with strong walking access
Orenco MAX Station	53%	76%	8	51	10	0.0%	0.0%	61.6%	38.4%	19,607	938	3,396	4,321	8,125	284	3,219	3,100	2,857	1	2	1	2785	5	8.1	10.8	0	Rail Station	Employment Focus	High-ridership stops with strong walking access
Century Blvd and Butler St	54%	79%	5	25	8	0.0%	0.0%	35.4%	64.6%	8,733	651	2,557	1,891	9,725	278	1,768	1,457	2,871	0	1	0	16	10	7.7	12.1	1	FS/FS JCT	Employment Focus	Residential and industrial areas with future service improvements
Cornell Rd and 25th Ave	38%	39%	8	11	10	0.0%	9.4%	59.2%	31.4%	77,705	2,576	6,348	27,646	12,027	1,992	13,760	13,745	6,389	0	1	0	76	1	13.0	10.5	1	FS/TIER2 JCT	Both High	Residential and industrial areas with future service improvements
Baseline Rd and Cornelius Pass Rd	54%	59%	10	57	11	0.0%	1.1%	95.5%	3.4%	67,284	1,875	6,754	15,589	6,664	753	11,466	12,649	3,018	0	1	0	0	0	10.9	9.7	1	FS/TIER2 JCT	Residential Focus	Residential and industrial areas with future service improvements
Brookwood Pkwy and Evergreen Pkwy	58%	50%	2	5	3	0.0%	0.0%	5.4%	83.7%	1,270	353	1,049	161	4,436	68	294	341	1,007	0	1	0	4	12	4.8	9.4	1	FS/TIER2 JCT	Both Low	Residential and industrial areas with future service improvements
Barrows Rd and Horizon Blvd	50%	65%	1	41	7	5.7%	0.0%	94.0%	0.3%	55,735	1,401	4,426	12,290	6,357	918	10,361	11,736	4,674	0	1	0	0	1	10.5	7.1	0	Transfer	Residential Focus	Residential and industrial areas with future service improvements
70th Ave and Beveland St MAX Station	28%	50%	10	19	15	4.3%	0.1%	68.0%	27.6%	9,519	627	2,208	2,681	23,006	321	1,412	2,327	11,198	0	1	0	0	10	9.1	13.2	1	Rail Station	Employment Focus	Residential and industrial areas with future service improvements
185th Ave and Cornell Rd	50%	84%	12	15	23	0.0%	1.0%	72.4%	26.6%	127,431	2,118	6,534	33,500	43,986	4,605	36,792	19,402	24,206	0	2	0	640	10	12.6	10.4	1	FS/FS JCT	Both High	Retail and job destinations served by transit
Cornell Rd and Murray Blvd	36%	69%	9	16	15	0.0%	5.1%	82.1%	12.8%	48,567	934	3,721	14,474	15,900	1,245	8,615	11,451	9,781	0	1	0	214	1	10.6	8.8	1	FS/TIER2 JCT	Residential Focus	Retail and job destinations served by transit
Farmington Rd and Remington Dr & 17500 Block	40%	49%	10	29	15	0.0%	7.3%	88.1%	4.5%	101,200	2,585	6,913	35,170	9,534	2,068	15,919	19,282	6,514	0	1	0	312	1	12.6	8.2	0	Ridership > 100	Residential Focus	Retail and job destinations served by transit
Hall/Nimbus WES Station	39%	44%	8	17	13	0.4%	8.5%	72.0%	19.1%	47,823	1,729	5,100	16,329	28,916	1,995	7,674	11,685	16,184	1	1	0	294	10	12.4	12.8	0	Rail Station	Both High	Retail and job destinations served by transit
Adair/Baseline and 10th Ave	43%	66%	7	15	12	0.0%	3.2%	43.9%	21.3%	17,497	1,764	4,416	8,375	3,466	390	3,455	3,116	2,128	0	1	1	134	1	8.3	4.4	0	Ridership > 100	Both Low	Suburban highway corridors
Pacific Ave and Quince St	48%	59%	6	6	11	0.0%	3.6%	43.0%	32.4%	18,387	1,382	3,828	10,971	9,102	2,006	2,235	4,947	5,893	0	2	1	86	2	9.3	5.4	0	Transfer	Both Low	Suburban highway corridors
TV Hwy and 185th Ave	29%	73%	11	14	14	0.0%	6.8%	81.1%	12.1%	85,153	2,585	7,395	34,057	14,693	1,533	15,299	15,495	8,498	0	1	1	881	1	12.7	11.1	1	FS/FS JCT	Both High	Suburban highway corridors
TV Hwy and 170th Ave	26%	56%	12	20	16	0.0%	5.6%	75.1%	19.3%	86,587	2,536	7,233	36,948	12,010	2,209	16,839	12,052	7,329	0	1	1	397	7	12.6	11.0	1	FS/TIER2 JCT	Both High	Suburban highway corridors
TV Hwy and Murray Blvd	53%	63%	8	21	12	0.0%	1.3%	67.1%	31.6%	78,011	2,163	6,359	39,680	33,137	4,284	14,332	13,640	17,016	0	1	1	334	19	13.7	10.1	1	FS/TIER2 JCT	Both High	Suburban highway corridors
B-H Hwy and Scholls Ferry/Oleson Rd	22%	42%	10	12	15	0.8%	5.8%	89.3%	4.0%	27,995	340	1,642	7,032	16,109	1,937	3,415	11,276	12,179	0	1	1	360	0	11.8	11.3	1	FS/TIER2 JCT	Both High	Suburban highway corridors
TV Hwy and 198th Ave	59%	67%	9	11	10	0.0%	5.8%	80.8%	12.8%	73,068	2,297	6,646	27,939	14,334	837	11,925	15,251	7,104	0	1	1	386	1	12.7	9.7	1	FS/FS JCT	Residential Focus	Suburban highway corridors
185th Ave and Kinnaman St	42%	52%	10	19	15	0.0%	9.5%	79.7%	10.8%	95,752	2,538	7,167	35,968	15,841	2,023	15,629	18,568	9,554	0	1	0	281	1	12.8	9.4	0	Ridership > 100	Residential Focus	Suburban highway corridors
Barnes Rd and Cedar Hills Blvd	53%	48%	10	24	13	0.0%	5.2%	94.8%	0.1%	36,823	519	2,535	9,200	11,928	671	6,637	9,128	6,981	0	1	0	140	3	9.4	9.0	1	FS/FS JCT	Both Low	Suburban highway corridors
TV Hwy and Cypress St & Minter Bridge Rd	26%	51%	6	18	11	0.0%	0.2%	75.9%	16.0%	63,405	2,560	7,475	33,444	16,859	2,743	10,807	11,864	12,826	0	1	1	481	4	13.8	9.3	0	Ridership > 100	Residential Focus	Suburban highway corridors
Pacific Hwy and 68th Pkwy MAX Station	50%	33%	5	17	8	2.6%	0.4%	78.7%	18.3%	13,970	461	2,234	2,509	10,213	615	1,380	4,159	5,613	0	1	1	158	9	10.5	14.1	1	Rail Station	Both High	Suburban highway corridors
Adair/Baseline and 20th Ave & 2200 Block Baseline	45%	55%	6	16	10	0.0%	0.7%	41.7%	12.4%	14,703	1,652	4,007	6,469	1,270	209	2,912	2,176	840	0	1	1	344	2	7.1	3.5	0	Ridership > 100	Both Low	Town centers
19th Ave and Main St & Pacific Ave and College Way	49%	81%	13	12	17	0.0%	7.3%	60.9%	8.6%	25,940	774	2,372	12,914	3,819	1,591	5,014	6,154	2,826	0	1	1	210	3	9.5	6.7	0	Ridership > 100	Both Low	Town centers
Murray Blvd and Scholls Ferry Rd	56%	62%	6	49	12	2.8%	0.0%	97.2%	0.0%	66,038	1,645	4,560	15,994	8,404	1,585	12,659	14,826	5,985	0	1	0	221	1	11.8	8.4	0	Ridership > 100	Residential Focus	Town centers
Pacific Hwy and Durham Rd	46%	63%	5	19	10	1.5%	3.2%	88.5%	6.8%	58,763	481	2,136	17,157	11,376	2,671	6,408	31,579	8,639	0	2	0	152	1	11.2	7.4	0	Transfer	Residential Focus	Town centers
16200 Block & 16400 Block Langer Dr	42%	62%	8	38	15	0.0%	8.2%	41.8%	20.2%	4,472	248	1,071	709	1,493	105	399	778	885	0	2	0	88	0	6.7	4.7	0	Transfer	Both Low	Town centers
Cornell Rd and Barnes Rd	38%	65%	8	18	14	0.0%	5.5%	87.1%	7.4%	49,535	807	3,339	14,299	13,724	1,166	8,930	11,688	9,002	0	1	0	170	1	9.7	8.5	1	FS/TIER2 JCT	Both Low	Town centers
Bethany Blvd and Laidlaw Rd	50%	56%	5	24	8	0.0%	1.5%	94.5%	1.2%	43,398	1,762	7,270	5,305	3,899	872	3,968	10,255	2,566	0	1	0	128	0	9.9	4.8	1	FS/TIER2 JCT	Both Low	Town centers
Boones Ferry Rd and Nyberg/Seneca St	52%	68%	6	28	14	2.0%	0.0%	53.2%	44.8%	43,744	834	2,772	15,736	40,294	1,297	10,608	7,281	24,344	1	2	0	113	7	8.9	9.7	1	FS/TIER2 JCT	Both Low	Town centers
Lower Boones Ferry Rd and Tualatin Rd	30%	48%	7	18	17	4.3%	0.8%	46.2%	48.6%	14,535	798	2,682	4,730	29,997	361	3,411	2,622	17,314	1	2	0	778	4	8.7	11.8	0	FS/TIER2 JCT	Employment Focus	Town centers

Appendix G
TM5: Identify Evaluation Criteria for Draft FLM Projects, Programs, and Strategies

Technical Memo #5: Identify Evaluation Criteria for Draft First and Last Mile Projects, Programs, and Strategies

Revised: June 20, 2019

Introduction

This technical memorandum identifies goals to guide how transit stop and station access improvements are prioritized in Washington County. This memorandum also describes criteria, performance metrics, and an evaluation process to prioritize strategic transit-supportive investments. The evaluation criteria and performance metrics from this memorandum will be used to analyze the 10 Representative Major Transit Stops effort as part of subsequent work for Washington County's First and Last Mile Transit Access Strategies Plan.

Goals for Transit Access

With support from the consultant team, the project's Technical Advisory Committee (TAC), comprised of Washington County stakeholders, local jurisdictions, and transit providers identified and discussed a set of five high-level goals to guide an evaluation process for potential First and Last Mile Access Strategies. These goals are described in more detail below.

Access to Transit

People reach transit in a variety of ways including walking, biking, riding in a car, or driving to a park-and-ride facility. A goal of this plan is to support these multimodal connections by considering how people access transit throughout a variety of land use and transportation contexts – from urban town centers to suburban and rural areas within the County. Potential

strategies for first and last mile access to transit will seek to address the first and last legs of a person's trip to and from a transit stop or station and will consider factors such as their proximity to transit, the suitability of sidewalks or bike paths, park-and-ride capacity, connections to key destinations, and the type of transit that is available.

Safety and Security
Ensuring that transit is safe and secure is essential to people's willingness to use transit. Safe and attractive walking and biking facilities, as well as park-and-ride areas facilitate better access to transit. Preventing crime on transit is crucial to an agency's ability to provide transit. but ensuring that security measures are not overtly punitive or disparate in their impact on communities of color or other minority groups is paramount.

Health and Environment
Policies and investments that support walking, biking and transit use (for example, complete streets, expanded transit service) are linked to an increase in safe, accessible walking and biking routes and expanded transit access. These improvements are associated with increases in active transportation and physical activity. Increased physical activity is causally linked to decreases in related chronic diseases (such as heart disease, stroke, diabetes, and cancer). Furthermore, transit can improve air quality in congested areas by reduce the number of single occupancy vehicle (SOV) trips, moving a large number of people in one vehicle (bus or train), and greenhouse gas emissions utilizing low-emission alternative fuels.

Economic Opportunity
Improving access to public transit can have regional and local economic benefit. Making transit a viable transportation option for many trips reduces congestion costs, reduces the cost burden of transportation, supports new development, and allows people who cannot drive or who do not have access to a vehicle the ability to the access employment opportunities, amenities, and services. Where transit goes, community grows, and this is especially true locally, as 60% of transit trips are for work, shopping, or recreation opportunities according to TriMet.

Equity
Equity in transit is not just about an equal distribution of services, it is about ensuring that transit is a viable transportation option for all people in Washington County regardless of age, race, income, English proficiency and physical ability.

Evaluation Criteria

Transit access investments should support as many of the goals noted above as possible. The following evaluation criteria will be used to analyze and prioritize each potential investment based on how an investment strategy performs toward meeting each goal.

Evaluation criteria are intended as more qualitative measures, while performance criteria assume quantitative measures. Note: many of these evaluation criteria have been previously assessed in the network access analysis (TM#3) and market assessment (TM#4) phases; and data from the previous work will be used in the evaluation described here.

Access to Transit

The evaluation for access to transit will assess how the built environment either facilitates access or creates a barrier to transit use. Specifically how direct, efficient, convenient and reliable is it to access transit.

Evaluation Criteria to be used:

- Sidewalk/network gaps - increase/improve bicycle and pedestrian pathways to transit
- Presence or absence of crossings / ADA facilities
- Access shed coverage (TM#3) within 0.5-, 1-, and 3-mile buffers, as appropriate
- Increase in access to transit options that provide viable travel time savings between key origins and destinations.
- Park-and-ride, drop-off zones, shuttles, micro-mobility and mobility hub improvements that increase transit access.
- Slope >4%

Safety and Security

Evaluation criteria for safety and security focus on safe and comfortable access to and from transit for all users.

Evaluation Criteria to be used:

- Number of bicycle and pedestrian related crashes (severe and fatal)
- Improves physical conditions for accessing transit by minimizing conflicts between modes.
- Improves ADA accessibility specifically (i.e., tactile warning device, audible pedestrian buttons, accessible transit information at stops).
- Improves perceived security in and around transit station using applicable Crime Prevention Through Environmental Design (CPTED) principles.

Health and Environment

The evaluation for health and environment will assess the impact that improving transit access has on SOV trips, congestion, and physical activity.

Evaluation Criteria to be used:

- Exposure to particulate matter
- Mode shift
- Greenhouse Gas Emissions (GHG)
- Environmental impacts

- Physical activity.

Economic Opportunity
The evaluation for economic opportunity will assess the level of impact strategies to improve access to transit has on supporting jobs, education, and key centers, as well as providing access that allows for the potential for multiple trips to be combined.

Evaluation Criteria to be used:
- Number of key growth/economic centers served.
- Encourages linking trips/trip chaining.
- Support access to jobs and education.
- Percentage of users from disadvantaged groups.
- Potential support through public/private partnerships

Equity
The evaluation for equity will assess strategies to improve access to transit and impacts on low-income communities, communities of color, older and younger populations and people with disabilities.

Evaluation Criteria to be used:
- Proximity between affordable housing and transit options.
- Percentage of users from disadvantaged groups.
- Increase access to jobs and education.
- Increase in transit trips by disadvantaged communities.
- Increase affordable travel options among low-income and communities of color.
- Increase ridership among those in need (elderly, low-income, minority populations, etc).
- Improve access for families and people with dependents.
- Improve ADA accessibility (i.e., tactile warning device, audible pedestrian buttons, accessible transit information at stops).

Evaluation Process
The project team will take a two-pronged quantitative-qualitative evaluation approach using GIS data to map and analyze each stop quantitatively, and then applying the criteria more broadly within community context qualitatively. It is important to distinguish between the quantitative “performance metrics” and more qualitative “evaluation criteria” and how each will be used during this planning process.

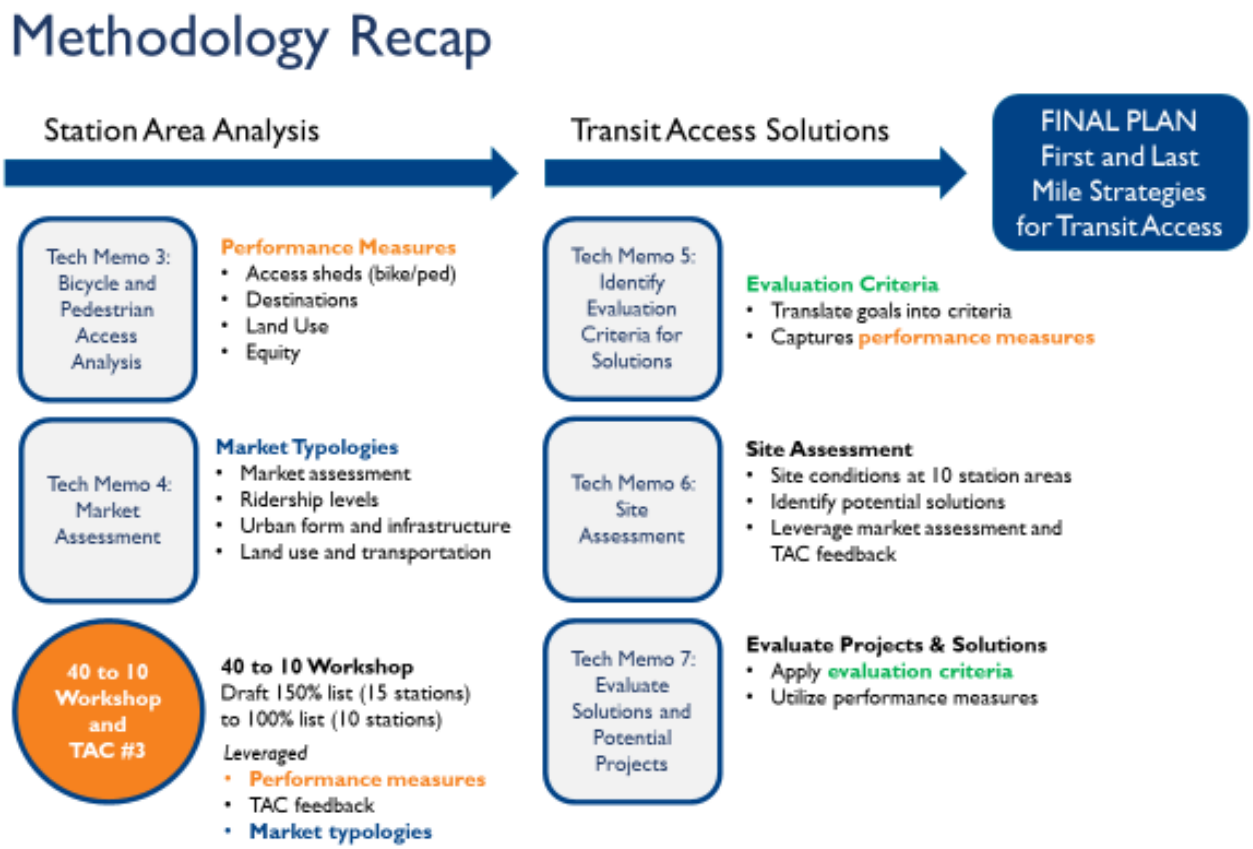
Performance Metrics: Evaluating Station Areas
Performance metrics have been used to understand, quantify and rank the station area conditions of the 40 stations selected for analysis in this project. Many of the performance

metrics are geographically-based, and GIS was used to compare station areas. Performance metrics included an assessment of the half-mile radius of the station for the following categories: bike- and walk-shed area, community facilities, zoning, market typology, demographics, transit market demand, and network connections.

Evaluation Criteria: Evaluating Solutions

Evaluation criteria will be used to understand how potential solutions compare to each other, highlighting relative strengths of improvements in light of the project's goals. Both the performance metrics and evaluation criteria are categorized within one the five overarching project goals of Access, Safety and Security, Environment, Economic Opportunity, and Equity.

This approach will help to prioritize transit-supportive investments and understand the impact investments will have on the community and transit network. Each potential improvement will be measured using the evaluation criteria and scored using a 1-4 scale. 1 means that the improvement does not meet the criteria, and 4 means that the improvement does meet the criteria and helps achieve the goals.



Station Selection for Detailed Analysis

The performance metrics were used to create an initial ranking of the 40 Major Transit Stops, leading into the 40-to-10 Workshop and the third meeting of the Technical Advisory Committee, where TAC members provided their input and helped select the 10 Representative Major Transit Stops. The 40-to-10 Workshop was an internal workshop of the Project Management Team to review the 40 stops and determine a preliminary "150% list." The 150% list consisted of 15 station areas that meet desired characteristics and are more broadly representative of conditions across the county. The 10 stations were selected based on performance measures, TAC feedback and market typologies. The selected stations are representative of different land use and transportation contexts, as determined by the PMT, and will inform needs, constraints and opportunities.

10 Stations

Transit Station Name	Market Typology
Merlo Rd/SW 158th Ave MAX Station	High ridership station with limited biking and walking access
Hillsboro Transit Center	High ridership station with strong biking/walking access
TV Highway and Murray Blvd	Suburban highway corridors
Washington Square Transit Center	Commercial/retail served by transit (Major transit centers with limited biking and walking access)
Boones Ferry Rd and Nyberg and Seneca St.	Town centers
Orenco MAX Station (Mobility Hub)	Major transit centers with strong biking/walking access
Pacific Hwy and 68th Pkwy MAX Station	Suburban highway corridors
Barrows Rd and Horizon Blvd	Residential areas with future service improvements
Bethany Blvd and Laidlaw Rd	Town center
Adair/Baseline and 10th Ave	Town center

Next Steps

Following selection of the 10 representative stations, site visits should be conducted to assess the physical conditions (safety, aesthetics, and accessibility) of the ten stations and how people move to and from the Major Transit Stop. This effort will inform the Technical Memo #6, Major Transit Stop and Access Site Evaluation.

Appendix H
TM6: Transit Station Site Assessment

WASHINGTON COUNTY FIRST AND LAST MILE TRANSIT STATION SITE ASSESSMENT

TECHNICAL MEMO #6 | SEPTEMBER 2019

INTRODUCTION

Washington County is developing a study of Strategic Solutions for First Mile/Last Mile Transit Connections. Initial station area analysis included 41 transit stops and stations across the county. In consultation with the Technical Advisory Committee, a list of ten representative stations were identified for further study, to include a diverse representation of jurisdictions, conditions, and levels of use.

This technical memorandum details site conditions and potential first and last mile strategies for improving access to ten key station areas.

Merlo/SW 158th MAX Station with Biketown bikeshare.

Unimproved path and closed crosswalk near Washington Square Transit Center.

Newly upgraded intersection with ADA curb ramps. Signalized crossings were few and far between.

WASHINGTON SQUARE TRANSIT CENTER

TYPOLOGY

High-ridership stop with limited biking and walking access to transit

RIDERSHIP

High: Over 2,200 weekday boardings and alightings

Line	Riders*	Freq.	Service
42	80	30-min+	Mon-Fri
43	90	45-min+	Mon-Fri
45	170	20-min+	Mon-Sun
56	45	15-min	Mon-Sun
62	600	30-min+	Mon-Sun
76	400	30-min+	Mon-Sun
78	420	25-min+	Mon-Sun

*Refers to average weekly ridership (boardings + alightings) at each stop.

PARK AND RIDE UTILIZATION

Capacity	Daily Use	% Use
122	30	25%

Fall, 2017

SAFETY

Crashes involving bikes:
27 injuries, 0 fatalities

Crashes involving pedestrians:
29 injuries, 0 fatalities

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY

Washington Square Transit Center is a high-ridership station area and designated Regional Center serving customers and employees for over 170 retailers in north Tigard.

Washington Square Transit Center is a high-ridership transit center served by seven TriMet bus lines. All bus lines run 7 days a week except for lines 42 and 43. Line 56 provides frequent 15-minute service and links riders in Tigard to Beaverton, Hillsdale, and downtown Portland.

Washington Square is an indoor shopping mall in Tigard featuring large-format retailers such as Nordstrom, Apple, and JCPenny. The mall is adjacent to the OR-217/Beaverton-Tualatin Highway corridor and land uses within the area are predominantly auto-oriented.

The station is located in a large parking lot adjacent to the main entrance to the mall. Transit users on foot or bike must travel through an auto-centric environment getting to and from the station and first/last mile destinations. This station area is representative of transit centers in Washington County with high ridership, high residential and employment propensity, and significant gaps in the pedestrian and bicycle network.

Washington Square Transit Center is located within a designated Regional Center, where the City of Tigard is developing an update to the Regional Center plan. Improved bus frequency on certain lines is also planned for the future at this station.

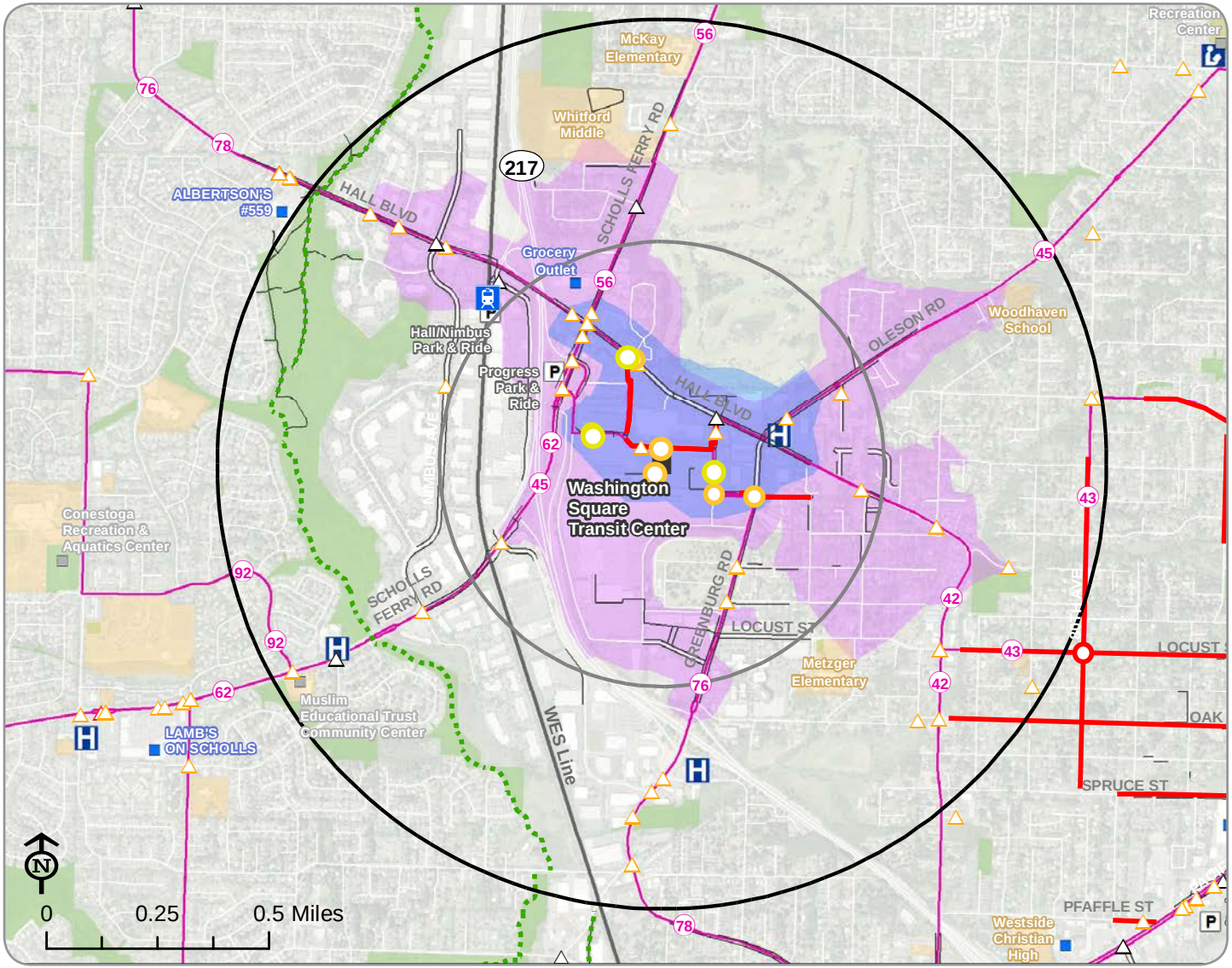
Potential strategies to improve first/last mile access in this area include:

- Provide safe and comfortable access to transit facilities by filling gaps in the bicycle and pedestrian network (e.g. improve crossings, infill sidewalk gaps, construct on-street bike facilities, etc.)
- Partner with TriMet to provide enhanced transit stop amenities, bike parking, and pick up/drop off areas.
- Expand and enhance service during peak periods (e.g. employee shuttles, increase service frequency, etc.)
- Pilot FLM on-demand services to expand stop access beyond walking/biking distance.

SUMMARY OF ACCESS BARRIERS

- OR-217/Beaverton-Tualatin Highway presents a major barrier for active transportation connections to the west.
- Sidewalks are narrow and intermittent in the shopping center area, and crossings are striped but not well marked to alert drivers.
- Visibility is blocked by vegetation at many intersections, and pedestrian-scale lighting is limited.
- Bike facilities are available for some of the higher-speed, higher-volume streets, but lower-speed streets within the shopping center do not have bike infrastructure.
- Many of the intersections connecting the shopping center to neighborhoods to the southeast do not have continuous sidewalks or crosswalks.
- The golf course to the north of the station area creates barrieres for pedestrians accessing transit from the north.

STATION AREA NEEDS AND OPPORTUNITIES MAP



Basemap
- School
- Park
- Hospital
- Library

Existing Infrastructure
- Transit Stop
- Regional Multiuse Trail
- Pedestrian Network
- MAX Blue Line
- Bus Line
- WES

Planned Infrastructure
- SW Corridor Stop
- SW Corridor Line
- Park and ride lots

Existing Pedestrian + Bicycle Access to Transit
- 1 mile buffer
- 1/2 mile buffer
- Pedestrian 1/2 mile access shed
- Bicycle 1 mile access shed

Bike/Pedestrain Crash (2009-2016)
- Non-Serious
- Serious Injury
- Fatality

Needs and Deficiencies
- Missing crosswalk
- Missing curb ramp
- Sidewalk gap
- Bicycle facility needed

MERLO/SW 158TH MAX STATION

TYPOLOGY

High-ridership stop with limited biking and walking access to transit.

RIDERSHIP

High: Over 2,000 weekday boardings and alightings

Line	Riders*	Freq.	Service
67	450	30-min	Mon-Fri
MAX Blue Line	1,600	15-min	Mon-Sun

*Refers to average weekly ridership (boardings + alightings) at each stop.

SAFETY

Crashes involving bikes:
26 injuries, 0 fatalities

Crashes involving pedestrians:
21 injuries, 0 fatalities

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY

Merlo/SW 158th Ave MAX Station is a high-ridership transit station located in the City of Beaverton, served TriMet MAX Blue that connects riders to key community assets, including world-class job centers, affordable housing, and access to recreation.

Merlo/SW 158th Ave MAX Station is a high-ridership transit station in the City of Beaverton, served TriMet MAX Blue Line, which provides 7-day-a-week intercity service between Hillsboro, Beaverton, Portland Central City, East Portland, and Gresham.

Land uses in the station area are predominantly high-density residential and industrial, creating significant transit demand to job centers such as Nike World Headquarters with workshifts perdominately between 7 am and 7 pm, Monday through Friday, Reser's Fine Foods, Portland General Electric, and market-rate, multi-family residential and affordable housing. This station area also provides access to the Tualatin Hills Parks and Recreation District (THPRD) Nature Park and Interpretive Center, along with THPRD's Howard M. Terpenning Recreation Complex, which operates 7 days per week from 6 am to 10 pm.

Riders can connect to the Merlo/SW 158th Ave MAX Station via TriMet Line 67, which provides 30-minute weekday service, on foot using the sidewalk or trail network, and by bike using on-street bicycle lanes or the multi-use Oak Trail path that parallels the MAX line. A future pedestrian and bicycle crossing for the Westside Trail over US-26 will improve active transportation access in an area that lacks a street grid network.

This area is representative of high-ridership rail stations in areas with concentrated residential and employment centers and significant pedestrian and/or bicycle network gaps.

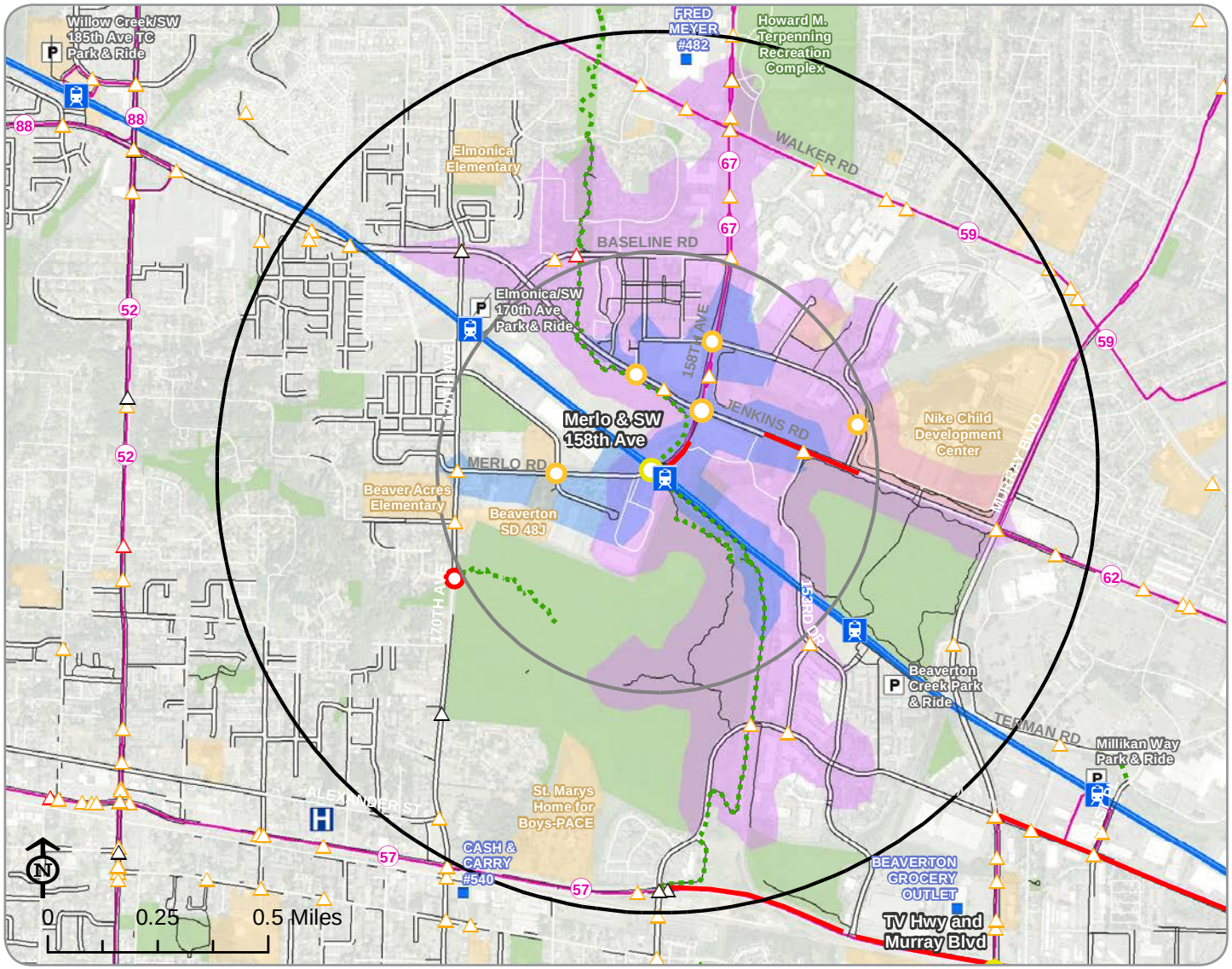
Potential strategies to improve first/last mile access in this area include:

- Infill bicycle and pedestrian network gaps, including elements to improve safety and comfort.
- Partner with TriMet to provide enhanced transit stop amenities, bike parking, and pick-up/drop-off areas.
- Pilot FLM on-demand services to expand stop access beyond walking/biking distance, including Nike Company shuttles from this location.

SUMMARY OF ACCESS BARRIERS

- The MAX line serves as a pedestrian/bicycle barrier, bisecting the entire station area.
- Sidewalks are available on most streets, but at times are only provided on one side of the street, with missing curb ramps and/or marked crossings at intersections.
- Sidewalks are only available on one side of the streets adjacent to the station (SW 158th Ave, between SW Jenkins Rd and the MAX rail line, and SW Jenkins Rd, between SW 158th Ave and SW Jay St).
- Several pedestrian crossings in the study area are not striped, and some intersections lack ADA-compliant curb ramps (SW Merlo Dr and SW Merlo Rd, SW 158th Ave and SW Jenkins Rd, and SW Jenkins Rd and SE 162nd Ave).
- Station access for bicycles includes on-street bike lanes and off-street/ recreational access from the adjacent THPRD Oak Trail.
- Fast vehicle speeds and long stretches of roadway without marked crossings make access and crossing dificult.

STATION AREA NEEDS AND OPPORTUNITIES MAP



HILLSBORO TRANSIT CENTER

TYPOLOGY

High-ridership stop with strong walking access.

RIDERSHIP

High: Over 3,570 weekday boardings and alightings.

Line	Riders*	Freq.	Service
46	70	60-min+	Mon-Fri
47	180	25-min+	Mon-Fri
48	260	20-min+	Mon-Sat
57	1,300	15-min	Mon-Sun
MAX Blue Line	1,700	15-min	Mon-Sun

*Refers to average weekly ridership (boardings + alightings) at each stop.

PARK AND RIDE UTILIZATION

Capacity	Daily Use	% Use
85	51	60%

Fall, 2017

SAFETY

Crashes involving bikes:
46 total, 42 injuries, 1 fatalities

Crashes involving pedestrians:
73 total, 66 injuries, 6 fatalities

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY

Hillsboro Transit Center is a heavily used transit center located in downtown Hillsboro within the City's Station Community Planning Area, which allows dense mixed-use development.

Hillsboro Transit Center is a high-ridership transit station area in downtown Hillsboro, served by TriMet Bus Lines 46, 47, 48, 57, MAX Blue Line light rail, WestLink, and YCTA Route 33. All bus lines provide weekday service, Line 48 provides Saturday service, and Line 57 runs 7 days per week. Bus Line 48 runs weekdays and Saturdays and provides connections to Hillsboro Transit Center, Hillsboro Airport, Tanasbourne, Cedar Mill, and Sunset Transit Center. Bus Line 57 provides frequent 15-minute service, 24 hours a day, and connects riders to Forest Grove, Cornelius, Hillsboro, Aloha, and Beaverton. The station also offers secure bike parking to facilitate transit access by bicyclists.

The Hillsboro Transit Center is located in Hillsboro's Station Community Planning Area, which allows dense mixed-used development. Land uses in this station area consist of mixed-use housing, commercial retail businesses, office spaces, medical facilities, local and county governmental institutions, schools, and parks. This station serves many City of Hillsboro employees with workshifts between 8 am and 5 pm, Monday through Friday.

A dense urban environment with a strong grid street network makes this station very accessible on foot, by bus, or car. Designated bicycle facilities are limited in the immediate station area, requiring people bicycling to mix with traffic. This station area is representative of rail stations with high ridership and relatively well-connected pedestrian and bicycle networks.

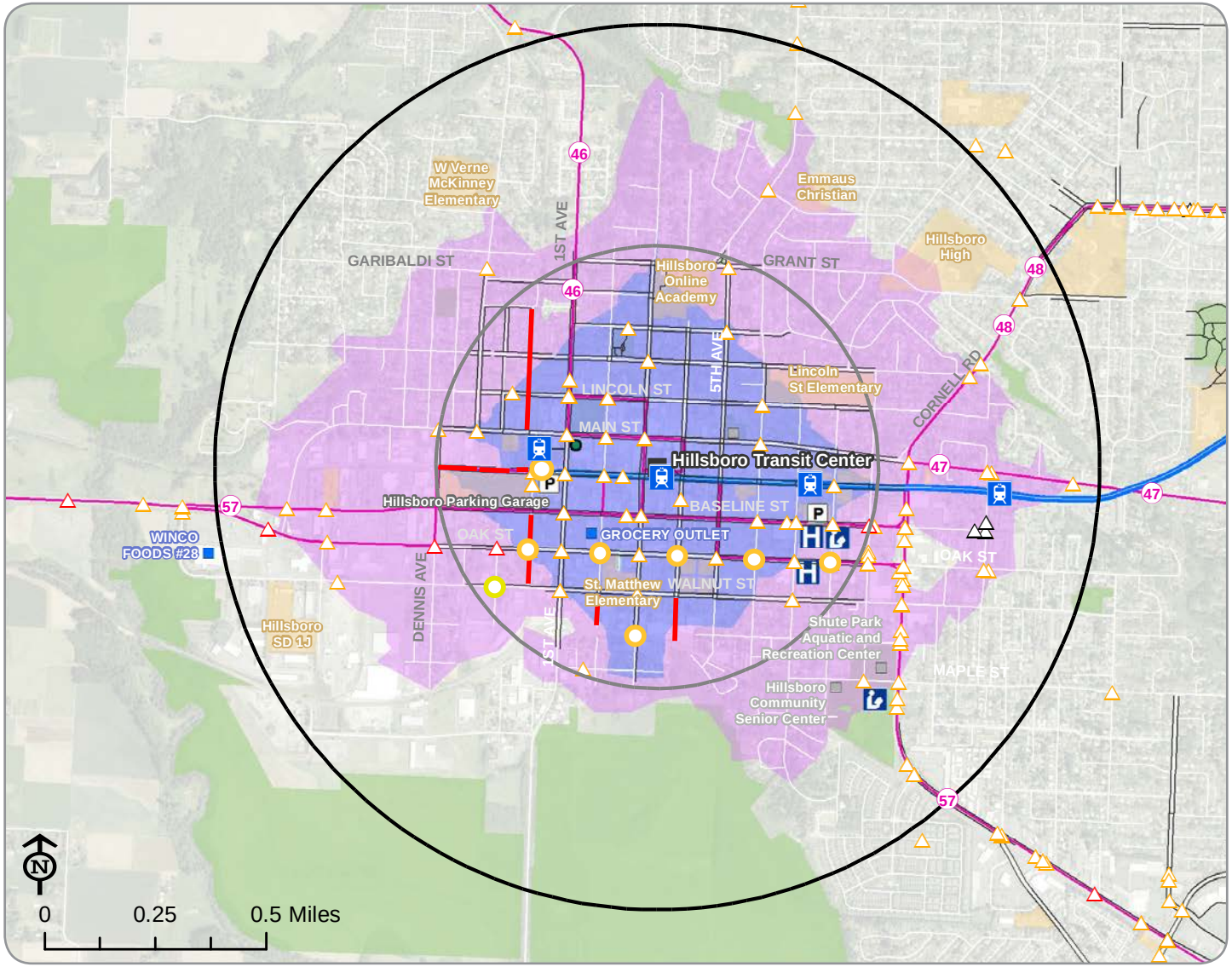
Potential strategies to improve first/last mile access in this area include:

- Infill bicycle network gaps with improved on-street facilities and signage where necessary.
- Enhance pedestrian environment to improve safety and comfort with improved crossings, mid-block crossings and ADA curb ramps.
- Pilot FLM on-demand and micro-mobility services to expand stop access beyond walking/biking distance.
- Partner with TriMet to provide enhanced transit stop amenities, bike parking, and pick-up/drop-off areas.

SUMMARY OF ACCESS BARRIERS

- Pedestrian access to Hillsboro Transit Center is generally good, with a well-connected sidewalk system and gridded street network.
- The dense street grid provides numerous access points for people walking, bicycling, and driving.
- Pedestrian access is limited in some locations due to narrow sidewalks and missing ADA-compliant curb ramps.
- Several intersections throughout the station study area lack marked crosswalks at intersections and a few locations present difficult sightlines for both pedestrians and vehicles (SE 3rd Ave and SE 4th Ave and SE Washington Street).
- People on bicycles must travel in mixed-traffic on downtown streets (SE 1st Ave, SE 5th Ave, Baseline Street) to access the Hillsboro Transit Center, as no on-street bike lanes currently exist in the immediate area. Traffic speeds on streets around downtown vary from 25 to 30 mph.

STATION AREA NEEDS AND OPPORTUNITIES MAP



TV HIGHWAY AND MURRAY BLVD

TYPOLOGY

Suburban highway corridor with a medium level of ridership.

RIDERSHIP

Medium: Over 300 weekday boardings and alightings

Line	Riders*	Freq.	Service
57	230	15-min	Mon-Sun
62	100	30-min+	Mon-Sun

*Refers to average weekly ridership (boardings + alightings) at each stop.

SAFETY

Crashes involving bikes:
53 total, 50 injuries, 1 fatalities

Crashes involving pedestrians:
55 total, 51 injuries, 4 fatalities

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY

TV Highway and Murray Blvd is located in the City of Beaverton, west of downtown, in a predominately suburban environment made up of commercial and medium-density residential housing.

TV Highway and Murray Blvd station area is a medium-ridership transit station area in the city of Beaverton, served by TriMet Bus Lines 57 and 62, and MAX Blue Line light rail within the 1 mile bicycle access shed. Bus Line 57 provides frequent 15-minute service, 24 hours a day, 7 days a week, and connects riders to Forest Grove, Cornelius, Hillsboro, Aloha, and Beaverton. Bus Line 62 provides service 7 days a week, linking riders to Washington Square and Sunset Transit Center. The MAX Blue Line connects Hillsboro, Beaverton, Portland City Center, East Portland, and Gresham.

TV Highway and Murray Blvd is located west of downtown Beaverton in a suburban environment made up of commercial and medium-density residential housing. Land uses consist of large-scale commercial uses such as tech, car dealerships, car rental services, moving and storage services, and apartment/townhome developments. Workshifts at Vernier Software occur most often between 6 am and 5 pm, Monday through Friday. Valley Catholic School and the German International School are located near this transit station.

Station access is generally good for people walking and biking with sidewalks, crossings, and on-street bicycle facilities. The suburban nature of the street network limits direct connectivity, and some intersections lack ADA curb ramps. This station area is representative of stops with medium levels of ridership located along suburban highway corridors. Future mixed-use development at the Kmart site (TV Highway and Murray Blvd) will increase ridership potential in this area over time.

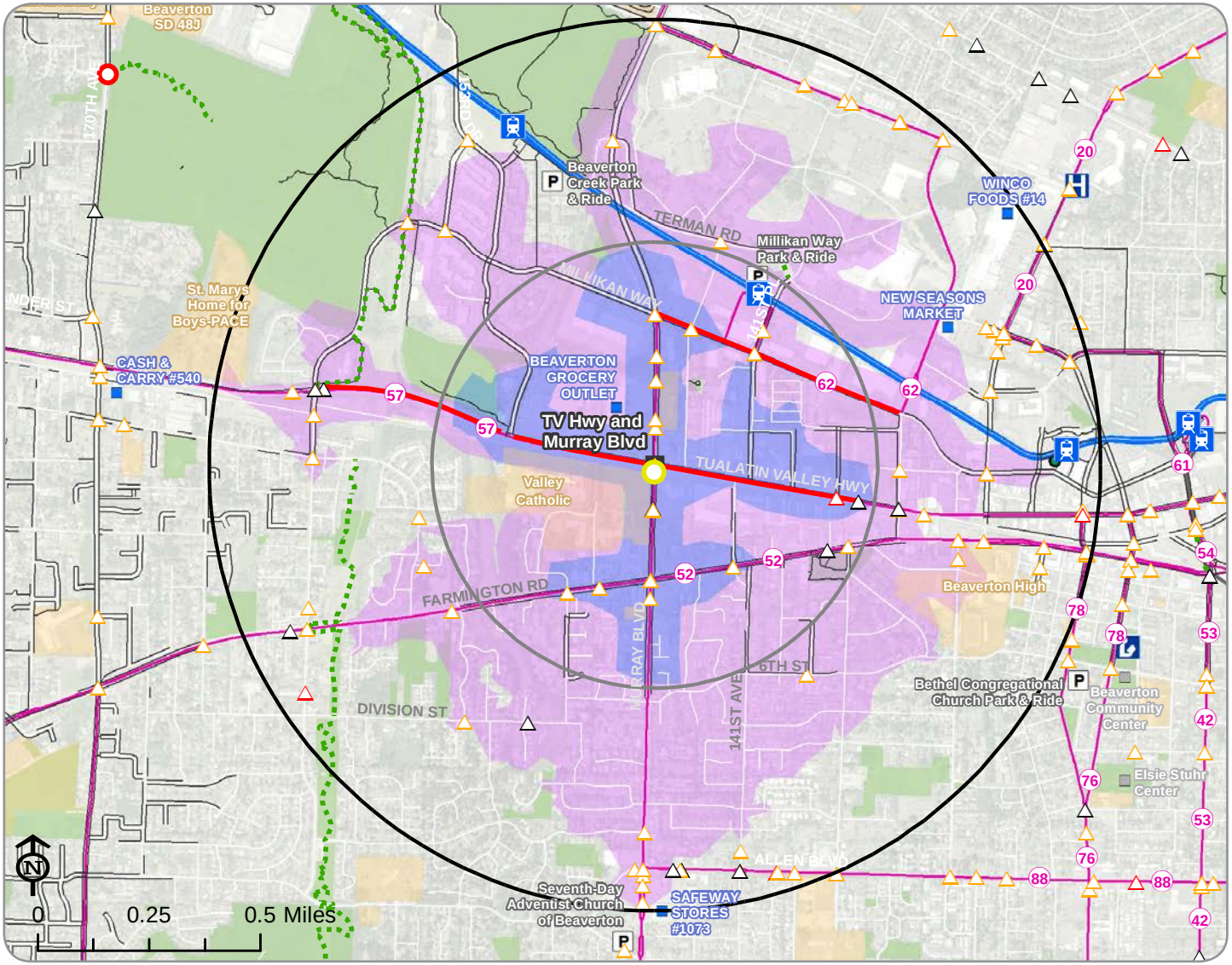
Potential strategies to improve first/last mile access in this area include:

- Fill any bicycle/pedestrian network gaps that currently exist and enchance pedestrian crossings.
- Coordinate infrastructure and access improvement investments with TriMet's transit improvements.
- Pilot FLM on-demand and micro-mobility services to expand stop access beyond walking/biking distance.
- Reevaluate FLM access strategies when transit service improvements are online.
- Partner with TriMet to provide enhanced transit stop amenities, bike parking, and pick up/drop off areas.

SUMMARY OF ACCESS BARRIERS

- Access is generally good for people walking and bicycling. The suburban nature of the street network limits the number of access points and through streets, but sidewalks and bike lanes facilitate access to the transit stop and to other community destinations.
- Station access for people walking is good, with just a few sidewalk gaps and missing curb ramps identified. However, the suburban nature of the street network limits the number of through streets and access points to the stop, with just five streets connecting to either TV Highway or Murray Blvd.
- Intersections in the study area are generally in good condition with marked crossings and curb ramps. However, some locations (TV Highway and Murray Blvd) do not have ADA-compliant curb ramps.
- Streets around the stop generally provide bicycle access with on-street bike lanes. However, these lanes are often on high-speed roads with large intersections and multiple lanes of motor vehicle traffic.
- Long stretches of roadway without marked crossings make access and crossing dificult.

STATION AREA NEEDS AND OPPORTUNITIES MAP



BOONES FERRY RD AND NYBERG/SENECA ST

TYPOLOGY

Town Center.

RIDERSHIP

Low to Medium: Over 100 weekday boardings and alightings.

Line	Riders*	Freq.	Service
76	70	25-min+	Mon-Sun
97	35	30-min	Mon-Fri

*Refers to average weekly ridership (boardings + alightings) at each stop.

PARK AND RIDE UTILIZATION

Capacity	Daily Use	% Use
390	265	68%

Fall, 2017

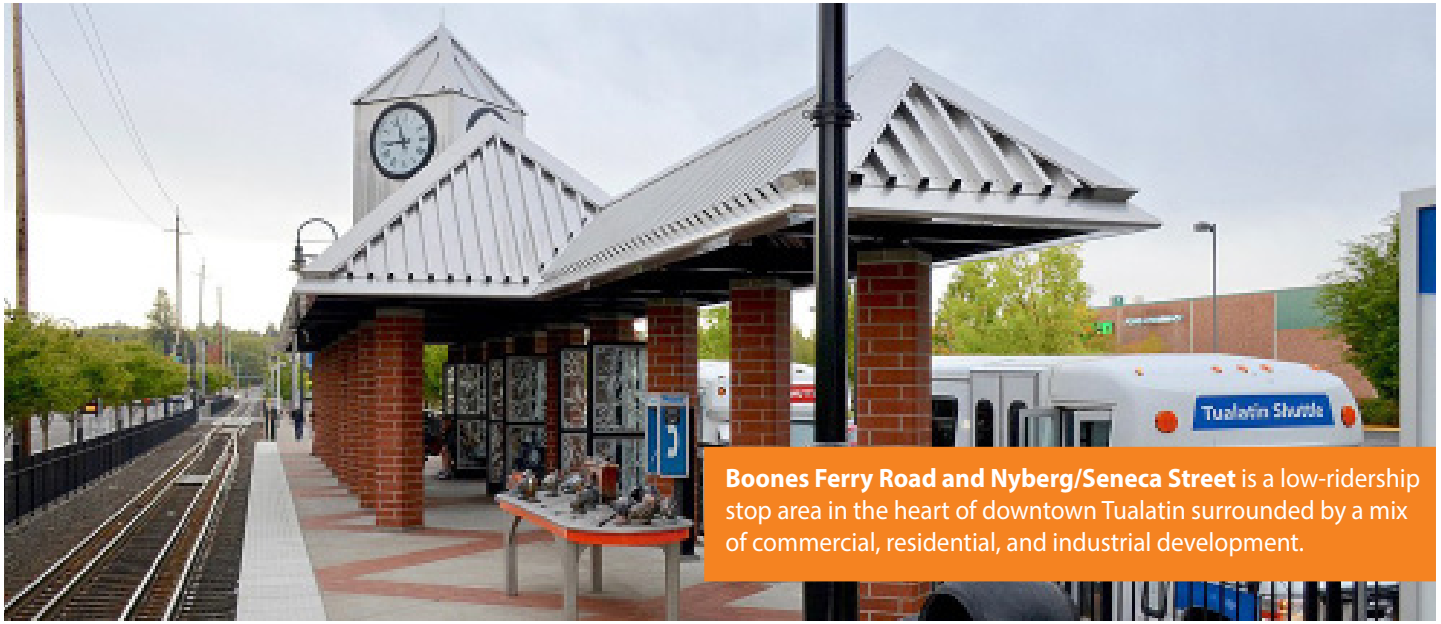
SAFETY

Crashes involving bikes:
54 total, 52 injuries, 0 fatalities

Crashes involving pedestrians:
52 total, 20 injuries, 0 fatalities

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY



Boones Ferry Road and Nyberg/Seneca Street is a low-ridership stop area in the heart of downtown Tualatin surrounded by a mix of commercial, residential, and industrial development.

Boones Ferry Road and Nyberg/Seneca Street is a low-ridership stop in the City of Tualatin, served by TriMet Lines 76, 97, and Westside Express Service (WES) Commuter Rail service. Line 76 provides 7-day-a-week service and connects riders to Tigard, Washington Square, and Beaverton. Line 97 provides weekday service and links riders from this station and the Sherwood Plaza. WES commuter rail provides intercity weekday service between Beaverton, Tigard, Tualatin, and Wilsonville.

Land uses surrounding the stop in downtown Tualatin include a mix of commercial, residential, and industrial uses, such a retail shopping, restaurants, single-family homes, apartments, and storage facilities. Lam Research employees work shifts are 24 hours per day, 7 days a week. Tualatin Commons is located near the station, and provides the community with green space, a lake, an interactive fountain, and a venue for outdoor summer concerts. The Tualatin South Park and Ride is located within the station area and provides good access to transit for automobile commuters.

Pedestrian and bicycle access to transit is generally good in the area, as many locations have been updated with curb "bulb-outs" to shorten crossing distances, curb ramps, and on-street bicycle facilities. Currently, bicycle and pedestrian access barriers to transit include missing sidewalks on one side of the street and unmarked or missing crosswalks. This station area is representative of other town centers in Washington County with low- to medium-ridership and a mix of commercial and industrial uses.

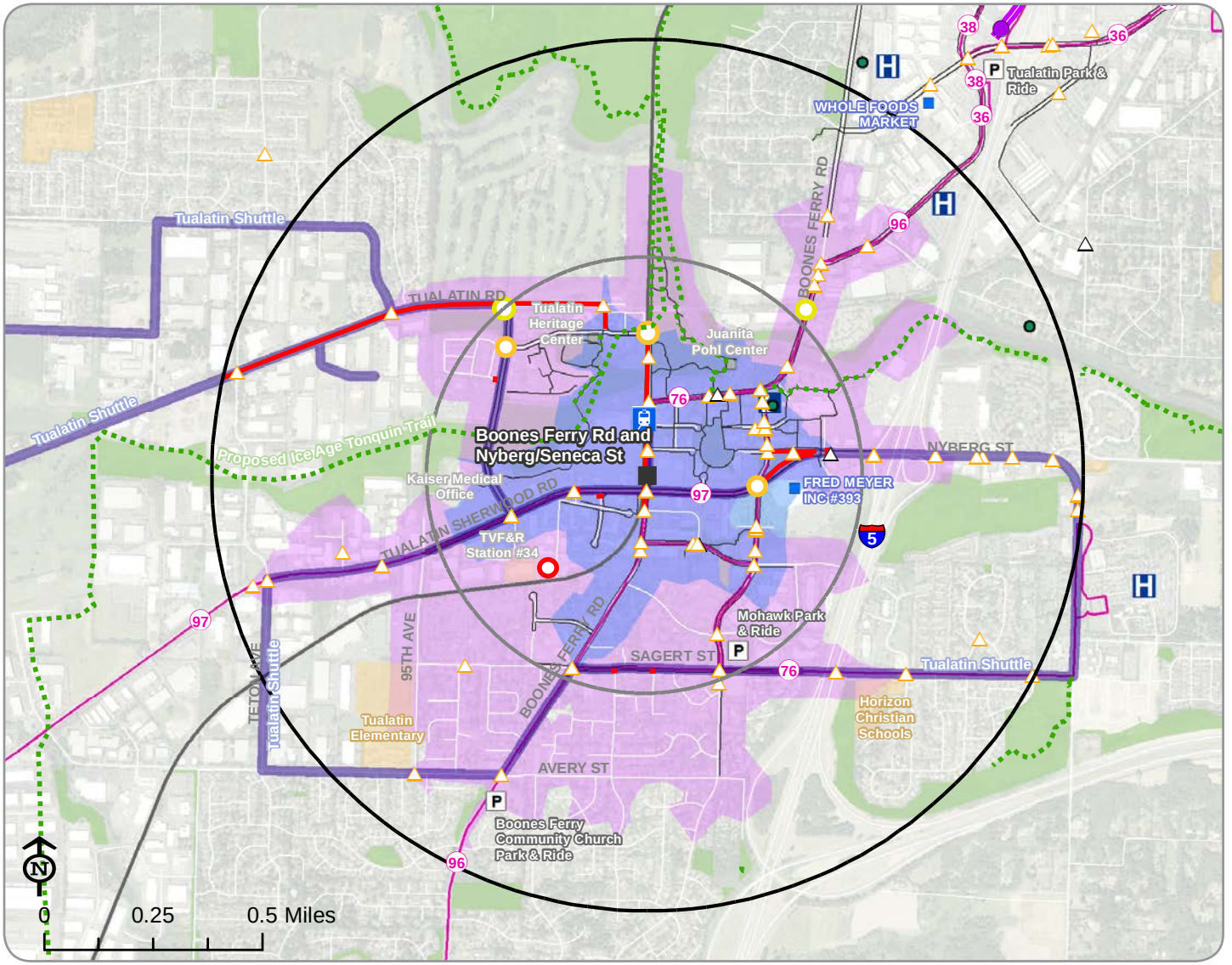
Potential strategies to improve first/last mile access in this area include:

- Infill sidewalk gaps, enhance crossings, install ADA-compliant curb ramps, and leverage active transportation investments to support placemaking and wayfinding efforts in the town center.
- Fill any bicycle/pedestrian network gaps that currently exist to increase safe and direct connections.
- Enhance connections between transit and key destinations such as Tualatin Commons, Juanita Pohl Center, and Tualatin-Sherwood Road employment areas.
- Provide FLM on-demand services to connect transit riders to nearest high-frequency/highspeed line.

SUMMARY OF ACCESS BARRIERS

- In general, the town center setting of this area offers a well-connected network of sidewalks and streets in proximity to the station. The quality of the pedestrian network worsens as you travel further away from the stop area.
- Sidewalks are narrow due to landscaping obstructions, and missing on one side of the street in many locations, impeding north-south and west-east pedestrian access to transit.
- Missing crosswalks at intersections or intersections with long crossing distances present access challenges (SW Boones Ferry Rd).
- Large intersections with short signal timing make crossing for pedestrians difficult.
- Many of the main arterials through the stop area provide bicycle access with on-street bicycle facilities, while local lower-speed streets require people to bike in mixed traffic.
- The Tualatin South Park and Ride provides good access to transit for automobile commuters.

STATION AREA NEEDS AND OPPORTUNITIES MAP



Basemap
- School
- Park
- Hospital
- Library

Existing Infrastructure
- Transit Stop
- Regional Multiuse Trail
- Pedestrian Network
- MAX Blue Line
- Bus Line
- WES

Planned Infrastructure
- SW Corridor Stop
- SW Corridor Line
- Park and ride lots

Existing Pedestrian + Bicycle Access to Transit
- 1 mile buffer
- 1/2 mile buffer
- Pedestrian 1/2 mile access shed
- Bicycle 1 mile access shed

Bike/Pedestrain Crash (2009-2016)
- Non-Serious
- Serious Injury
- Fatality

Needs and Deficiencies
- Missing crosswalk
- Missing curb ramp
- Sidewalk gap
- Bicycle facility needed

ORENCO MAX STATION (MOBILITY HUB)

TYPOLOGY

High-ridership stop with strong walking access.

RIDERSHIP

High: Over 2,700 weekday boardings and alightings.

Line	Riders*	Freq.	Service
47	350	30-min	Mon-Fri
MAX Blue Line	2,400	15-min	Mon-Sun

*Refers to average weekly ridership (boardings + alightings) at each stop.

PARK AND RIDE UTILIZATION

Capacity	Daily Use	% Use
125	68	54%

Fall, 2017

SAFETY

Crashes involving bikes:
22 total, 22 injuries, 0 fatalities

Crashes involving pedestrians:
27 total, 26 injuries, 1 fatality

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY

Orenco MAX Station is a high-ridership station within a transit-oriented development (TOD) area of mixed-use urban commercial and housing development.

Orenco MAX Station is a high-ridership station area in the City of Hillsboro, served by TriMet Line 47, MAX Blue Line, and North Hillsboro Link. Line 47 provides weekday service, linking riders to Hillsboro, Tanasbourne, and Portland Community College-Rock Creek. The MAX Blue Line provides frequent, all-week service and connects Hillsboro, Beaverton, Portland City Center, East Portland, and Gresham. The North Hillsboro Link provides service from Orenco MAX Station to suburban employment destinations in the North Hillsboro area.

Orenco Station is a TOD mixed-use urban commercial zone with land uses consisting of dense single and multi-family housing, commercial retail businesses, offices, parks, and services. Orenco station is near several large-scale tech employers such as Intel, Genentech, Salesforce, and others.

This station area is representative of light rail stations with high ridership and relatively well-connected pedestrian and bicycle networks within a half-mile radius of the station area.

A well-connected sidewalk network and park-and-ride facilitate good transit access for pedestrians and drivers. Some intersections are large, creating long crossing distances for pedestrians navigating through the station area. Bicycle facilities in the area consist of on-street bike lanes on higher-volume streets and "sharrow" pavement markings and signage on slower streets.

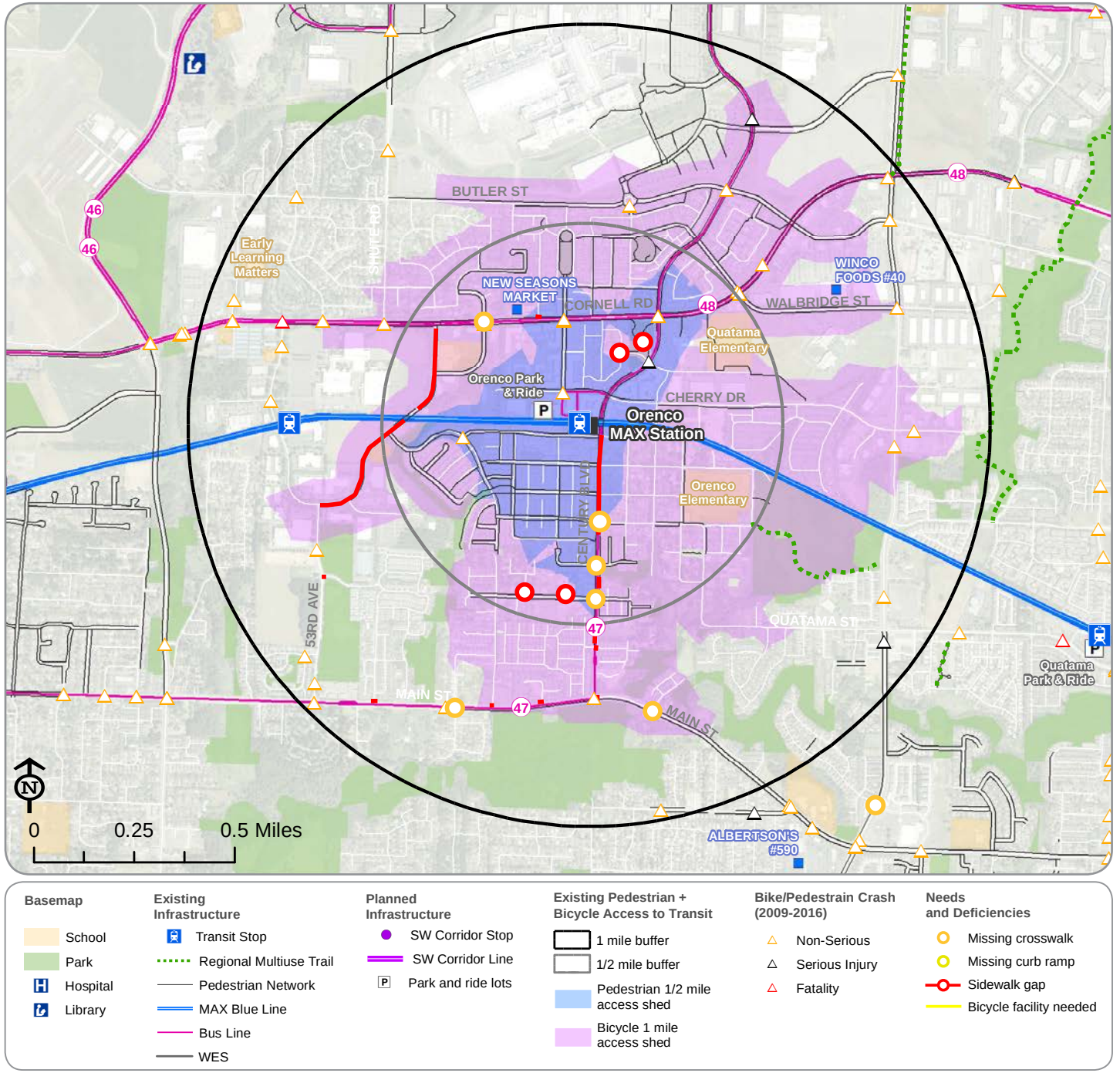
Potential strategies to improve first/last mile access in this area include:

- Enhance bicycle/pedestrian environment with wayfinding signage and improve safety and comfort with improved crossings and ADA-compliant curb ramps.
- Pilot FLM on-demand and micro-mobility services (e-scooters, dockless bikeshare, etc.) to expand stop access beyond walking/biking distance.
- At stops where bicycle and pedestrian networks are mostly complete, pilot shared micro-mobility services, and ride hailing, shuttle, and pick-up/drop-off locations.

SUMMARY OF ACCESS BARRIERS

- Orenco MAX Station has relatively good existing bicycle and pedestrian access to transit. Sidewalks and bike lanes are provided on many streets, as well as sidewalk landscape buffers, seating, and trees.
- In addition to the light rail line, NE Cornell Road acts as a barrier cutting through the area.
- Signalized intersections provide pedestrian crossings, but crossing distances are long and potentially challenging for some users.
- Station access for pedestrians is good, with a strong sidewalk network and only a few streets providing a sidewalk on only one side of the street (e.g. NE Century Blvd).
- Missing crosswalks and long crossing distances at intersections (e.g. NE Century Blvd and NE Cornell Rd) are barriers to access.
- Bicycle access is provided by on-street bike lanes on busy streets, and mixed traffic on more local streets that are designed for slower speeds.

STATION AREA NEEDS AND OPPORTUNITIES MAP



PACIFIC HIGHWAY/68TH PARKWAY STATION

TYPOLOGY

Suburban highway corridor.

RIDERSHIP

Medium: Over 120 weekday boardings and alightings.

Line	Riders*	Freq.	Service
12	120	15-min	Mon-Sun

*Refers to average weekly ridership (boardings + alightings) at each stop.

SAFETY

Crashes involving bikes:
23 injuries, 0 fatalities

Crashes involving pedestrians:
19 injuries, 3 fatalities

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY

Pacific Highway and 68th Parkway is a medium-ridership stop along a suburban highway corridor in Washington County.

Pacific Highway (OR-99W) and 68th Parkway is a medium-ridership bus stop in the city of Tigard, just west of the I-5 interchange and served by TriMet Line 12. Line 12 provides frequent 15-minute service, 7 days a week, connecting riders to Tigard, Burlingame, Portland City Center, NE Portland, and Parkrose.

Land uses in the area are predominately auto-oriented and follow the suburban highway corridor environment found along OR-99W. Commercial uses in this area consist of restaurants, large-scale grocery stores, retail businesses, convenience stores, and a storage centers.

This station area is representative of stops with medium levels of ridership (between 100 and 1,500 boardings + alightings per day) located along suburban highway corridors. While this stop has some limited commercial and retail uses, the transit line primarily serves to connect neighboring cities. The Southwest Corridor Light Rail Project includes a proposed station at this location, increasing the propensity of FLM strategies that would increase ridership as high capacity transit comes online.

Pedestrian and bicycle access to a variety of goods and services in is made possible via existing on-street bicycle lanes and sidewalks, although significant gaps exist on OR-99W and on adjacent neighborhood streets. Missing ADA curb ramps and sidewalks gaps exist and are most prominent north of OR-99W.

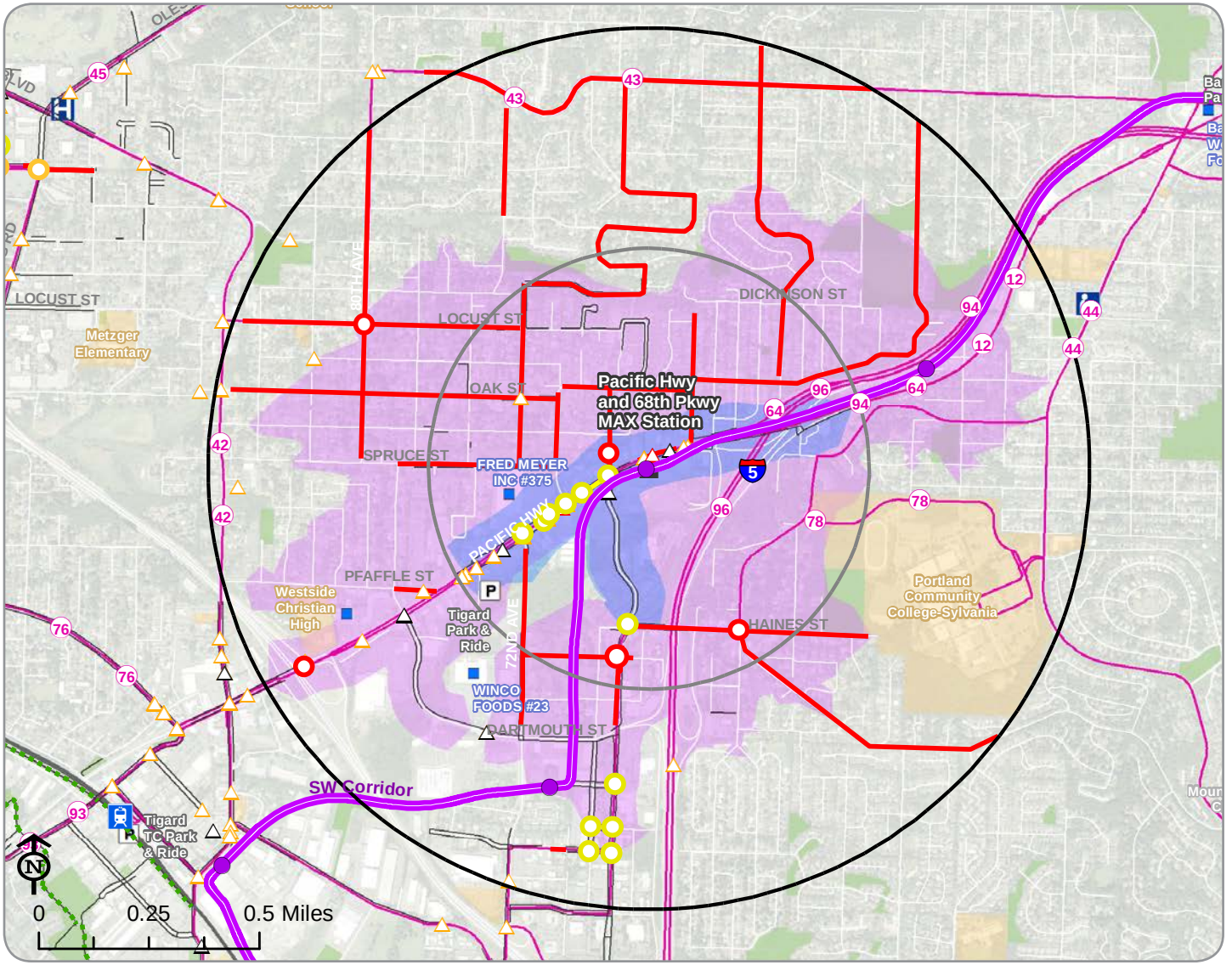
Potential strategies to improve first/last mile access in this area include:

- Enhance crossings, install ADA-compliant curb ramps, fill bicycle and/or pedestrian network gaps to create a safer environment for people walking or biking.
- Pilot FLM on-demand and micro-mobility services to expand stop access beyond walking/biking distance.

SUMMARY OF ACCESS BARRIERS

- The street network around Pacific Highway (OR-99W) and 68th Parkway follows a suburban development pattern, with two high-volume highways running through the station area.
- Sidewalk gaps exist, especially northwest of OR 99W (missing sidewalks or sidewalks on only on one side of the street) limiting continuous pedestrian access.
- Several intersections do not have marked crossings or ADA-compliant curb ramps.
- OR-99W has an on-street bicycle lane; however, this lane has significant gaps and does not have an adequate buffer given the high-speed motor vehicle traffic along OR-99W. Many other streets in the station service area do not have bicycle facilities.
- In locations where separated on-street facilities are not needed, signage or sharrows would be beneficial. FLM options that improve bicycle access will be important as more transit service comes to the area.

STATION AREA NEEDS AND OPPORTUNITIES MAP



Basemap
- School
- Park
- Hospital
- Library

Existing Infrastructure
- Transit Stop
- Regional Multiuse Trail
- Pedestrian Network
- MAX Blue Line
- Bus Line
- WES

Planned Infrastructure
- SW Corridor Stop
- SW Corridor Line
- Park and ride lots

Existing Pedestrian + Bicycle Access to Transit
- 1 mile buffer
- 1/2 mile buffer
- Pedestrian 1/2 mile access shed
- Bicycle 1 mile access shed

Bike/Pedestrain Crash (2009-2016)
- Non-Serious
- Serious Injury
- Fatality

Needs and Deficiencies
- Missing crosswalk
- Missing curb ramp
- Sidewalk gap
- Bicycle facility needed

BARROWS RD AND HORIZON BLVD

TYPOLOGY

Residential and industrial areas with future service improvements.

RIDERSHIP

N/A.

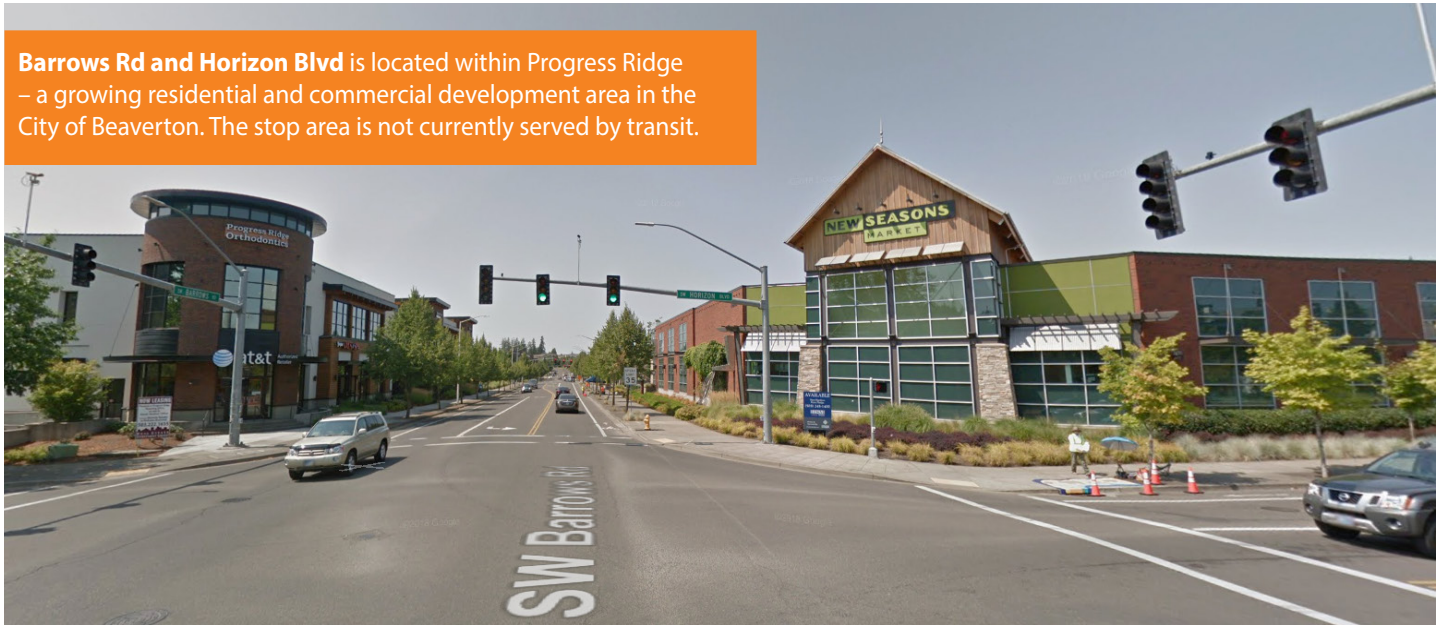
SAFETY

Crashes involving bikes:
12 injuries, 0 fatalities

Crashes involving pedestrians:
10 injuries, 0 fatalities

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY



Barrows Rd and Horizon Blvd is located within Progress Ridge – a growing residential and commercial development area in the City of Beaverton. The stop area is not currently served by transit.

Barrows Rd and Horizon Blvd is a key intersection in the City of Beaverton Progress Ridge development that is *not currently served by transit*. However, future transit enhancements will increase transit opportunities in this area.

The area is anchored by Progress Ridge Townsquare which includes restaurants, grocery stores, and entertainment. Land uses surrounding Progress Ridge follow a suburban residential development pattern, with circuitous streets, limited access to transit, and bicycle and pedestrian connectivity barriers.

This station area is representative of other locations in Washington County where growth and development is occurring, and where there are significant opportunities to leverage first/last mile solutions once planned transit service improvements are implemented.

Due to the recent development of this area, the sidewalk and bicycle network is relatively complete with safe and adequate facilities in some areas. Crosswalks are missing in some locations and there are no shared roadway facilities to enhance bicycle travel through the suburban street network.

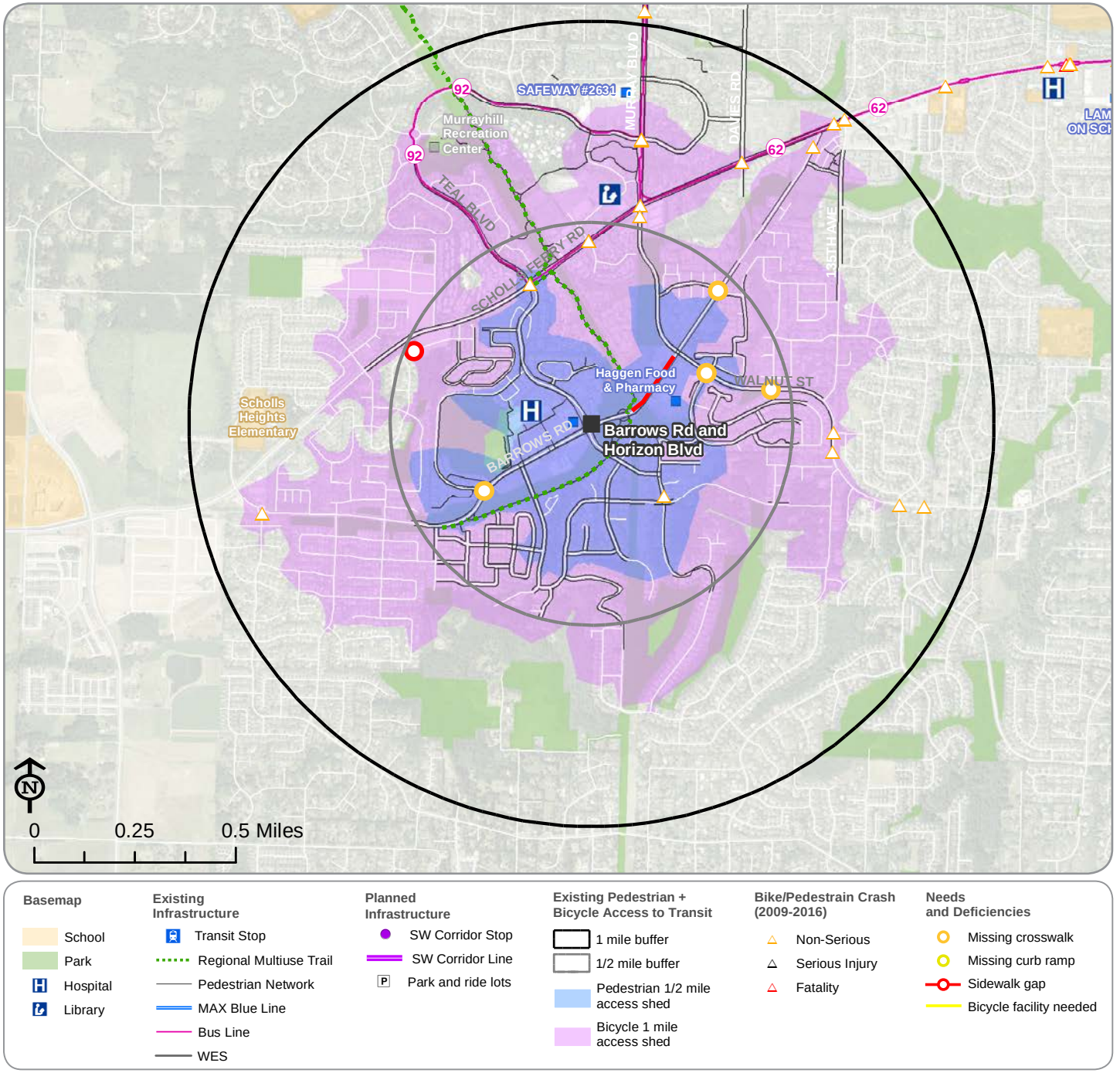
Potential strategies to improve first/last mile access in this area include:

- Consider shared roadway facilities in neighborhoods to facilitate bicycle access to transit via low-stress, low-volume routes.
- Install crosswalks and fill sidewalk gaps in key locations.
- Time first/last mile infrastructure investments to be ready when TriMet planned service improvements come online.
- Consider internal ciruclation and access routes within commercial parking lots and retail areas.
- Pilot FLM on-demand services to connect residents and workers to high-speed/high-frequency transit once service begins. This will build ridership in areas that might have low initial ridership without the FLM pilot.

SUMMARY OF ACCESS BARRIERS

- This area is not currently served by transit. Future transit enhancements are planned that will greatly improve access to and from the area.
- Pedestrian access is generally good with mostly complete sidewalks. However, a suburban land use pattern and street network creates few through-streets and circuitous walking routes to transit.
- There are often long distances between marked or controlled crossings. Some crossings within the area are narrow and/or lack ADA-compliant curb ramps and markings.
- On-street bike lanes exist on busier streets (SW Barrows Rd, SW Scholls Ferry Rd), but no bicycle facilities exist on slower residential streets.
- This is an auto-oriented area with large parking lots. These parking areas serve the businesses in Progress Ridge, and could prove useful as future transit comes into the area.

STATION AREA NEEDS AND OPPORTUNITIES MAP



BETHANY BLVD AND LAIDLAW RD

TYPOLOGY

Town Center in Bethany.

RIDERSHIP

Low to Medium: Over 120 weekday boardings and alightings.

Line	Riders*	Freq.	Service
47	60	25-min+	Mon-Fri
67	70	15-min+	Mon-Sat

*Refers to average weekly ridership (boardings + alightings) at each stop.

SAFETY

Crashes involving bikes: 12 total, 12 injuries, 0 fatalities.

Crashes involving pedestrians: 7 total, 7 injuries, 0 fatalities.

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY

The Bethany Blvd and Laidlaw Rd station is a low- to medium-ridership bus stop serving both residential and commercial uses in the Bethany town center.

Bethany Blvd and Laidlaw Rd is a low- to medium-ridership bus stop located in the Bethany Village Center and is served by TriMet Lines 47 and 67. Line 47 runs weekdays and provides connections to Hillsboro, Orenco Station, Tanasbourne, and Portland Community College-Rock Creek (PCC Rock Creek). Line 67 runs weekdays and Saturdays and links riders to the Merlo MAX station and PCC Rock Creek.

The stop is located in the Bethany Town Center. The land use around this station area consists of intense residential development and a mix of commercial and retail uses. Land uses in the Bethany Village Center primarily consists of single and multi-family residential development, as well as a mix of commercial uses such as restaurants, a medical clinic, Bethany Athletic Club, schools, and retail shopping. Employees in the area typically work shifts between 7 am and 10 pm, with certain estblishments open 24 hours a day. The street grid in Bethany Village follows an un-gridded, suburban network pattern, but neighborhood streets generally provide good connectivity for bicyclists and pedestrians to access transit.

This station area is representative of other town centers in Washington County with low- to medium-ridership (up to 1,500 boardings + alightings per day) in a predominately residential suburban area. Several of these stops are transfer points between transit providers or a between one of TriMet's Frequent Service bus lines and a higher-frequency regular bus line.

Pedestrian and bicycle access is generally adequate in the area. The sidewalk network is well-connected through the neighborhoods and there are existing multi-use trails to facilitate north-south and east-west travel through the area. However, there are not sufficient bicycle network connections between regional trails and the station area. The main challenge for pedestrians accessing transit in the focus area is a lack of ADA curb ramps and marked, safe crossings in several areas, such as along Laidlaw Rd.

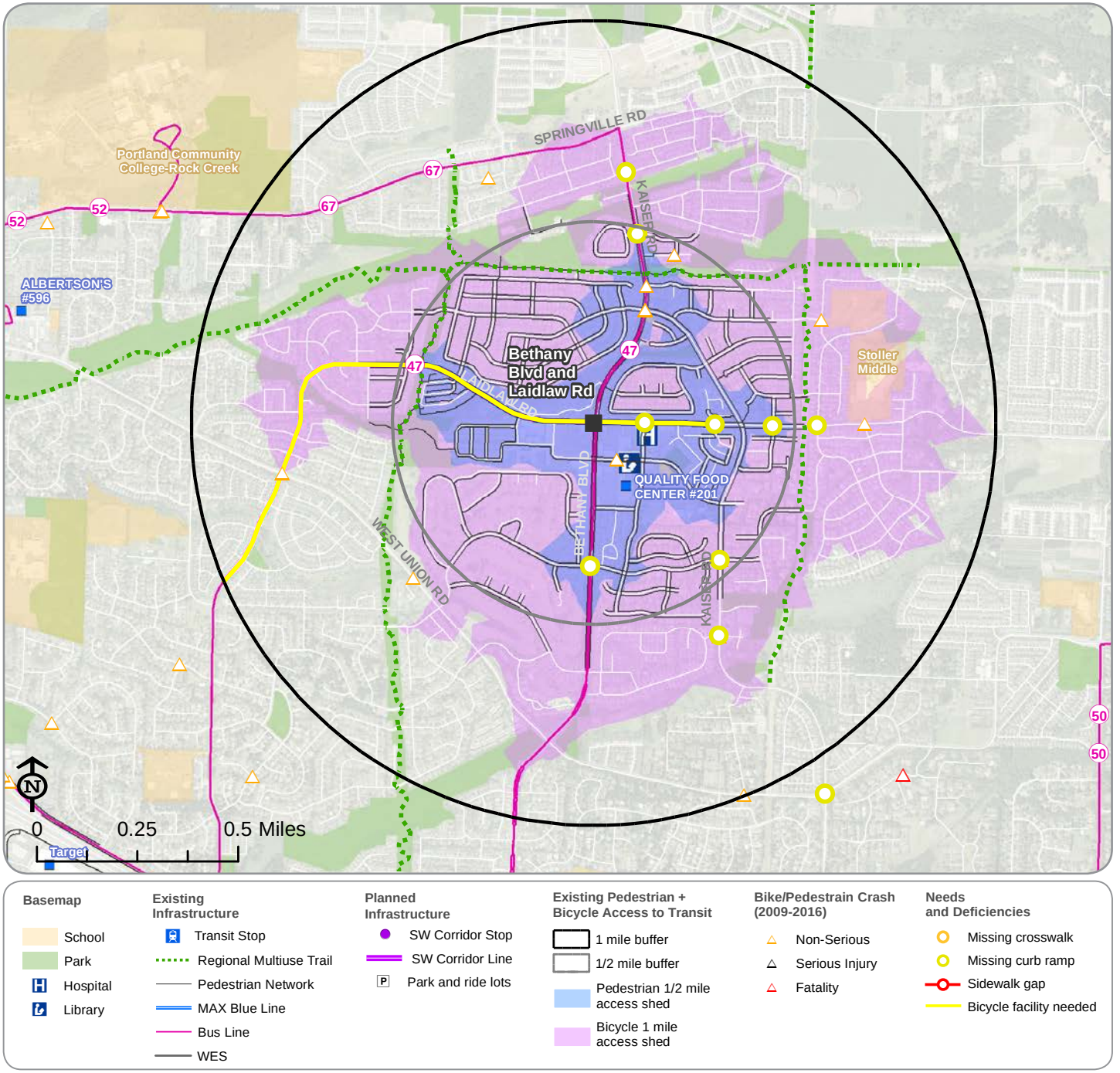
Potential strategies to improve first/last mile access in this area include:

- Install ADA curb ramps and leverage active transportation investments to support placemaking and wayfinding efforts in the town center.
- Provide FLM on-demand services to connect transit riders to nearest high-frequency/high-speed line.

SUMMARY OF ACCESS BARRIERS

- Land uses in the area result in a suburban street network patten with limited street connections, requiring people walking and biking to take circuitous routes to access goods and services. Within the town center, Bethany has a relatively connected street and sidewalk network.
- The existing sidewalk network provides sufficient pedestrian access, is connected, and is generally in good condition. Some streets only have sidewalks on one side.
- The main access barrier in this area is a lack of ADA-compliant sidewalk ramps at several intersections (on Laidlaw Rd, east of Bethany Blvd), and a lack of marked, safe crossings (also on Laidlaw Rd).
- Bethany Blvd provides bicycle access with dedicated on-street lanes. However, Laidlaw Rd and other local, lower-speed streets require people bicycling to mix with traffic. Buses and people riding bicycles interact as buses pull across bike lane to make stops.
- Pick up/drop off space is limited.

STATION AREA NEEDS AND OPPORTUNITIES MAP



ADAIR/BASELINE AND 10TH AVE

TYPOLOGY

Town Center in City of Cornelius.

RIDERSHIP

Low to Medium: Over 130 weekday boardings and alightings.

Line	Riders*	Freq.	Service
57	130	15-min	Mon-Sun

*Refers to average weekly ridership (boardings + alightings) at each stop.

SAFETY

Crashes involving bikes:
22 total, 21 injuries, 0 fatalities

Crashes involving pedestrians:
27 total, 25 injuries, 2 fatalities

HIGH VEHICLE SPEED STREETS

STATION AREA SUMMARY

Adair/Baseline and 10th Ave is a low- to medium-ridership bus stop serving transit users accessing residential and commercial land uses in the heart of the City of Cornelius.

Adair/Baseline and 10th Ave is a low- to medium-ridership bus stop in downtown Cornelius served by TriMet Line 57. Line 57 provides frequent 15-minute service, 24 hours a day, 7 days a week, and links riders to Forest Grove, Hillsboro, Aloha, and downtown Beaverton.

The Cornelius town center is located just east of the stop along OR-8/Tualatin Valley Highway, a state highway whose primary function is to provide inter-urban and inter-regional mobility to connect places that are not directly served by an interstate. Most land uses in the Cornelius town center are commercial, including several automobile-oriented businesses such as retailers with large parking lots, auto repair shops, gas stations, and drive-thru businesses. A mix of single residential, multi-family residential, and rural land uses surround the stop outside of the immediate commercial area. There are also several schools in the vicinity.

This station area is representative of commercial town centers with low- to medium-ridership (up to 1,500 boardings + alightings per day) in predominately residential areas within Washington County.

Several of the stops in this typology are transfer points between transit providers or a transfer point between one of TriMet's Frequent Service bus lines and a higher-ridership regular bus line.

A consistent street grid network in Cornelius provides good opportunities for future access improvements in the pedestrian and bicycle network.

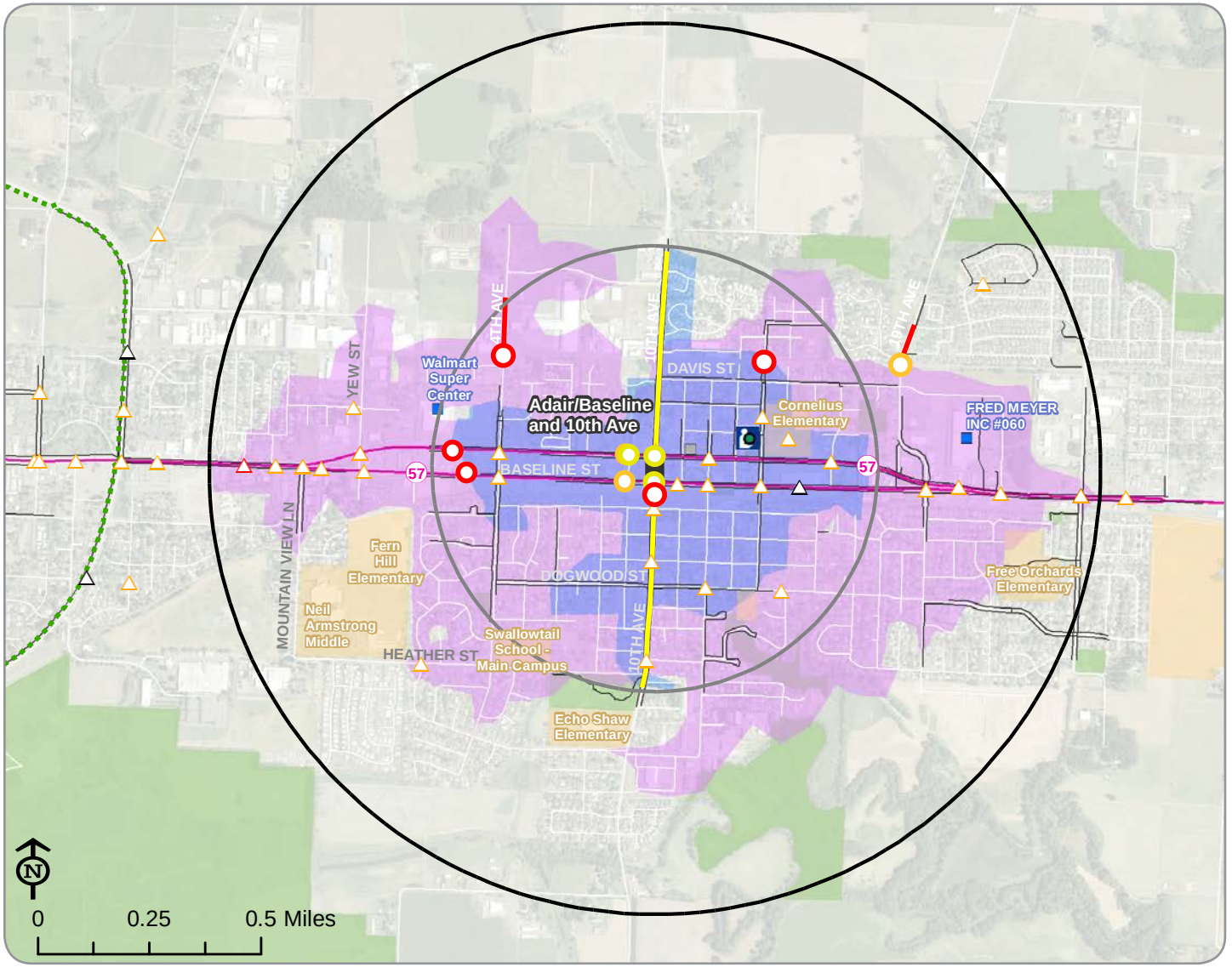
Potential strategies to improve first/last mile access in this area include:

- Install crosswalks, close sidewalk gaps, and construct ADA curb ramps to facilitate bicycle and pedestrian access to transit in the Cornelius town center.
- Consider a on-street bicycle facility along 10th Avenue to facilitate north-south bicycle travel to transit.
- Leverage active transportation investments to support placemaking and wayfinding efforts in the Cornelius town center.
- Provide FLM on-demand services to connect transit riders to nearest high-frequency/high-speed line.
- Consider internal circulation and access routes within commercial parking lots and retail areas.

SUMMARY OF ACCESS BARRIERS

- The Adair/Baseline (OR-8) couplet running through the middle of the stop area creates a north-south access barrier for bicycles and pedestrians, particularly along 10th Avenue.
- Although there are existing sidewalks along the couplet, bicycle and pedestrian access is limited by a lack of midblock crossings on N Baseline Street, missing curb ramps at several intersections, and sidewalk gaps near the railroad tracks.
- The area lacks ADA-compliant curb ramps and marked crossings at some intersections.
- Large intersections with short signal timing make crossing for pedestrians difficult.
- On-street bicycle facilities exist on N Adair St and N Baseline St, but other streets in the station area lack signage and on street markings. An on-street bicycle facility is needed on 10th Avenue to enhanced north-south bicycle travel to and from transit through the Cornelius town center.

STATION AREA NEEDS AND OPPORTUNITIES MAP



WASHINGTON SQUARE TRANSIT CENTER

POTENTIAL PROJECTS

- Add bicycle lanes to SW Greenburg Road.
- Improve bicycle facilities on Hall Boulevard and Scholls Ferry Road to buffer bicycles from high-speed traffic.
- Partner with Washington Square Mall to add marked bicycle facilities in the parking lot connecting riders to arterial facilities.
- Fill in the sidewalk gaps on Palmblad Road.
- Update curb ramps throughout the station area to meet ADA standards.
- Improve pedestrian facilities on Eliander Lane and Blum Road to buffer pedestrians from vehicles.
- Add marked crossings on Greenburg Road to create safe connections from the mall to the neighborhoods to the east.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located within the Washington Squre Mall parking lot, this high-ridership station serves many employees and customers. **Photo 1**: Bus stops at transit center with shelters and seating. **Photo 2**: Narrow sidewalk with bus stop along SW Blum Rd, within the Washington Square shopping area. **Photo 3:** Typical intersection within the mall parking lot. **Photo 4**: Unimproved path and closed crosswalk at SW Brightfield Circle and SW Hall Blvd.

MERLO/SW 158TH MAX STATION

POTENTIAL PROJECTS

- Add a crossing at the intersection of Merlo Road and Merlo Drive.
- Add pedestrian control gates on the north side of Merlo Road to separate pedestrians from the light rail tracks.
- Fill the sidewalk gaps on Jenkins Road.
- Widen and add landscaping to the sidewalks on Merlo Road west of the station.
- Add bicycle lanes on Merlo Road west of the station.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located off of SW Merlo Rd and SW 158th Ave in Beaverton, this high-ridership station serves employees at nearby lage comparnies and residents within the area. **Photo 1**: Merlo Rd/SW 158th MAX Station, with Biketown bikeshare available. **Photo 2:** SW Merlo Rd pedestrian crossing to access MAX station. **Photo 3:** Intersection with deteriorating crosswalk paint near station. **Photo 4:** Oak Trail multi-use path next to station.

HILLSBORO TRANSIT CENTER

POTENTIAL PROJECTS

- Create a network of dedicated bicycle facilities, especially on higher-speed streets such as Oak Street, Baseline Street, 1st Avenue, Main Street, and Lincoln Street that will connect the retail core to the residential areas.
- Improve pedestrian and bicycle crossings with marked crosswalks, curb extensions, bike boxes, and ADA-compliant curb ramps to create safer crossings for pedestrians.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located in downtown Hillsboro, this high-ridership station provides transit for many people within a dense mixed-use downtown environment. **Photo 1:** Hillsboro Central MAX Station. **Photo 2:** ADA-accessible curb ramps on a local downtown street. **Photo 3:** Older sidewalk with street trees in downtown Hillsboro. **Photo 4:** Wide, accessible sidewalks with landscaping.

TV HIGHWAY AND MURRAY BLVD

POTENTIAL PROJECTS

- Fill in bicycle lane gaps on Millikan Way, which is classified as a Major Bikeway by the City of Beaverton.
- Improve bicycle facilities on Murray Boulevard and TV Highway to buffer bicycles from high speed traffic. Alternatively, a cycle track on a parallel route to Murray (e.g., SW 142nd Avenue) could provide north-south bicycle connectivity on lower-speed streets.
- Add sidewalks to the south side of TV Highway.
- Update curb ramps on Murray Boulevard and TV Highway to meet ADA standards.
- Improve bicycle crossing treatments through intersections with high-speed, multi-lane roadways and a history of collisions. This includes the intersections of Murray Boulevard/TV Highway, Murray Boulevard/Millikan Way, TV Highway/SW 153rd Drive, and TV Highway/Millikan Way.
- Add bicycle and pedestrian crossings of Murray Boulevard and TV Highway to shorten the distance between crossings.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located along TV Highway and Murray Blvd in Beaverton, this station is a medium-ridership station that serves residents and businesses in a suburban setting. **Photo 1**: TriMet bus stop with shelter. **Photo 2:** Newly constructed sidewalk with landsaping strip and on-street bicycle lane. **Photo 3:** ADA-compliant pedestrian crossing over railroad tracks. **Photo 4:** Newly constructed ADA pedestrian curb ramp with pedestrian signal push button.

BOONES FERRY RD AND NYBERG/SENECA ST

POTENTIAL PROJECTS

- Add bicycle lanes on Tualatin-Sherwood Road east of Boones Ferry Road and on Martinazzi Ave.
- Fill in bicycle lane gaps on SW Tualatin Road.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located in downtown Tualatin, this low-ridership station is surrounded by a mix of commercial and residential uses. **Photo 1:** TriMet bus stop adjacent to WES Commuter Rail line. **Photo 2:** Marked crossing with island refuge on downtown street. **Photo 3:** Street with bicycle lane. **Photo 4:** Older sidewalk within the station area.

1

2

3

4

ORENCO MAX STATION (MOBILITY HUB)

POTENTIAL PROJECTS

- Enhance safety and comfort with additional crossings on NE Century Blvd.
- Fill sidewalk gaps in the residential areas.
- Update curb ramps throughout the station area to meet ADA standards.
- Add bicycle lanes on Orenco station Parkway and Cherry Drive to provide access directly to the station area.
- Create north-south bicycle connections on lower-speed residential streets to provide more comfortable alternative routes to Intel and residential neighborhoods. This would necessitate creating safe crossings on NE Cornell Road and NE Butler Street, both of which are higher-speed streets.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located within the TOD area of Orenco Station in Hillsboro, this high-ridership station is surrounded by a dense mix of walkable commercial and residential uses. **Photo 1:** Orenco Station MAX station and bus stop with shelter. **Photo 2:** Mixed-use development with wide sidewalk. **Photo 3:** Intersection without marked crosswalk. **Photo 4:** TriMet bus stop on a new ADA-compliant sidewalk.

PACIFIC HIGHWAY/68TH PARKWAY STATION

POTENTIAL PROJECTS

- Add bicycle lanes and complete sidewalk gaps north of Pacific Highway to provide safe connections to the residential areas.
- Continue bicycle lanes south on SW 68th Avenue to provide a connection to TriMet Route 78.
- Create a safe buffered bicycle connection over I-5 either on Atlanta Street or on Pacific Highway to Lesser Road.
- Enhance bicycle facilities through major high-speed intersections for safety and comfort.
- Buffer bicycle lanes and sidewalks on Pacific Highway to separate walkers and bikers from high-speed traffic.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located in Washington County, this stop is a medium-ridership station along a suburban highway corridor. **Photo 1**: TriMet bus stop with shelter. **Photo 2:** Sidewalk and intersection without marked crosswalk. **Photo 3:** Street with person on bicycle mixing in vehicle traffic along Pacific Highway, approaching 68th Parkway. **Photo 4:** Nearby residential street with no sidewalks or pedestrian facilities; extremely limited pedestrian access to the transit stop from adjacent residential neighborhoods on the north side of Pacific Highway.

BARROWS RD AND HORIZON BLVD

POTENTIAL PROJECTS

- Add marked crosswalks across Barrows Road and Walnut Street to create safe access to the grocery store and Progress Ridge.
- Continue the bicycle lanes on Barrows Road from Walnut Street to Scholls Ferry Road.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located within Progress Ridge in Beaverton, this area is currently not served by transit, but has strong potential as transit increases due to its residential and commerical development. **Photo 1:** Dense development with wide sidewalks and street trees. **Photo 2:** Marked and signalized crosswalk. **Photo 3:** ADA curb ramps at residential street. **Photo 4:** Street with bicycle lane and sidewalk.

BETHANY BLVD AND LAIDLAW RD

POTENTIAL PROJECTS

- Add bicycle lanes on Laidlaw Road west of Kaiser Road to connect riders to the Morgan's Run Park and connecting trail system, and to the neighborhoods west of the stop area.
- Create an enhanced bicycle and pedestrian crossing of Laidlaw Road where the Morgan's Run Park trail is bisected by the roadway. There is currently no marked crossing.
- Add marked crosswalks across Laidlaw Road and on Bethany Boulevard south of the stop to reduce crossing distances and create safe connections from the residential areas to the Bethany Village retail amenities.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located in Bethany Village Center, this stop is a low- to medium-ridership station serving both residents and businesses in Bethany town center. **Photo 1:** TriMet bus stop with shelter at Bethany Blvd and Laidlaw Rd. **Photo 2:** People on bicycles wait on the sidewalk and pedestrians wait at a wide ADA-accessible curb at the intersection of Bethany Blvd and Laidlaw Rd. **Photo 3:** A person riding a bicycle uses the sidewalk along Laidlaw Rd. **Photo 4:** No pedestrian crosswalk between residential developments near transit stops on Laidlaw Rd.

ADAIR/BASELINE AND 10TH AVE

POTENTIAL PROJECTS

- Add bicycle lanes on 10th Avenue to provide protected bicycle access to the neighborhoods north and south of the retail core.
- Add marked crosswalks across 10th Avenue, Baseline Street, and Adair Street to reduce crossing distances and create safe connections across major thoroughfares.
- Fill in sidewalk gaps on 4th Avenue, 19th Avenue, and 20th Avenue to provide north-south access into and out of the town center.
- Provide pedestrian control gates at railroad crossing locations to separate pedestrians from the tracks.

STATION AREA PHOTOGRAPHS

The photos below are representative of current conditions within the station area. Located in downtown Cornelius, this stop is a low- to medium-ridership station serving both residents and businesses in the heart of the community. **Photo 1:** TriMet bus stop with shelter along Adair St. **Photo 2:** Unmarked crosswalk along high-speed, high-volume Baseline St . **Photo 3:** Newly constructed ADA-accessible sidewalk and railroad crossing. **Photo 4:** Improved sidewalk abruptly ends and turns to gravel along roadway.

SITE VISITS

Site visits and visual evaluation of transit access barriers were conducted for each station area. Overall, many of the stops are not pleasant places to catch a bus. These transit stops, representative of conditions throughout Washington County, are frequently located along high-volume, high-speed roads with multiple travel lanes where crossings are few and far between. Many crossings near transit stops are unmarked and/or uncontrolled, where pedestrians and bicyclists must wait for drivers to stop or for a break in the flow of vehicles. At controlled and signalized crossings, active and able-bodied site surveyors frequently reached the other side of the crosswalk with less than 5 seconds left in the crossing phase. The crossing time would likely be too short for older or younger transit riders, or people with mobility impairments to safely cross. This was a common issue observed along roads with higher vehicle speeds. Bike lanes and facilities were available in a few locations, but it was rare to see any bicyclists using them. Most cyclists observed were seen using sidewalks, across most stations visited. Even within the most walkable and low-stress station area, Orenco MAX Station (Mobility hub), first- and last-mile connections seemed potentially challenging for people walking, rolling, or riding a bike due to higher vehicle speeds and fewer marked crosswalks just a few blocks away from the station. Most lighting observed was roadway lighting, and not pedestrian-scaled or focused on sidewalks or other pedestrian and bicycle facilities.

Many of the 10 station areas have private parking lots adjacent or within a block or two, and all observed were at less than 50% utilization in the late afternoon observation time (generally between 2-5pm, mid-August 2019). These lots could provide locations for pick-up and drop-off zones and space for micro-mobility services such as bike share and e-scooter share.

The site visits included a site assessment survey to rate the general site conditions in terms of safety and accessibility, with a total of 35 possible points for each category. Scores are listed below for each station.

SAFETY ASSESSMENT CRITERIA

- Adequate lighting
- Well maintained public realm
- Safety buffer for bikes
- Safety buffer for pedestrians
- People-friendly traffic speeds and maners
- Clear safety signage
- Overall, the station area feels safe

ACCESSIBILITY ASSESSMENT CRITERIA

- High quality sidewalks
- Clear, safe crossings
- Seamless transit mode transfer
- Operating and sufficient bicycle facilities
- High quality signage
- Parking and drop-off are streamlined
- Curbs and curb ramps are provided

Transit Station	Safety (out of 35)	Accessibility (out of 35)
Orenco MAX Station	25	19
Merlo & SW 158th Ave	21	21
Bethany Blvd and Laidlaw Rd	20	13
Barrows Rd and Horizon Blvd	20	15
Boones Ferry Rd and Nyberg/Seneca St	18	20
Adair/Baseline and 10th Ave	18	12
TV Hwy and Murray Blvd	17	15
Hillsboro Transit Center	14	17
Washington Square Transit Center	12	18
Pacific Hwy and 68th Pkwy	11	8

STATION, TYPOLOGY, & POTENTIAL STRATEGIES

Transit Station	Typology	Description	Potential Strategies
Merlo Rd/SW 158th Ave MAX Station	High-ridership station with limited biking and walking access	Ridership over 2,000 weekday boardings and alightings; Serves 2 transit lines; No park and ride facility	Infill bike and pedestrian network; Enhanced transit stop amenities; Pilot on-demand services including employer shuttles
Hillsboro Transit Center	High-ridership station with strong biking/walking access	Ridership over 3,750 weekday boardings and alightings; Serves 5 transit lines; Park and ride facility (60% utilization)	Infill bike and pedestrian network; Enhance pedestrian environment; Pilot on-demand services; Enhanced transit stop amenities
TV Highway and Murray Blvd	Suburban highway corridor	Ridership over 300 weekday boardings and alightings; Serves 2 transit lines; No park and ride facility; 24-hour service (Line 57)	Infill bike and pedestrian network; Enhance pedestrian crossings; Pilot on-demand services
Washington Square Transit Center	Commercial/retail served by transit (Major transit centers with limited biking and walking access)	Ridership over 2,200 weekday boardings and alightings; Serves 7 transit lines; Park and ride facility (25% utilization)	Infill bike and pedestrian network; Enhanced transit stop amenities; Expand service during peak periods; Pilot on-demand services
Boones Ferry Rd and Nyberg and Seneca St.	Town center	Ridership over 100 weekday boardings and alightings; Serves 2 transit lines; park and ride facility (68% utilization)	Infill bike and pedestrian network; Enhance connections to key destinations; Provide on-demand services to connect riders to high-frequency transit lines
Orenco MAX Station	Major transit centers with strong biking/walking access	Ridership over 2,700 weekday boardings and alightings; Serves 2 transit lines; Park and ride facility (54% utilization)	Infill bike and pedestrian network; Improve wayfinding; Pilot on-demand and micro-mobility services; Pilot ride-hailing services, shuttles and enhanced pick-up/drop-off zones
Pacific Hwy and 68th Pkwy	Suburban highway corridor	Ridership over 120 weekday boardings and alightings; Serves 1 transit line; No park and ride facility	Infill bike and pedestrian network; Pilot on-demand and micro-mobility services
Barrows Rd and Horizon Blvd	Residential area with future service improvements	No current transit service; Future service planned; No park and ride facility	Infill bike and pedestrian network; Consider shared neighborhood streets for low-stress bicycle access routes; Align timing of first and last mile strategies with Trimet service improvements; Pilot on-demand services now to existing nearby transit to build ridership demand
Bethany Blvd and Laidlaw Rd	Town center	Ridership over 120 weekday boardings and alightings; Serves 2 transit lines; No park and ride facility	Infill bike and pedestrian network; Provide on-demand services to connect to nearest high-frequency lines; Pilot subsidized ride hailing program; Improve connections to key destinations (PCC Rock Creek); Enhance station amenities
Adair/Baseline and 10th Ave	Town center	Ridership over 130 weekday boardings and alightings; Serves 1 transit line; 24-hour transit service (Line 57); No park and ride facility	Infill bike and pedestrian network; Pilot micro-mobility services and rural vanpools; Support placemaking and wayfinding

Appendix I
TM7: Evaluate FLM Projects and Programs

Technical Memorandum 7:
Evaluate First and Last Mile Projects and Programs

1.0 Project Goals & Evaluation Criteria

1.1 Introduction

This technical memorandum details the evaluation and application of the first mile and last mile strategies recommended for improving transit access across Washington County. Following a recap of the goals and evaluation criteria developed early in the planning process, the programs are described at length and include several regional and national examples.

1.2 Evaluation Criteria

Transit access investments and strategies should support the goals identified early in the planning process. The following evaluation criteria have been used to analyze and prioritize each potential investment based on how an investment strategy performs toward meeting each goal.

Evaluation criteria are designed as qualitative measures. Note: many of these evaluation criteria have been previously assessed in the network access analysis (TM #3) and market assessment (TM #4) phases. Data from this previous work will be used in the evaluation described here.

1.2.1 Access to Transit

Goal: People reach transit in a variety of ways including walking, biking, rolling, use of a mobility device, riding in a car, or driving to a park-and-ride facility. A goal of this plan is considering how people access transit through a variety of land use contexts — from urban town centers to suburban and rural areas within the county — and identifying opportunities for improving multimodal connections and transportation choices. Potential strategies for first and last mile access to transit will seek to address a person's trip to and from a transit stop or station and will consider factors such as their proximity to transit, the suitability of sidewalks or bike paths, park-and-ride capacity, connections to key destinations, and the level of transit service that is available.

Evaluation: The evaluation for access to transit assesses how each project and program option either facilitates access or reduces a barrier to transit use. This includes an assessment of the extent to which it provides direct, efficient, convenient, and reliable access to transit. Specific criteria include:

- Improving access to transit for all residents, including people who walk, use mobility devices, and bike.
- Increasing transit access to key community and employment destinations.
- Encouraging use of transit centers and multimodal hubs.

1.2.2 Safety and Security

Goal: Ensuring that connections to transit are safe and secure is essential to people's willingness to use transit. Safe and attractive facilities for walking, biking, and rolling to transit help increase ridership. This desire for safety extends to the transit system itself: preventing crime on board vehicles, while waiting at stops and stations, and while using park and ride facilities is crucial to an agency's ability to provide transit while ensuring that security measures are not overtly punitive or disparate in their impact on communities of color or other minority groups.

Evaluation: Criteria for safety and security evaluate each project and program's ability to provide safe and comfortable access to and from transit for all users. Specific criteria include:

- Supporting bike and ped safety and comfort
- Supporting physical improvements to minimize conflicts between modes
- Increasing access to transit for people living with disabilities

1.2.3 Health and Environment

Goal: Walking, biking, and transit offer health and environmental benefits by increasing physical activity and decreasing pollution from automobiles. Increased physical activity is associated with decreases in chronic diseases, such as heart disease, stroke, diabetes, and cancer. Cars and trucks contribute nearly one quarter of the nation's greenhouse gas (GHG) emissions and are a major source of airborne pollutants, including particulate matter, nitrous oxides, carbon monoxide, and volatile organic compounds. These are linked to cancer, asthma, and cardiovascular mortality. Pollution more severely impacts people living near busy roads, who are disproportionately low income and communities of color. Travelling by walking, biking, or transit, instead of driving, improves health outcomes by reducing airborne pollution. GHG emissions are further improved when transit uses low emission vehicles.

Evaluation: The evaluation for health and environment assesses the extent to which each project and program option reduces SOV mode share and GHG emissions, improves air quality, and increases physical activity. Specific criteria include:

- Reducing GHG emissions
- Reducing airborne pollutants
- Increasing transit mode share
- Promoting active travel modes

1.2.4 Economic Opportunity

Goal: Improving access to public transit can have benefits to the local and regional economy. Making transit a viable transportation option reduces the cost burden of transportation, supports new development, and allows people who do not have access to a vehicle the ability to the access employment opportunities, amenities, and services. Where transit goes, community grows, and this is especially true locally, as 60% of transit trips are for work, shopping, or recreation opportunities, according to TriMet.[1]

Evaluation: The criteria for economic opportunity evaluates each project and program option on its ability to improve transit access to jobs, education, and key centers. It also considers whether programs can facilitate efficient multimodal or combined trips. Specific criteria include:

- Increasing access to jobs and education
- Increasing transit access to key growth and economic centers
- Supporting public-private partnerships

[1] TriMet Delivers for Our Economy. https://trimet.org/business/

1.2.5 Equity

Goal: Equity in transit is not just about an equal distribution of services, it is about ensuring that transit is a viable transportation option for all people in Washington County regardless of age, race, income, English proficiency, and physical ability.

Evaluation: The evaluation for equity looks at the impact of each project and program option on low income communities, communities of color, older and younger populations, and people with disabilities. Specifically, it analyzes disproportionate impacts and the ability of specific programs to improve transit options and access for environmental justice communities. Specific criteria include:

- Increasing access to transit for affordable housing developments.
- Serving transit riders in equity communities as identified in the 2040 Regional Transportation Plan.
- Increasing affordable travel options for historically marginalized populations.
- Supporting trips for families and people traveling together.
- Supporting diversity in trip purposes.

1.2.6 Cost

Cost considerations were added by the Project Management Team (PMT) during evaluation discussions to capture the possible costs borne by individuals and the public sector in using and implementing the strategies.

Evaluation: These criteria evaluate the financial implications for each program, from an infrastructure, management, and user perspective. Specific criteria include:

- Capital costs to implement the service.
- Ongoing operating costs to implement the service.
- Costs for individuals to use the service.

2.0 Projects and Programs

2.1 **Access to Transit Projects**

The project team identified a total of 150 discrete infrastructure improvement projects within the walk- and bike-sheds of the 10 major station areas. Walk-sheds are defined as a half mile from the station area, a distance that a person can reasonably travel by walking or using a mobility device. Bike-sheds are

defined as a one-mile radius of the station area. These projects were identified to improve active access to transit stations by walking, rolling, and bicycling.

The full list of projects is included in an attachment, Draft Project List (PDF). The projects are also detailed geographically at: https://jacobs.maps.arcgis.com/apps/webappviewer/index.html?id=78aca3d7996540d1ba08d5889bdb34f7

Examples of the suggested infrastructure projects include:

- Bicycle facilities: *Add bicycle lanes on 10th Avenue in Cornelius to provide protected access to the neighborhoods north and south of the retail core.*
- Crosswalk improvements: *Add sidewalk access and crossing over railroad tracks at 192nd Avenue in Aloha.*
- Curb ramp improvements: *Add ADA ramps on sidewalks at 9th Avenue & Adair Street in Cornelius.*
- Intersection improvements: *Add marked crosswalk across Walnut Street in Hillsboro to create safe access to the grocery store.*
- Sidewalk improvements: *Fill in sidewalk gaps on 4th Avenue in Cornelius.*
- Wayfinding: *Add wayfinding information at the bus stop to help pedestrians and cyclists locate destinations and safe routes.*

2.2 Programs

2.2.1 Transportation Demand Management

Transportation demand management (TDM) describes any activity that provides an alternative to SOV trips. It encompasses a set of strategies that influence when, where, and how much people travel in order to make more efficient use of transportation infrastructure and services. These strategies encourage walking, bicycling, transit, carpool programs, and ride sharing. They can also promote flexible work schedules and telecommuting. Overall, TDM is a relatively low-cost way to improve mobility and expand access to alternative transportation options.

Examples

- Free or reduced cost public transportation passes for employees
- Preferential parking for carpooling vehicles
- Bike storage, showers, and secure locker rooms
- Subsidized employer shuttles

- Flexible schedules (e.g. compressed work weeks)
- Telecommuting
- Individual marketing programs (e.g. SmartTrips program)
- Multimodal challenges and competitions (e.g. Bike More challenge)
- Incentive programs

2.2.2 Bike Share and Scooter Share

Bike share and scooter share programs aim to provide convenient, affordable, on-demand access to micromobility for short-term use over short-to-medium distances. Micromobility refers to small, fully or partially human-powered vehicles such as bikes, e-bikes, and e-scooters.[2] Bike share and scooter share can help reduce traffic congestion, air pollution, and demand for vehicle parking. They can also enhance access to transit and facilitate first and last mile connections.

Bike share systems come in a few forms: (1) station-based systems, where users pick up and drop off bikes at kiosks that are typically located near transit stops and desirable destinations; (2) dockless systems, where bikes have an onboard global positioning system (GPS) and riders can park anywhere within a designated service area; (3) hybrid systems that combine docking stations with dockless options; and (4) internal, limited-access systems that employers, visitor destinations (e.g., hotels and resorts), and other organizations may provide for explicit use by their employees or patrons.

Several cities and counties have recently approved scooter share programs. These programs allow private companies to provide shared electric scooters (e-scooters) for short-term, app-based rentals. E-scooters use an electric power source and feature a floorboard for the rider to stand on and sometimes a seat to sit on. Like dockless bike share systems, scooter share allows users to end rides anywhere within a designated service area. However, local governments typically create rules for allowable parking areas and other elements of the program.

Examples

Station-Based Bike Share

- Capital Bikeshare (Washington, DC Metro Area)
- Bluebikes (Boston Metro Area)
- Citi Bike (New York City Metro Area)
- MoGo (Detroit, Michigan)

Dockless Bike Share

- JUMP (electric-assist bikes, multiple cities)

[2] "Guidelines for Regulating Shared Micromobility." NACTO (September 2019).

- Helbiz (electric-assist bikes, multiple cities)

Hybrid Bike Share

- BIKETOWN (Portland, Oregon)
- PeaceHealth Rides (Eugene, Oregon)
- Nice Ride Minnesota (Minneapolis Metro Area, proposed for 2020)

Employer/Campus-Based Bike Share

- Nike (Beaverton and Washington County)
- Google (Mountain View, California)

Scooter Share

- Portland (5 permitted private companies, a total of 2,800 scooters)
- Washington, DC (4 permitted private companies, up to 10,000 total scooters)

2.2.3 Car Share

Car share offers people a convenient way to make connections beyond the first and last mile of a public transit stop. Vehicles may be parked within a specified service area, at transit stations, or other locations, and people can find them by using a smartphone app. Users are typically charged according to a combination of time and distance traveled. Fees cover car insurance, parking, emergency roadside service, and other car-related expenses.

Car sharing companies operate under three different models:

1. Round-trip car share services where cars must be picked up from and returned to a designated parking space.
2. Free-floating services that allow cars to be returned to any parking spot within a service area, useful for one-way trips.
3. Peer-to-peer car share services that allow individual car owners to rent out their vehicles, usually for round-trips.

Examples

Round-Trip Car Share

- ZipCar (many cities)

Free-Floating Car Share

- Car2Go (many cities, but no longer in North America)

- GIG (Bay Area and Seattle)
- Free2Move (Washington, DC)

Peer-to-peer Car Share

- Getaround (many cities)
- Turo (many cities)

2.2.4 On-Demand Shuttles

On-demand shuttle services (often called demand-responsive services) use vehicles that carry between 5 and 15 passengers. Riders request service over the phone, online, or through a mobile app that directs them to gather at common locations along the service route for pick up. Some shuttle programs operate along fixed routes, while others may allow for deviated routes based on rider origins and destinations. There are four general types of on-demand programs: (1) many origins, many destinations; (2) many origins, one destination; (3) one origin, many destinations; and (4) one origin, one destination. On-demand service can be provided by transit providers or by private companies or non-profits that sometimes partner with public agencies.

Examples

Public Providers

- FlexRide (Regional Transportation District, Denver metro area)
- Ride On Flex (Montgomery County, Maryland)

Public-Private Partnership

- RTP Connect (GoTriangle, Raleigh metro area; Lyft and Uber)
- Shotl (many cities worldwide)

Private Providers

- Chariot (Ford Motor Company, no longer active)
- Ride Connection (Portland Metro Area)

Ride Connection operates five shuttles in Washington County using a deviated route service, which allows riders to schedule pick-ups and drop-offs within a half mile of shuttle routes. Ride Connection's shuttle routes are: GroveLink in Forest Grove, King City RideAbout, North Hillsboro Link, the Tualatin Shuttle, and westLink in Hillsboro, Banks, and North Plains.

2.2.5 Employer Shuttles

In places where workplaces are located further than a short walk from transit stations, including Washington County, large employers may provide shuttles connecting their campuses with transit. Shuttles provide service during morning and afternoon peak commute hours and are timed to connect with transit. These shuttles can be privately operated for the exclusive use of a single company's employees or can be jointly funded by a consortium of employers and coordinated through a local chamber of commerce, government agency, or a Transportation Management Association (TMA). Shuttles operated by TMAs or public agencies are usually open to members of the public and may serve shopping and service destinations as well as workplaces.

In Washington County, Intel and Nike provide employee shuttles that connect their campuses to MAX stations. Ride Connection provides several publicly accessible shuttles in Washington County.

Examples

- Nike employee shuttles (Washington County)
- Intel employee shuttles (Washington County)
- Shuttle Express (Seattle metro area, multiple employers)

2.2.6 Rural Van Share

Similar to carpooling, van sharing is a mid- to long-distance commute option for employees that work at the same location. It can typically accommodate 5 to 15 riders, and can be organized by individuals, employers, private mobility companies, non-profits, or public agencies. In a rural setting, van sharing is frequently used by farmworkers and employees who work at large, remote business parks without access to public transportation.

Examples

- Ride On Transportation (San Luis Obispo County, CA; non-profit)
- CalVans (California; public provider)
- King County Metro Vanpool (King County, WA; public provider)
- C-TRANS Vanpool (Clark County, WA; Portland, OR; public provider
- Enterprise Vanpool (Multiple areas; private company)

2.2.7 Mobility Hubs

Mobility hubs are centralized sites with amenities, activities, and programs that support multi-modal connectivity near transit stations. They provide services and supporting technologies to facilitate

seamless connections between transit, walking, biking, and shared mobility options. They are most effectively located near concentrations of shopping, employment, housing, and recreational sites. Mobility hubs can support newer technologies, such as electric vehicle and electric bike charging, real-time transit information, micromobility vehicle docking or parking areas, Wi-Fi, and parcel delivery lockers. They typically include placemaking features to increase aesthetic appeal and assist with wayfinding.

There are four general types of mobility hubs, all of which serve to support first and last mile connections: **(1) Branch hubs** are points of entry into high-frequency transit networks and are located outside of an urban region's core area; **(2) trunk hubs** are closer to a transit system's core area, served by multiple connecting routes, and can accommodate a variety of transportation options; **(3) destination hubs** can be either branch or trunk hubs, and are close to several desirable destinations; and **(4) local hubs** are a branch variety, serving areas without high concentrations of attractions or regionally significant destinations.

Examples

- San Francisco introduced community mobility hubs that provide solar electric vehicle car sharing, e-bikes, free transit passes, and other benefits to low income residents at three affordable housing sites.
- Toronto designed a series of mobility hubs as places to concentrate future population and job growth near high-frequency public transportation.
- Bremen, Germany, uses mobility hubs to provide car share vehicles, bike parking, and wayfinding near high-frequency public transportation. Bremen's car sharing program has led to a reduction of 4,200 privately owned cars across the city.[3]

3.0 Project Evaluation

3.1 Station Area Infrastructure Projects

A list of infrastructure improvements was developed for the 10 major transit stops to improve access for people walking, rolling, and bicycling to transit. These improvements were evaluated using a geographic network analysis to determine the relative impact of each improvement in expanding access for households and jobs in the area.

3.1.1 Geographic Project Analysis and Ranking

[3] "Build Your Own Mobility Hub: 7 Lessons for Cities from Bremen, Germany." Shared-Use Mobility Center, https://sharedusemobilitycenter.org/build-your-own-mobility-hub-7-lessons-for-cities-from-bremen-germany/

Over 340 individual infrastructure projects were identified during work for TM6 Station Area Evaluation as potential projects to improve access to transit within the 10 Major Station Areas. Using 20 detailed evaluation criteria, these projects were rated and ranked based on a geographic analysis of their effectiveness and viability to improve transit access for people walking, rolling and biking. Many criteria used a buffer count, while others (especially demographic considerations) were classified based on Census geographic data. For complete ranking, please see the Project Evaluation Summary workbook. (Attached TM7_Project_Evaluation_Summary_2020-0527.xlsx)

Access to transit

- Access to park and ride stations
- Access to shuttle stops
- Slope >4%
- Project closes gap in the bicycle network accessing transit
- Project closes gap in the pedestrian network accessing transit

Safety and security

- Number of bicycle fatal crashes
- Number of bicycle severe crashes
- Number of bicyles involved in crashes
- Number of pedestrian fatal crashes
- Number of pedestrian severe crashes
- Number of pedestrians involved in crashes

Health and environment

- Exposure to particulate matter (air quality)

Economic opportunity

- Total Jobs
- Essential Destinations

Equity

- Households No Automobile (Census B25044)
- Households Below 200% Poverty Level (Census C17002)
- Households Limited English Profeciency (Census B16002)

- Older Population 55yrs older
- Youth Population Under 29yrs
- People of Color (Minority)

4.0 Program Evaluation

4.1 Considerations, Evaluation and Station Best Fit

4.1.1 Transportation Demand Management

Advantages and Disadvantages

As growth in Washington County continues, travel demand in the area will also increase. TDM strategies can help accommodate this growth, shift individuals from SOV trips to other modes, improve local air quality, and public health outcomes. It is a flexible, partnership-based approach that can also leverage private sector participation. For example, the State of Oregon requires employers in the Portland region with more than 100 employees to have programs in place that reduce the percentage of people driving to work. To help implement and coordinate this work, TMAs such as the Westside Transportation Alliance (WTA) that serves Washington County are public-private partnerships that can assist employers in complying with these regulations and are advocates for activities that reduce auto demand. TDM can help encourage a range of options for different trip purposes and users, an overall effective way of increasing the attractiveness of public transportation.

As a standalone program, TDM may not address one of the biggest obstacles to public transportation ridership in suburban and rural environments: accessibility. TDM strategies may be most effective when combined with facility improvements to make walking and biking safer, more convenient, and more comfortable. There are also ongoing costs associated with staff time to deploy and manage the program.

Physical Space Requirements

TDM strategies encourage modes and travel options that may impact public spaces. Its focus on reducing vehicle miles travelled and shifting SOV trips to other modes can change use and prioritization of public spaces. TDM can lower demand for private motor vehicle parking but increase demand for bike and scooter parking. It may also lead to requirements for dedicated areas for carpool and vanpool pick up and drop off.

Connections with Emerging Technologies

TDM promotes modes and programs that utilize emerging technologies, like bike and scooter share, car share, and on-demand shuttle programs.

Station Recommendations

With a focus on employers and commute patterns, TDM strategies are particularly effective for station areas that have frequent transit service, provide a central hub for multiple transit options and are located close to employment centers. For Washington County, this includes: (1) high-ridership stops with limited walking and bicycling access; (2) high-ridership stops with strong walking access; and (3) town centers. TDM programs can take advantage of the relative predictability and frequency of service these nearby transit stops to help incentivize their employers to consider using transit on a regular basis. Illustrative station areas that can maximize TDM programs include:

- Merlo Rd/SW 158th Ave MAX Station
- Washington Square Transit Center
- Orenco MAX Station
- Hillsboro Transit Center
- Boones Ferry Rd and Nyberg/Seneca

In addition to sharing characteristics associated with service and proximity to employment areas, the stations listed above also have several other advantages for TDM programs. They all have adequate drop-off areas or park and ride capacity nearby, and they have high-quality station amenities to facilitate connections and provide wayfinding information.

4.1.2 Bike Share and Scooter Share

Advantages and Disadvantages

Bike share and scooter share enable flexible trip planning, reduce GHG emissions and local air pollution, and can make transit more time-competitive by facilitating faster first and last mile connections. They may be attractive to people who either prefer not to own a bicycle or micromobility vehicle, or have to transport one for the entirety of their journey. Since different systems can lead to somewhat distinct rider patterns, these programs can be customized to match a community's demographic profile, land use patterns, and geographic characteristics. Station-based systems, for example, can be especially attractive for trips with predictable time and location characteristics (e.g. commuting). Dockless systems, on the other hand, can help facilitate non-SOV trips to a wider variety of locations and trip purposes.

Launching and operating these programs introduces several administrative, management, equity, and safety challenges. First, establishing a clear regulatory environment with appropriate pricing and

incentive structures at the outset is important for micromobility programs to meet community needs and goals. Second, managing the programs to ensure they meet these goals requires staff and budget for the regulating agency. Finally, introducing many bikes and scooters in areas with wide roads, high-speed traffic, and missing or substandard active transportation facilities can create safety challenges. The success of shared micromobility programs can therefore depend on the roadway environment. These programs need to be implemented in locations with robust existing active transportation infrastructure. Regulatory fees may be helpful to facilitate infrastructure improvements for comfortable and safe riding environments when service areas are expanded.

Providing equitable access to historically marginalized communities can be challenging for bike and scooter share programs. They can be unaffordable for low income communities and out of reach for people without smartphones and credit cards. Programs also struggle to serve areas on the periphery of a city or region, often home to historically marginalized communities. The low densities of residents and destinations in peripheral areas make bike and scooter share less practical for people to use and more difficult to manage. Jurisdictions have addressed some of these challenges through regulations, including incentives and reduced fares for people with low incomes, defined geographic service areas, and more frequent rebalancing. Other equity considerations include fee structures and vehicle types, which favor single travelers and may be difficult to use with groups and people with physical limitations.

Physical Space Requirements

Impacts on physical space depend on the type of service. Docked bike and scooter share systems require space for docking stations. These are usually on or near sidewalks or in parking lanes. When placed in the parking lanes near crossings, they can improve visibility for people crossing the street. Dockless systems are more flexible but lead to other space impacts. Dockless users may leave scooters or bikes in undesirable locations that obstruct pedestrians. This is particularly troublesome for people with disabilities who require a clear path to travel. One solution to limit sidewalk impacts is to create marked, organized parking zones, similar to a docking station. Incentives encourage users to leave bikes or scooters in those zones. Private dockless companies can ask users to take a photo of the scooter or bike after ending the ride to confirm adherence to parking rules. Local governments can encourage companies to self-manage parking behavior by tying incentives to compliance.

Connections with Emerging Technologies

Bike share and scooter share programs often use emerging technologies, including smartphone user access and GPS positioning. These systems track travel data, which can be used to better understand route choices and user behavior. Most jurisdictions require private companies to share anonymized data, which gives local governments a great opportunity to implement evidence-based improvements to the transportation system. Moreover, these programs can feed into aggregation smartphone apps (like the Transit app) that can help users plan for a multimodal trip using a variety of options and connection points.

Station Recommendations

Although micromobility programs are typically deployed in urban areas, there are several examples of suburban communities piloting programs for e-scooters and dockless bicycles. As discussed, micromobility devices can help address several first and last mile challenges; however, these programs are most successful when several conditions are present. These include: (1) consistent and connected pedestrian and bicycling infrastructure; (2) clear and reasonably direct routes to and from transit stops that are not along high-speed roads; and (3) nearby amenities and employment centers. Town Centers and high-ridership station areas often possess these characteristics. Illustrative station areas that may be able to support micromobility programs include:

- Merlo Rd/SW 158th Ave MAX Station
- Hillsboro Transit Center
- TV Highway and Murray Blvd
- Boones Ferry Rd and Nyberg/Seneca St
- Orenco MAX Station
- Pacific Highway / 68th Parkway Station
- Barrows Rd and Horizon Blvd
- Bethany Blvd and Laidlaw Rd

4.1.3 Car Share

Advantages and Disadvantages

Car sharing can enable flexible trip planning and facilitate connections to public transportation. In dense urban environments with high numbers of car share vehicles, these programs can make it easier for residents to forgo private car ownership. Free-floating car share services can simplify first and last mile connections to transit that would otherwise be difficult. Overall, car share can reduce the need to own a car and add transportation flexibility.

There are several limiting factors as well. Driving requires a driver's license, which excludes some residents, particularly in low income and recent immigrant communities. These programs typically require an app to access vehicles, which can limit use to individuals that own smartphones. Moreover, car share can be expensive, although generally less than taxis or Transportation Network Companies (TNCs) such as Uber and Lyft. Round-trip services are impractical for connecting to transit because they require returning the car to the origin. From an environmental standpoint, using car share produces the same negative impacts as driving. Car share may be appealing for affluent residents and those that live in more central areas, and less appealing for low income communities and residents that travel outside the service area.

Physical Space Requirements

Car share programs have considerable public space impacts related to parking, and providers tend to use one of two approaches. Some, like Zipcar, work with local jurisdictions to create dedicated parking spaces for pick up and drop off, which can be on-street or off-street. Others, like Car2Go, allow users to end trips in any legal parking space, and obtain any relevant parking permits for each vehicle as needed. These impacts are more pronounced in areas with limited parking.

Connections with Emerging Technologies

Car share programs utilize smartphone apps to access vehicles or arrange trips. Like bike share and scooter share companies, car share providers collect travel data that local governments may use to understand transportation patterns. Car share companies also partner with aggregation apps (e.g. Transit App) to help individuals choose from a range of multimodal options in their area.

Station Recommendations

No car share systems Washington County offer free-floating service for one-way trips, which help to serve transit access. Services such as Zipcar, where the trip originates and ends at the same location, generally replace transit trips rather than augment service.

However, several station areas may be able to support car sharing programs in the future. Free-floating programs support transit access and ridership when:

- Car share vehicles are available within walking distance of residential or commercial areas.
- Transit stations have parking available for car share vehicles.
- Transit service is frequent and reliable enough to make transit a more appealing option than using car share for the entire trip.

Illustrative station areas that could support free floating car share programs include:

- Adair/Baseline
- Boones Ferry Rd and Nyberg/Seneca
- Orenco MAX
- TV Highway and Murray Boulevard
- Washington Square Transit Center

Washington County will continue to work with ODOT and other jurisdictions, plus the WTA, Westside Economic Alliance (WEA), and potential private sector partners in the region to encourage and support publicly accessible car sharing services that could serve each of the stations.

4.1.4 On-Demand Shuttles

Advantages and Disadvantages

On-demand shuttle services can fill transportation gaps where fixed-route transit does not operate. On-demand shuttles can be particularly important and useful for low income individuals, seniors, or people with disabilities, providing a lifeline to those who experience barriers to accessing other transportation options. Current on-demand shuttle service is not enough to meet existing demand or projected growth, and these programs can be an effective way to increase transit use, facilitate easier multimodal connections, and reduce overall vehicle miles traveled. Shuttle programs may be appealing to individuals that are not comfortable (or unable) to walk or bike to transit stops, and they typically provide critical service for elderly residents, people living with disabilities and residents in transit-inaccessible areas. Vehicle size can also facilitate family travel and can accommodate multiple destinations. Although shuttle programs may not be as cost- or energy-efficient as larger fixed-route buses, electrifying shuttle fleets significantly reduces local carbon emissions, particularly as battery technology improves and vehicle range increases.

Cost and management implications need to be weighed against benefits, since on-demand shuttles are typically not as cost-effective as fixed-route transit that prioritizes ridership over coverage. However, these programs serve an important equity goal, and the diversity of provider options can reduce the financial implications for local jurisdictions.

Physical Space Requirements

Beyond vehicle storage and maintenance facility requirements, physical space needs associated with on-demand shuttle programs are nominal. Some providers or jurisdictions may choose to create quasi-bus stops at designated pick up or drop off areas, but these shuttles typically do not require dedicated space within the public realm. However, jurisdictions may want to coordinate with shuttles to (1) ensure designated stops are in safe locations, and (2) shuttle drivers adhere to rules that prevent dangerous interactions with people walking and biking.

Connections with Emerging Technologies

Some on-demand shuttle programs can use similar routing technologies that TNCs such as Lyft and Uber employ, which optimize pick up, drop off, and route choice based on user locations and traffic conditions. This can make shuttles more appealing and time-competitive with other modes. These technologies can also incorporate public transportation schedules into routing choices, which can facilitate smoother connections and convenient trip-chaining. Moreover, improvements in battery-electric vehicle technology (and charging speeds) mean that shuttle providers can consider electrifying their fleets while maintaining high levels of service.

Station Recommendations

On-demand shuttle programs are suited for areas where fixed-route transit does not meet the existing demand of residents (either through lack of coverage or sub-optimal service). However, that's only one half of the equation. The other half is identifying areas with insufficient fixed-route transit that are also key shopping, retail, or commercial destinations. There are a few illustrative station areas that fit this description and could be candidates for shuttle service:

- Bethany Blvd and Laidlaw Rd
- Washington Square Transit Center
- TV Highway and Murray Blvd
- Barrows Rd and Horizon Blvd

4.1.5 Employer Shuttles

Advantages and Disadvantages

Employer shuttles can function effectively in campus or business park settings where many employees travel to a common destination. They can be an effective last mile solution for areas where public transportation is frequent and reliable, allowing employees to develop consistent commute patterns and feel comfortable with non-auto travel options. Moreover, they can be effectively paired with other TDM strategies — such as priced parking, parking cash-out, transit subsidies, bicycle user amenities, or internal incentives — to encourage commutes that link transit with shuttle services. Like on-demand shuttle programs, employer shuttle programs can take advantage of improvements in technology to electrify shuttle fleets and reduce emissions.

Physical Space Requirements

Like on-demand shuttles, employer shuttles require only a small amount of space. Since these programs typically carry employees from transit stops to office locations, local jurisdictions or transit providers may want to assign specific shuttle pick up locations to make them clear to riders and avoid potential friction with transit vehicles.

Connections with Emerging Technologies

There may be some opportunities for on-demand features and routing optimization for shuttle programs that do not operate along a fixed route and schedule. Automation also has several implications for on-demand shuttle services in the future. Although autonomous vehicle (AV) technology is not yet ready for deployment on a large scale, shuttle services may provide a viable platform to pilot AV technology, since the area of operation, routing, and number of AV vehicles can be more carefully managed. Some cities have experimented with AV shuttles in recent years, typically operating along a fixed route with limited stops.

Station Recommendations

Employer shuttles are an excellent way to increase transit access and ridership through convenient connections from a station to an employment site. They are ideally suited for suburban areas with: (1) large employers that are more than a mile from a high-frequency or high-capacity transit station; (2) a concentration of employers that have similar workforce profiles and commute patterns; and (3) employers with a large share of employees that commute from an urban area with good transit service. Illustrative stations that could support employer shuttles include:

- Washington Square Transit Center
- Orenco MAX Station
- Merlo Rd/SW 158th Ave MAX Station

4.1.6 Rural Van Share

Advantages and Disadvantages

Van sharing is an effective strategy for rural communities, especially for agricultural workers and others that share a common work site. Public transportation may not reach these rural areas while on-demand shuttle services may not be convenient, even if these areas are within their service area. Van sharing can be formal or informal, organized on regular schedules, and an excellent way to facilitate mid- to long-distance connections. Moreover, these services are often used by individuals who lack access to a private automobile, which makes van sharing an important strategy for promoting equity and transportation justice.

Since van sharing is typically used for longer trips to or from transit inaccessible environments, these programs may not promote active transportation access to existing public transportation stops.

Physical Space Requirements

These programs require space to store vans when not in use and facilities to maintain them. They also require spaces for pick up and drop off at transit stops or nearby.

Connections with Emerging Technologies

Formal van share programs — provided by public agencies or private companies — may incorporate smartphone-based reservations and routing optimization. However, informal van share programs — and those run by non-profits — may not rely on these technologies to access and organize trips. In some cases, technology may be a barrier for potential van share users, since they often serve low income populations that may not have smartphones or electronic banking access (which can be a requirement for some smartphone-based transportation services).

Station Recommendations

A great strategy for areas with agricultural workers and other employees that work in areas without transit access, rural van share can help provide affordable and convenient connections to existing transit service. Because it is particularly useful for those traveling from urban or suburban residential areas to more rural employment sites, rural van share is most effective when paired with transit stations with that are located toward the edge of the service area (and closer to rural areas). Illustrative station areas in Washington County include:

- Adair/Baseline and 10th Ave

4.1.7 Mobility Hubs

Advantages and Disadvantages

Mobility hubs can increase transportation options for all members of a community — residents, employees, and visitors. They can reduce traffic congestion (and associated air pollution), decrease dependence on private cars, and address equity goals by expanding access to a wide range of transportation services. Moreover, they can be an effective way to concentrate activity around existing transit routes and corridors, helping to increase use of the transit system without expanding service (though gains in ridership may be limited without associated increases in frequency and other service-related variables).

However, there are several financial implications. First, mobility hubs require initial investments in new infrastructure (e.g. vehicle charging stations and placemaking). Second, there will be ongoing maintenance requirements to ensure these hubs continue to provide high-quality amenities and services. Third, depending on the nature of the mobility hub, local jurisdictions may want to pay for specific programs to support residents, such as free or subsidized transit passes and discounted shared micromobility vehicles.

Physical Space Requirements

There are substantial physical space requirements for mobility hubs, since they combine several transportation options and services in a single area. However, in a suburban environment, there may be a variety of strategies to find enough space. For example, jurisdictions can identify underutilized surface parking lots near transit routes and explore partnerships with the property owner. Other options may include using space within the public right-of-way (perhaps across one or more blocks, near transit), partnering with business parks or large employer campuses to explore mobility hub options on site, or retrofitting other public spaces.

Connections with Emerging Technologies

Mobility hubs incorporate several emerging technologies to support alternative transportation options. They frequently provide charging stations for electric vehicles, seamless integration of payment options across different modes and services, real-time transit updates, and innovative wayfinding information for people walking and biking, complementary Wi-Fi to facilitate access to app-based services, geofence techniques for micromobility parking, and smart parking tools to manage demand with dynamic pricing. Some mobility hubs also offer pick up and drop off zones for Lyft, Uber, and other TNCs.

Station Recommendations

Since mobility hubs provide connections between modes , it is important that they are situated near transit stations with these characteristics: (1) more than one transit line, or more than one transit type; (2) connected pedestrian and bicycle facilities; (3) parking capacity that can be adapted for other purposes; and (4) amenities, commercial areas, or employment sites. Illustrative examples of stations that can support mobility hubs include:

- Orenco MAX Station
- Hillsboro Transit Center
- Washington Square Transit Center
- Pacific Highway / 68th Parkway Station
- Barrows Rd and Horizon Blvd
- Bethany Blvd and Laidlaw Rd

4.2 Evaluation Matrix Summary Table

	Mobility Hubs	Bike Share & Scooter Share	Car Share	On-Demand Shuttles	Employer Shuttles	Rural Van Share	Transportation Demand Mgmt
Transit Accessibility	●	●	○	◑	◑	◑	●
Safety and Security	●	○	○	○	○	◑	○
Health and Environment	◑	●	○	○	○	◑	●
Economic Opportunity	●	●	◑	●	●	●	●
Equity	◑	○	○	◑	◑	◑	◑
Cost	◑	●	◑	◑	◑	◑	◑

● Program scores highly

◑ Program scores moderately

○ Program scores low

5.0 Policy Considerations and Points of Leverage

5.1.1 Phasing and dependencies

Among the recommendations from community feedback received at the October 2019 community open house, participants strongly favored infrastructure investments that improve safe mobility for all people — including transit users and non-transit users alike. These include sidewalks, crossings, intersection, and bicycle facilities.

When considering implementation, some investments must be made first to enable others. Bike and scooter share programs benefit when there are extensive and high-quality bicycle and pedestrian facilities on which to ride and safe places to park that do not interfere with pedestrian traffic. Other strategies, such as shuttle services TDM measures can be deployed independently with little or no physical infrastructure needs.

	Initial Investments	*Enabled Investments*
Infrastructure projects to serve active modes	• Sidewalks • ADA upgrades (i.e. curb ramps) • Multiuse paths • Bike lanes, bike treatments for intersections • Intersections and crossing • Wayfinding • Lighting • ADA accessible transit stop loading areas	• Mobility hubs • Bike share • Scooter share
Infrastructure projects to serve vehicles	• Curb space for drop off zones • Dedicated parking spaces (owned or leased)	• Car share • Park & Ride

5.1.2 Families and People with Mobility Challenges

Many new mobility tools are best suited for adult individuals traveling alone. To address needs of families with children, it will be important to maintain and expand programs, services, and strategies that can accommodate groups of people traveling together, especially those that work well for parents with small children and people with disabilities. These types of supportive mobility strategies can include traditional park and ride facilities, on-demand shuttles, and TNC partnerships. Where possible, these programs should be structured to include vehicles that can accommodate mobility devices, strollers, and child seats.

5.1.3 Private Sector Services

Implementing many programs and services will require partnership and coordination with private sector service providers. In entering these partnerships, it is important to acknowledge both the shared interests and where interests diverge between the County and private partners. The County should outline public priorities and create contracts or agreements that include thoughtful and specific requirements to ensure those priorities are supported. Private sector partnerships can offer access to new mobility services that might not otherwise be feasible for the public sector. Important equity considerations include:

- Geographic service area
- Low income fares
- Access for those without mobile phones
- ADA access
- Labor practices and safety

5.1.4 TriMet and Ride Connection

TriMet and Ride Connection provide the backbone transit services that Washington County residents and employees rely on for getting where they need to go. Service improvements for speed and reliability, transfer timing, and station design and amenities can improve access and utility for residents throughout the County. Both organizations continue to improve customer experience and transit service fundamentals. In working with TriMet, Washington County can:

- Coordinate station improvements to incorporate space for TNCs and shared vehicle use, such as parking spaces or curb space for mode transfers
- Coordinate with Ride Connection to expand shuttle service to residential neighborhoods, employment areas and important community destinations that are beyond the reach of existing fixed-route transit and shuttle service

- Coordinate with TriMet to make station area improvements, including ADA access improvements, sidewalk and crosswalk investments, and other amenities such as shelters, lighting, and real-time arrival signs.

5.1.5 Major Employers

Washington County, along with TriMet and Ride Connection, can work with major employers looking to relocate to identify routes most used by their employees and customers and, where needed, identify opportunities for shuttle services that connect to the transit network. The site selection process should be coordinated with transit providers to coordinate service hours with business operating hours, especially for shift workers.