TOOLE DESIGN

319 SW WASHINGTON STREET
SUITE 420
PORTLAND, OR 97204

503.205.4607
TOOLEDESIGN.COM

MEMORANDUM

October 29, 2021

To: Susan Shanks and Dave Roth
Organization: City of Tigard
From: Jess Zdeb, AICP and Gwen Shaw, EIT
Project: Tigard WSRC Update

Re: SW Greenburg Road Existing Conditions and Recommendations

---

This memorandum will document the existing conditions and recommendations for SW Greenburg Road within the City of Tigard from SW Hall Boulevard to the Highway 217 interchange. The purpose of this work is to identify opportunities and constraints to possible future changes of the roadway as part of the ongoing Washington Square Regional Center update.

This memorandum includes the following:

- Existing Conditions
  - Overview
  - Modal Summaries
    - People Walking
    - People Bicycling
    - People Taking Transit
    - People Driving
- Analysis and Recommendations
  - Overview
  - Segment Analysis
    - Segment A – Highway 217 to Washington Square Road (south)
    - Segment B – Washington Square Road (south) to Locust Street
    - Segment C – Locust Street to Washington Square Road (north)
    - Segment D – Washington Square Road (north) to Summit Drive
    - Segment E – Summit Drive to Hall
  - Crossings Analysis
    - SW Locust Street
    - SW Lehman Street
    - SW Washington Square Road (north)
    - SW Summit Drive
    - Recommended Priority Crossing

Existing Conditions

Overview

The segment of SW Greenburg Road under study, from SW Hall Boulevard to the Highway 217 interchange, is located in the City of Tigard but is under the jurisdiction of Washington County. It is classified as an arterial in the County Transportation System Plan. See Table 1 for additional modal classification information and Figure 1 for study area extents. It should be noted that the design standards presented in Table 1 would not apply if the roadway were transferred to City of Tigard jurisdiction as is discussed in the Recommendations section of this memo.

At the northern end of the study area, SW Greenburg Road ends and continues as SW Oleson Road north of SW Hall Boulevard. This intersection is the boundary between City of Tigard to the south, City of Beaverton to the west/northwest, and unincorporated Washington County to the east/northeast.

At the southern end of the study area SW Greenburg Road continues across Highway 217 and eventually terminates at the intersection with SW Pacific Highway (99W). Jurisdiction for SW Greenburg Road transfers to the City of Tigard south of the 217 interchange.

There are four signalized intersections, five unsignalized intersections, and several medium to large driveways and auxiliary/turn lanes within the study area. Three of the four signalized intersections are located in the southern end starting with Highway 217 interchange at the very south, 610 feet north to SW Washington Square Road, and 360 feet north to SW Locust Street. The next signal is located 2,320 feet (0.44 miles) north at Hall Boulevard. The posted speed limit is 35 miles per hour.

For the purposes of this study, the corridor has been broken up into five segments, as shown in Figure 1. Figure 2 summarizes additional bicycle and pedestrian facility considerations.

Figure 1. Study Area and Existing Conditions Summary

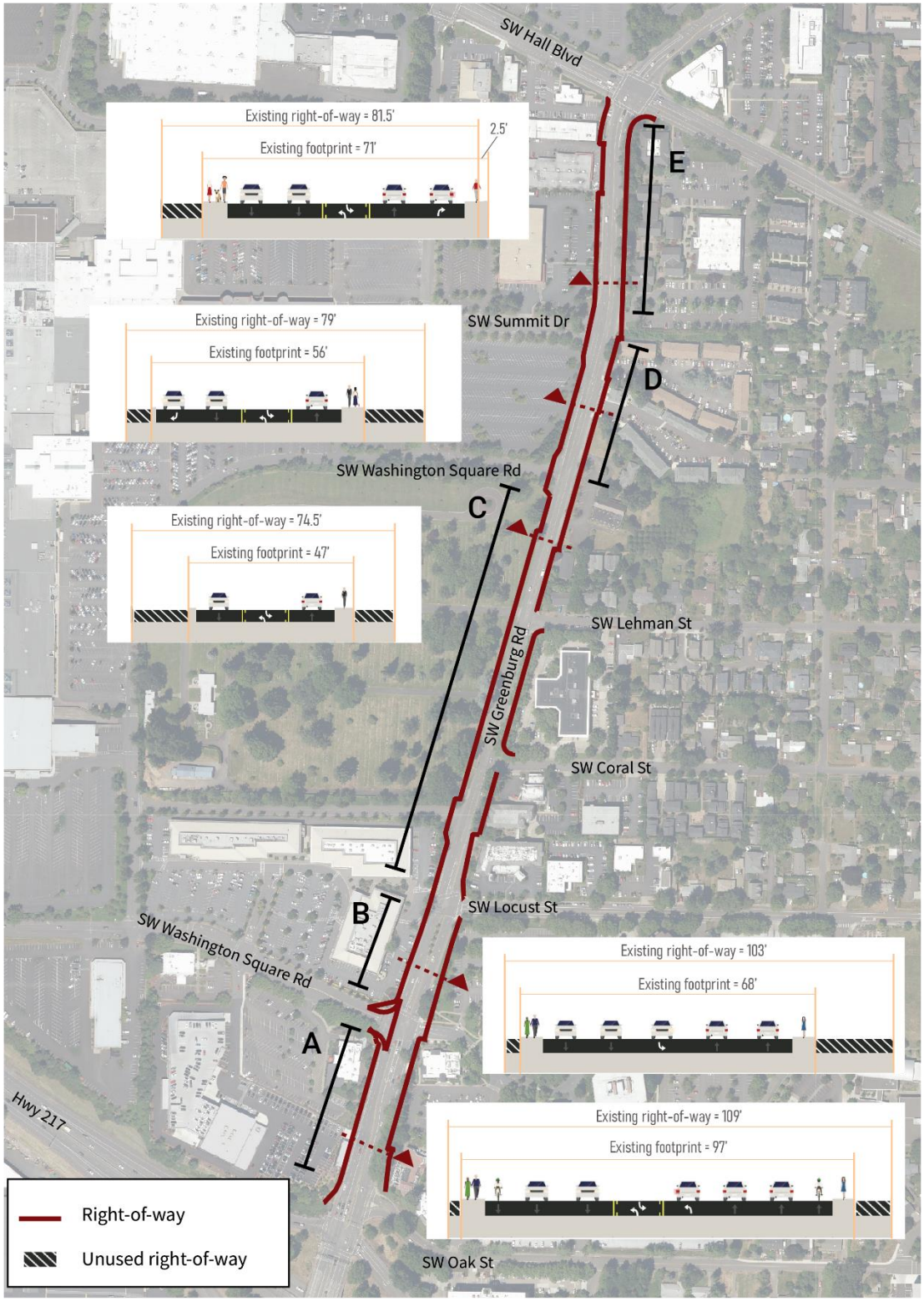


Figure 2. Existing Bike Lane and Sidewalk Gaps

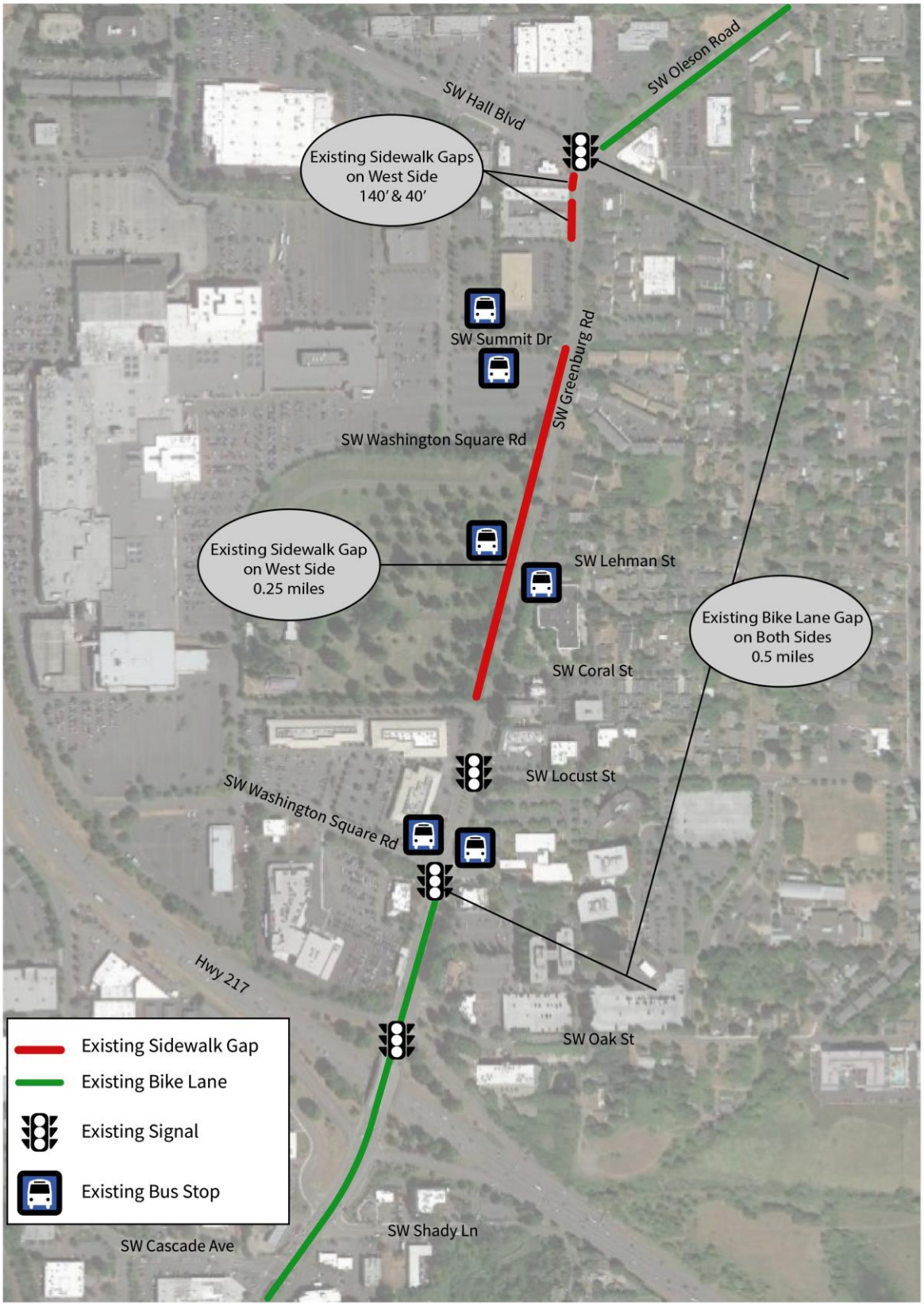


Table 1. Functional Classification Descriptions and Existing Conditions

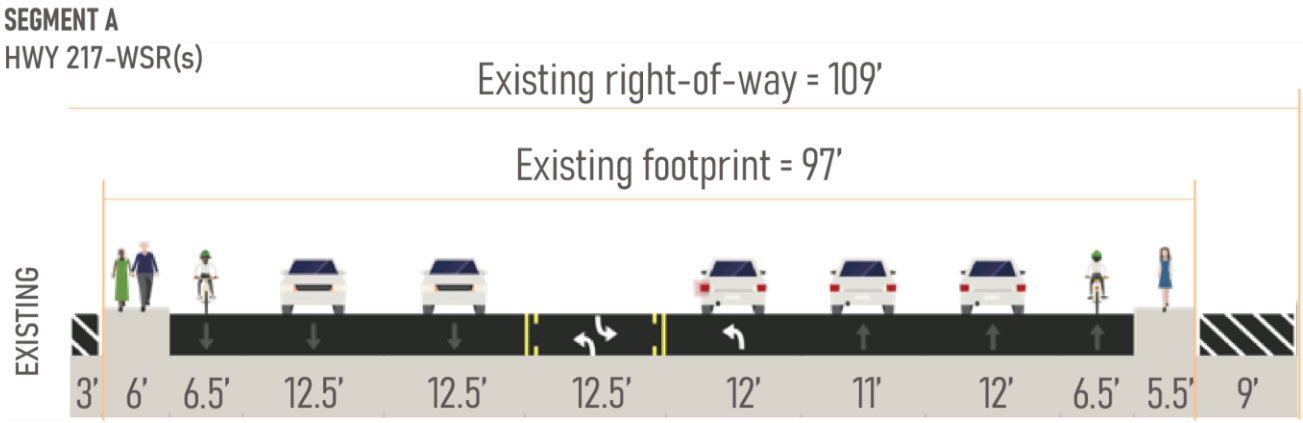
Mode: Classification	Functional Classification Descriptions	Existing Conditions
Roadway System: Arterial in Town Center*	• Designed for 30 mph • 6.5-foot bike lanes separated from traffic • 8-foot sidewalks, with additional buffer for light poles, furnishings, landscaping, etc. • 11-foot vehicle lanes • 13-foot median • Option for on-street parking	• Posted for 35 mph • 6-foot bike lanes & no bike lanes • 5- to 6-foot sidewalks & no sidewalks • 12- to 14-foot vehicle lanes • 13- to 14-foot median • No on-street parking
Bicycle System: Major Street Bikeway	• All arterials in urban areas are considered Major Street Bikeways • 6-foot minimum bike lane or buffered bike lane	• No bike lanes for most of corridor
Pedestrian System: Pedestrian Parkway with Street Scape Overlay	• A Pedestrian Parkway is an arterial that has potential for significant pedestrian activity • Enhanced pedestrian facilities and crossing opportunities are encouraged and the design should be context-sensitive to the adjacent land uses • A Streetscape Overlay is a segment of roadway where enhanced pedestrian features, expanded facility dimensions and other placemaking amenities are encouraged "to facilitate a comfortable and attractive walking environment and to leverage community and economic development"	• 5- to 6-foot curb-tight sidewalks with ¼-mile gap on west side of corridor • If trees present, located at edge or outside of right-of-way; not placed between pedestrians and motor vehicle traffic

*Washington County is actively updating its Road Design and Construction Standards at the time of this memorandum. "Arterial in a Town Center, Main Street or Station Area" is the new proposed classification applicable to this segment of SW Greenburg Rd given its location in a Regional Center.

Source: Washington County TSP User's Guide and Complete Streets Design Update Online Open House

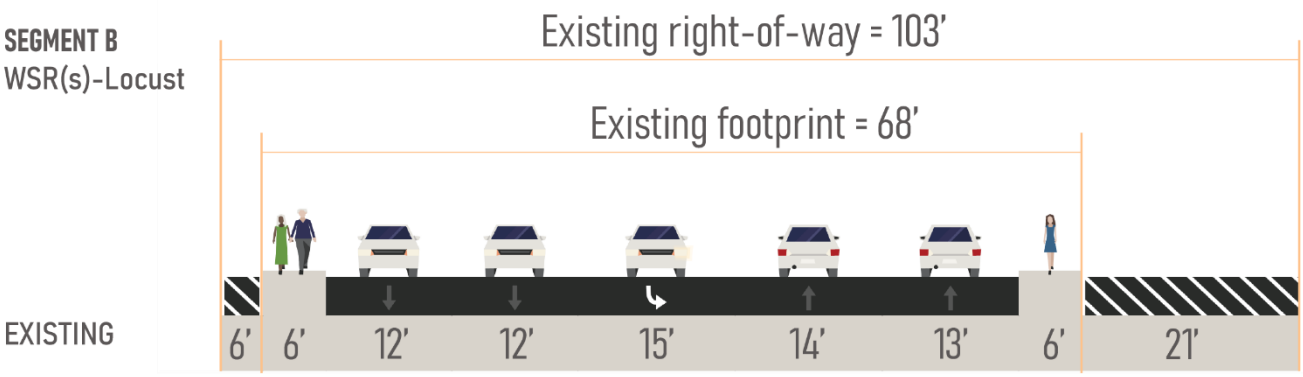
Segment A: Between Highway 217 and SW Washington Square Road (south), SW Greenburg Road has two through lanes in each direction and provides dual left turn lanes (380 feet and 180 feet, respectively) turning onto SW Washington Square Road. In the southbound direction, a captive storage lane is provided for the eventual left turn onto Highway 217 south of the study area. Sidewalks are present on both sides of the street. Standard curbside bike lanes are provided in both directions and end at SW Washington Square Road.

Figure 3. Existing Conditions for Segment A



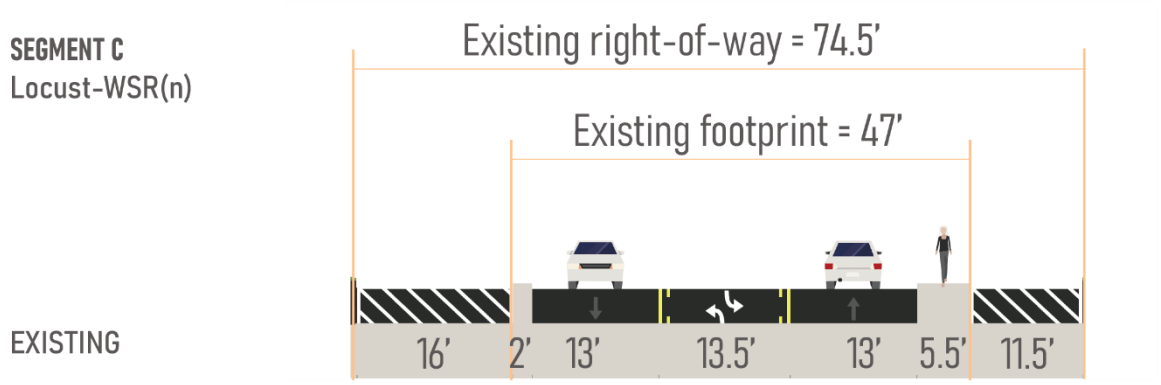
Segment B: Between Washington Square Road (south) and SW Locust Street, SW Greenburg Road has two through lanes in each direction and approximately 300 feet north of SW Locust Street, transitions to one through lane in each direction. In the northbound direction, left turns at Locust into the shopping center are prohibited, and right turns are made from the wide outside travel lane. In the southbound direction, left turn lanes are provided onto SW Locust Street and SW Washington Square Road (both 100 feet); and a 60-foot right turn pocket is provided at SW Locust Street to access the shopping center. Sidewalks are present on both sides of the street. There are no bike lanes in this segment.

Figure 4. Existing Conditions for Segment B



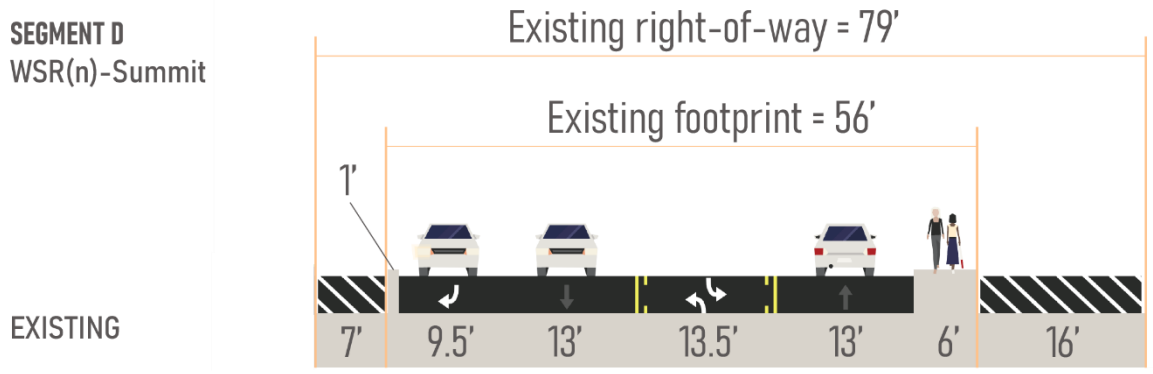
Segment C: Between SW Locust Street and SW Washington Square Road (north), there is a single lane in each direction and a two-way center turn lane. There is a sidewalk on the east side of the street. The west side of the street is directly adjacent to the Crescent Grove Cemetery. Along the length of the cemetery, there is no sidewalk and the gap continues into Segment D, creating a total sidewalk gap of 0.25 miles. There are no bike lanes in this segment.

Figure 5. Existing Conditions for Segment C



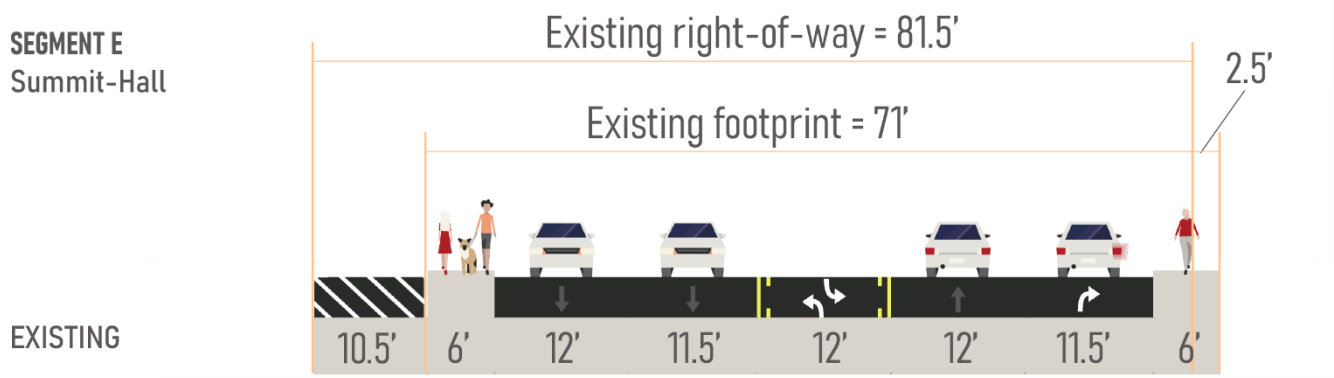
Segment D: Between SW Washington Square Road (north) and SW Summit Drive, an additional southbound lane is present which serves as a right turn lane. There is a sidewalk on the east side of the street and no sidewalk on the west side; this is part of the 0.25 mile gap noted in Segment C above. There are no bike lanes in this segment.

Figure 6. Existing Conditions for Segment D



Segment E: Between Summit Drive and SW Hall Boulevard an additional northbound lane is present. The two-way center turn lane transitions to a northbound left turn onto SW Hall Boulevard, and the outside lane serves as the right turn lane. One northbound through lane continues north as SW Oleson Road. There is sidewalk on both sides of the street. There are no bike lanes in this segment.

Figure 7. Existing Conditions for Segment E



Modal Summaries

The following sections provide summaries of the existing conditions for the various modes people use to travel SW Greenburg Road.

People Walking

The land uses along SW Greenburg Road provide several origins and destinations for people walking or rolling. The east side of the road includes office buildings at the south and residential at the north. The west side of the road includes restaurants with parking and mall access behind them at the south, a cemetery in the center, and parking and mall/retail access at the north.

Sidewalk Presence and Conditions

As described in the overview, there is a continuous sidewalk on the east side of the roadway for the entire length of the study area and beyond both to north and the south. On the west side, there is a sidewalk south of the study area and north to 250 feet north of SW Locust Street. There is no sidewalk along the cemetery or the block between SW Washington Square Road and Summit Drive. Sidewalk is present from Summit Drive north to SW Hall Boulevard.

The conditions of the sidewalk on the east side is fair. It is five feet in width with several asphalt patches and some raised seams. The sidewalk is directly adjacent to the northbound travel lane with one exception along frontage at the multifamily residential development at 9510 SW Greenburg Road which features an eight-foot sidewalk and three-foot planter strip. Diagonal curb ramps are provided at each intersection, with tactile domes being present at 40%. See Figure 8 and Figure 9 for photos and detailed captions.

The conditions of the sidewalk on the west side is fair and similar to those of the east side sidewalk. Diagonal curb ramps are provided at each intersection that has sidewalk on both sides, with tactile domes being present at 10%. See Figure 8 and Figure 9 for photos and detailed captions.

Crossing Opportunities & Network Connectivity

Crossing opportunities are legally present at each of the nine intersections within the study area, however only four provide a marked crosswalk either across or along SW Greenburg Road, each being at the signalized intersections. At the three southern signalized intersections, only one leg across SW Greenburg Road is marked and signalized, restricting crossings at the opposite leg. This requires pedestrians to potentially need to cross three legs of an intersection to reach their destination. All marked crosswalks along the corridor are marked with standard transverse markings.

There is a large gap with no signalized crossing opportunity, 2,320 feet (0.44 miles), between SW Locust Street and SW Hall Boulevard. This segment contains a bus stop in each direction at SW Lehman Street as well as a primary mall access point at Summit Drive.

The sidewalk network nearby the SW Greenburg Road corridor is documented in more depth in the Infrastructure Analysis done as part of the Washington Square Regional Center plan update.

Barriers

The relatively narrow width of the existing sidewalk and the lack of furnishing zone between people walking and adjacent 35 mph traffic creates pedestrian discomfort and may limit the number of people walking. For users in wheeled mobility devices, the sidewalk may present accessibility issues at the transitions between concrete and asphalt (see Figure 8). The gap in sidewalk on the west side is compounded by the lack of crossing opportunities at the locations where the sidewalk ends, reducing the effectiveness of the sidewalk that is present. Additionally, not having a sidewalk or a crosswalk to the bus stop on the west side at SW Lehman Street renders the stop unusable to some users.

In general, there are few crossing opportunities for a large portion of the corridor, despite the presence of destinations on both sides of the street. This may also limit the number of people able and/or willing to walk along the corridor since accessing destinations may require crossing the street at locations without pedestrian enhancements, or walking excess length to a signalized crossing opportunity, which may not be feasible or desirable.

At intersections, the diagonal curb ramp directs users very close to the adjacent travel lane due to the lack of furnishing zone in the sidewalk and the large corner radii present at the majority of intersections Additionally, the large corner radii encourage high speeds for motorists turning on and off the roadway.

Driveways present similar issues to intersections; some are designed with large curb radii acting more like an intersection, but the majority are designed so that the sidewalk ramps down to serve as the driveway apron. Nearly all of these driveways are nearing or above the ADA maximum cross slope of 2 percent, and there are several driveway curb cuts in the sidewalk that don’t actually connect to a driveway/business.

Figure 8. Existing Sidewalk Conditions for People Walking and Rolling

Conditions on the west side of the road, south of SW Hall Boulevard.
(photo faces south)

Segment where the sidewalk technically ends and the walking path continues along the curb and into the surface parking lot, with two large driveways serving the site.
(photo faces north)

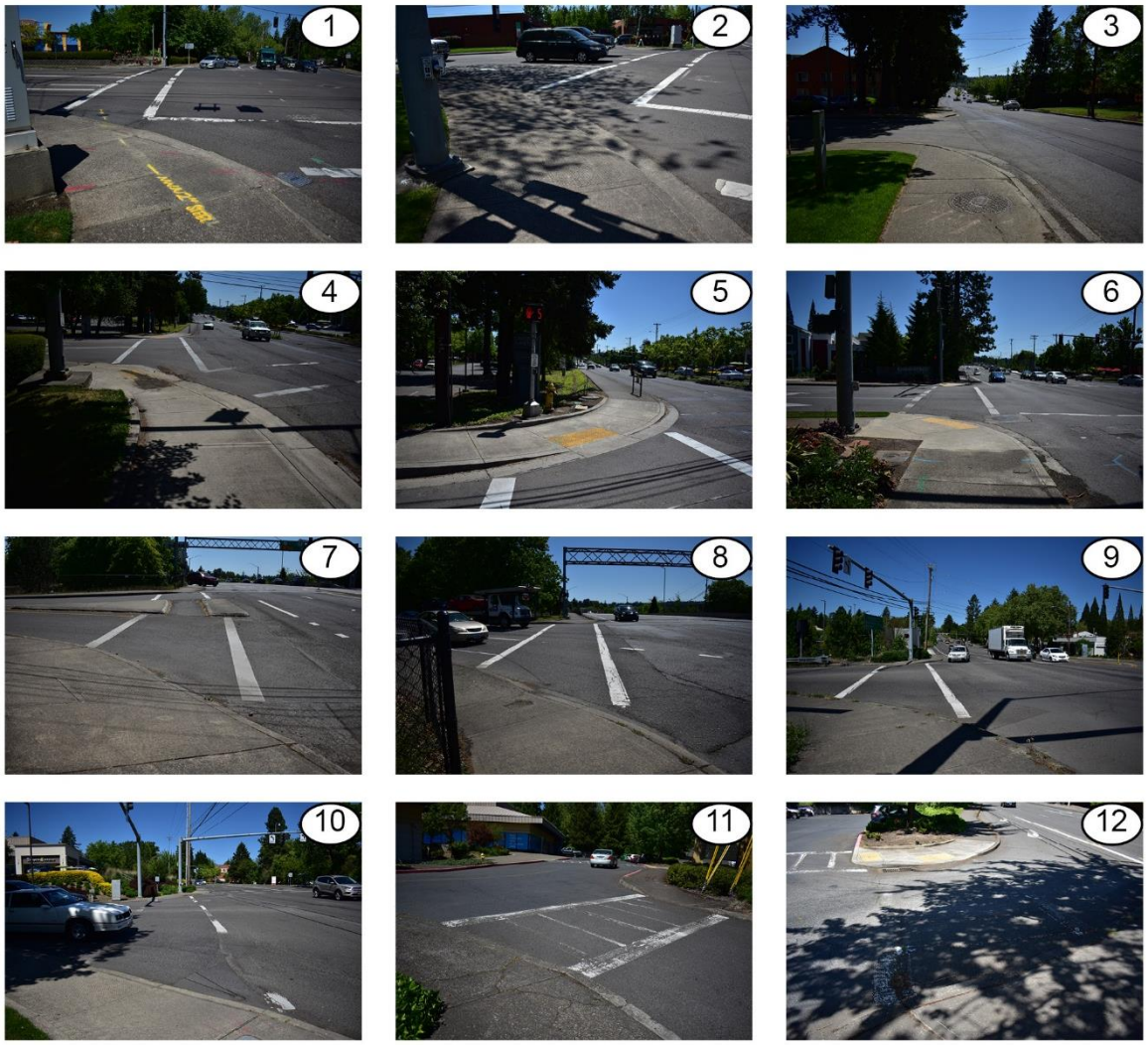
The driveway entrance just south of SW Hall Boulevard has a gap in the sidewalk and a splitter island defines direction of traffic for motorists.
(photo faces north)

Three different asphalt patches, and #5 also shows a raised sidewalk panel.
(photos all face south)

A common situation where a driveway is present in the sidewalk, but does not lead to anything. This situation occurs several times.
(photo faces south)

Two locations where relatively new development has built out an updated sidewalk. In both scenarios, the sidewalk has a tree-lined furnishing zone separating the walkway from motor vehicle traffic in the road. In #8, the sidewalk is set-back from the road and space is provided for parking or other curbside uses that operate outside of the travel lanes.
(photos face south (#8) and north (#9))

Figure 9. Existing Curb Ramp Conditions for People Walking and Rolling



Photos highlighting the wide range of curb ramp conditions along the SW Greenburg Road corridor.
(top row, left to right: photos face north, west, and south, respectively;
2nd row, left to right: all photos face south;
3rd row, left to right: photos face south, south, and north, respectively;
bottom row, left to right: all photos face north)

People Bicycling

As described in the overview, there is only a short segment of the study area that has bike lanes. However, there is likely demand for bicycling trips between the retail, dining, and services on and west of the corridor and the residential neighborhood to the east.

Bike Lane Presence and Conditions

Bike lanes are present on SW Greenburg Road south of SW Washington Square Road (south). When present, they are standard five-foot striped lanes adjacent to the curb. Bike lane markings do not carry through the intersection with Highway 217 access ramps to indicate bicyclists' presence to turning drivers.

See Figure 10 for photos and detailed descriptions. In the remainder of the segments, people on bikes can choose between riding on the sidewalk on the east side of the road or riding in the wide curbside travel lanes, see photo 2 in Figure 10.

Crossing Opportunities & Network Connectivity

Similar to the crossing opportunities for pedestrians, people on bikes have legal crossing opportunities at each of the intersections in the corridor and only the signalized intersections provide marked and controlled locations. Bicyclists can dismount and walk bikes or ride bikes slowly in the provided crosswalks.

Bike lanes are present both south and north of the study area, with the segment in this study area creating a gap in the route. Additionally, bike lanes are present on SW Locust Street and SW Hall Boulevard, intersecting with SW Greenburg Road.

The bicycle network nearby SW Greenburg Road corridor is documented in more depth in the Infrastructure Analysis done as part of the Washington Square Regional Center plan update.

Barriers

The lack of continuous bike lanes and the few crossing opportunities present the largest barrier to people riding bikes along the SW Greenburg Road corridor. The large corner radii encourage high motorist turning speeds, increasing the severity of a potential conflict. Based on standard best practice for assessing bicycle facilities, the existing bike lanes would be classified as "high-stress" due to their lack of physical separation from 35-mph traffic at volumes exceeding 15,000 vehicles per day. This condition leads to only a small segment of the population truly feeling comfortable enough to bike along SW Greenburg Road. Many people biking may choose to do so on the sidewalk, so conditions described in the previous section also impact them. Given the narrow width of the sidewalk, use by both modes creates potential congestion and conflicts for people walking and rolling.

If bike lanes were to be installed along additional portions of SW Greenburg Road, designers should consider the presence of a one-foot gutter pan and drainage grates. Seams between gutter pans and asphalt can decrease the functional width of the bike lane, and grates with larger holes parallel to the direction of travel can present a hazard to people biking catching their wheels.

Figure 10. Conditions for People Bicycling

Drainage grates located in bike lane collecting debris.
(photo faces north)

Person riding bicycle southbound on east side sidewalk.
(photo faces south)

Debri in bike lane and multiple abandoned driveways (right) in sidewalk, compounding the debri issues. (photos face north)

Sidewalk and northbound bike lane on SW Greenburg Road on the overpass of Highway 217.
(photo faces south)

Motorist turning onto SW Oak Street from SW Greenburg Road, crossing the bike lane. Large corner radii facilitates high speeds.
(photo faces north)

People Taking Transit

An overview of transit in the area surrounding SW Greenburg Road and the general Washington Square Regional Center is provided in more depth in the Infrastructure Analysis done as part of the Washington Square Regional Center plan update.

Route Overview

TriMet Bus Line 76 uses SW Greenburg Road from the southern end of the study area north to Summit Drive. This is a Frequent Service line and the only line that uses this segment of SW Greenburg Road. Line 76 uses Summit Drive to access the Transit Center located within the mall parking lot. This serves as a transfer point to several other lines:

- 43 – Taylors Ferry Rd
- 45 – Garden Home
- 56 – Scholls Ferry Rd
- 62 – Murray Blvd
- 78 – Denney/Kerr Pkwy

Northbound buses make a left turn into Summit Drive from the two-way center turn lane on SW Greenburg Road. This movement is unsignalized which may impact the operations during peak travel hours. There is a right-turn lane on Summit Drive approaching SW Greenburg Road and there is a separate lane for the bus to turn into before merging into the through lane to continue south.

Bus Stop Overview

There are four bus stops along SW Greenburg Road in the study area, as well as a pair of bus stops on Summit Drive, approximately 300 feet from SW Greenburg Road. Bus stop pairs on SW Greenburg Road are located on either side of the street at SW Washington Square Road (south) and SW Lehman Street. With the exception of the northbound stop at SW Washington Square Road (south), all bus stops are marked with a sign and no additional furniture or amenities. The northbound SW Washington Square Road (south) stop provides two shelters with seating. The southbound SW Lehman Street stop at the cemetery does not provide any ADA landing pad or sidewalk access.

See Figure 11 for a TriMet System map of the west side and Figure 12 for additional field photos and detailed captions.

Figure 11. TriMet System Map; west of Downtown Portland

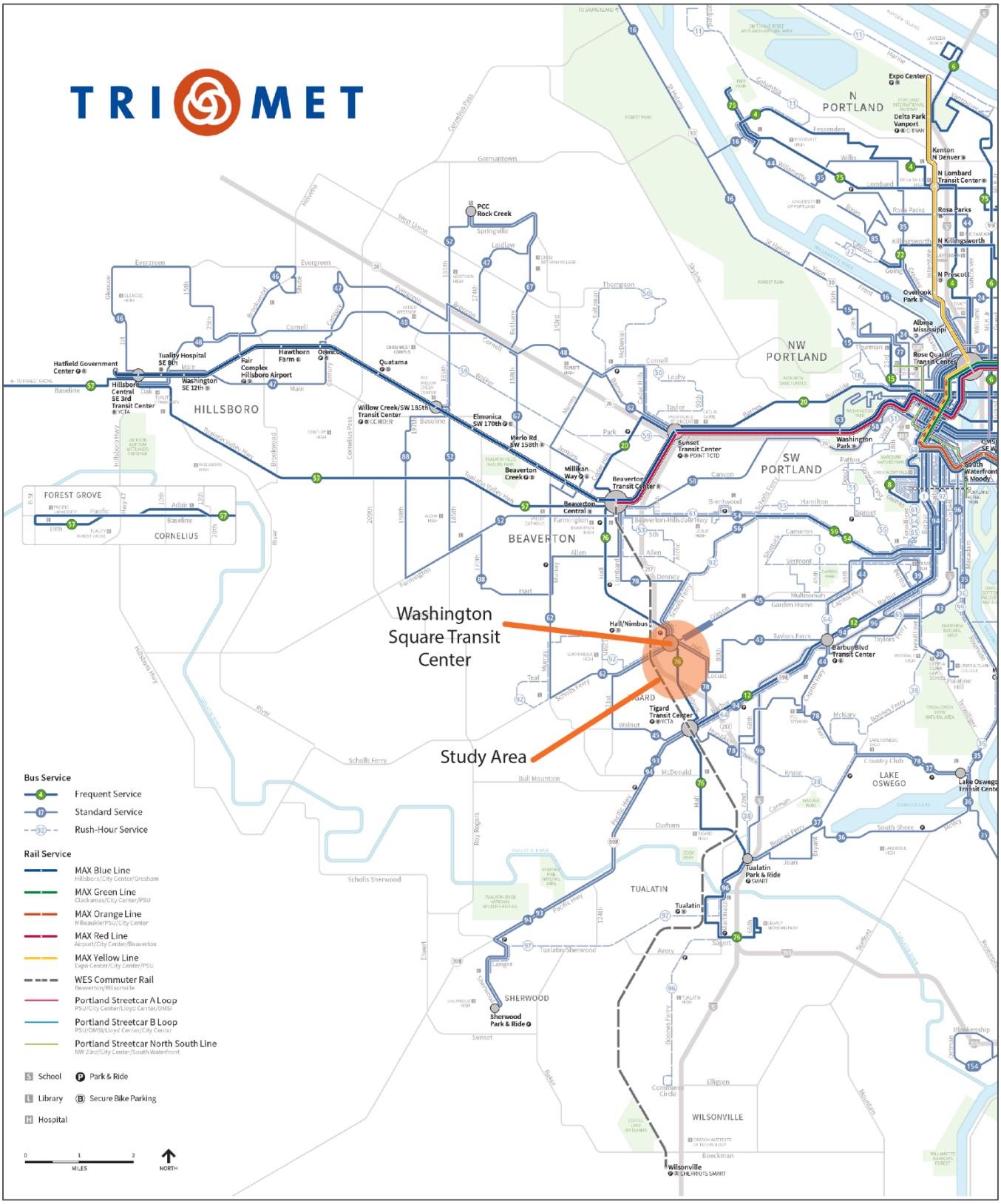


Figure 12. Existing Conditions for People Taking Transit

North/westbound bus stop on Summit Drive. Accessible by sidewalk in both directions.
(photo faces west)

South/eastbound bus stop on Summit Drive. Not accessible by sidewalk in either direction; clear walkway in grass near parking lot (construction fence at edge of parking lot in photo).
(photo faces west)

Bus stops on SW Greenburg Road at SW Lehman Street. Northbound (left) stop is accessible by sidewalk in both sides. Southbound (right) stop is not accessible by sidewalk in either direction.
(photo faces south)

Bus stops on SW Greenburg Road at SW Washington Square Road (south). Northbound (left) stop has an additional paved waiting area behind the sidewalk. Both stops are accessible by sidewalk in both directions.
(photo faces south)

People Driving

People driving make up the majority of those traveling on SW Greenburg Road in the study area.

Origin & Destination Overview

As discussed throughout the previous sections, there are several land uses on both sides of the corridor that serve as regional destinations (e.g., Washington Square Mall) and local origins (e.g., residential neighborhood) and serve as trip generators. There are several large surface lots and garages to accommodate vehicle parking on both sides of SW Greenburg Road and it appears that most commercial businesses have their own or shared spaces available to staff and guests.

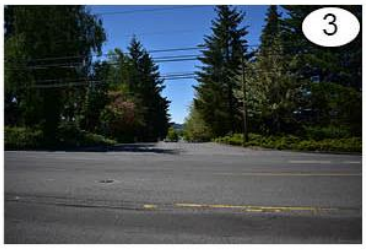
Roadway Characteristics

SW Greenburg Road features several characteristics that cater primarily to motor vehicles, such as large curb radii and wide travel lanes. Dedicated turn lanes are provided throughout the corridor, whether at intersections or to provide an auxiliary lane for driveway access to reduce the impacts to through traffic. All of these features together create an environment that encourages high travel speeds. Particularly in the segment without a signalized intersection or crossing opportunity, motorists were observed to be driving higher than the speed limit of 35 mph. SW Greenburg Road is not a dedicated freight route.

The only speed limit sign for the northbound direction within the study area is located just south of SW Washington Square Road (north). Therefore, motorists traveling north on SW Greenburg from Highway 217 will have traveled nearly a half mile before seeing indication of the posted speed. Motorists heading south see a speed sign just south of the SW Hall Boulevard intersection and again at SW Washington Square Road (north). See Figure 13 for photos and detailed captions.

Figure 13. Existing Conditions for People Driving and all Modes

SW Hall Boulevard at the eastern leg of its intersection with SW Greenburg Road. The bike lane has been worn off and there is a large radius, accommodating high motorists speeds making the turn.
(photo faces east)



Two side-street intersections with SW Greenburg Road, both with large radii.
(photos faces east (#2) and west (#3))

Wide curb radii and a delivery van blocking the sidewalk to ensure visibility as they turn onto SW Greenburg Road.
(photo faces west)

The intersection with SW Locust Street and provides a snapshot of the typical roadway cross-section.
(photo faces south)

The approach to SW Greenburg Road from Summit Drive; the large curb radii accommodates high speed rurning movements.
(photo faces east)

Same intersection as #6, but the SW Greenburg Road legs showcase the third southbound lane present between SW Hall Blvd and SW Washington Square Road (north).
(photo faces south)

The southbound auxilary lane that provides access to adjacent businesses at SW Locust Street.
(photos face north)

Analysis and Recommendations

Overview

The following recommendations set the framework for achieving a multimodal corridor on SW Greenburg Road, following national best practices and deviating from Washington County standards (Table 1) where necessary to right-size each element to the City of Tigard's current and long-term vision of the street.

As mentioned previously, the portion of SW Greenburg Road in the study area is under the jurisdiction of Washington County but located within the City of Tigard. This study assumes that a jurisdictional transfer would occur to provide maximum flexibility in achieving project goals and outcomes and to better serve active transportation needs identified in the Washington Square Regional Center Update Project, which is being led by the City of Tigard in coordination with Washington County. Though County roadway standards are presented in the Existing Conditions portion of this memo, the recommendations identified in the following section do not assume adherence to those standards.

The cross-section recommendations assume a major capital improvement project that reconstructs the entire 3,300-foot (0.61 miles) length of SW Greenburg Road within the study area. The recommendations also assume minimal right-of-way acquisition given the existing development patterns on both sides of the street. Given the cost of and need for such a project, the City should discuss the potential for MSTIP funding from the County for the following reasons:

- Project has an equity and active transportation focus and would improve access to transit, services, and jobs for residents in the area, which has above average Indicators of Potential Disadvantage (IPD) as defined by Title VI of the Federal Civil Rights Act.
- Project area continues to experience infill redevelopment, including affordable housing.
- Project would fill significant active transportation infrastructure gaps in regional pedestrian and bicycle network.
- Project would address deficiencies identified in the Washington County First Mile Last Mile Study along Greenburg Rd.
- Project would address deficiencies identified in the TriMet Pedestrian Plan, including two intersections on TriMet's high-priority list for crossing improvements.
- Project located within a Metro-designated regional center and on a transit street in close proximity to a regional transit center.
- Re/development extremely unlikely to effectively remedy infrastructure gaps.
    - Existing historic cemetery not likely to ever redevelop.
    - Infill improvements by re/development won't be able to address significant inconsistencies in existing right-of-way widths and improvements along length of corridor.

Figure 15 shows the proposed cross section for each of the five segments. Locations where right-of-way acquisition should be studied are shown. These locations are primarily where the current right-of-way pinches or is at an angle different from that of the roadway creating pockets that need more analysis. These recommendations were determined via measurements from Google Earth and GIS shapefiles and are not based on a topological survey. Further study is necessary to confirm feasibility and actual measurements.

New crossing location recommendations are also included and shown in Figure 21. These crossing projects may be completed in advance of the corridor-length project or as part of the corridor-length project. Recommended crossing treatments are based on existing speeds, volumes, and lane configurations to address sidewalk gaps and long distances between crossing opportunities.

In summary, this study recommends the following:

- 8’ - 12’ sidewalks on both sides of street, with planting strips or tree wells
- 7’ buffered bike lanes on both sides of street, with 2’ - 3’ raised buffers
- Up to 3 additional signalized crossings and reconstruction of the Locust crossing
- 11’ vehicle travel and turn lanes
- Same number and type of vehicle lanes as existing cross sections, except for the removal of one through/ right-turn lane in Segments D/E
- Minimal right-of-way acquisition
- Jurisdictional transfer to City of Tigard
- MSTIP funding from Washington County

Figure 14. Typical Cross-Section Recommendation

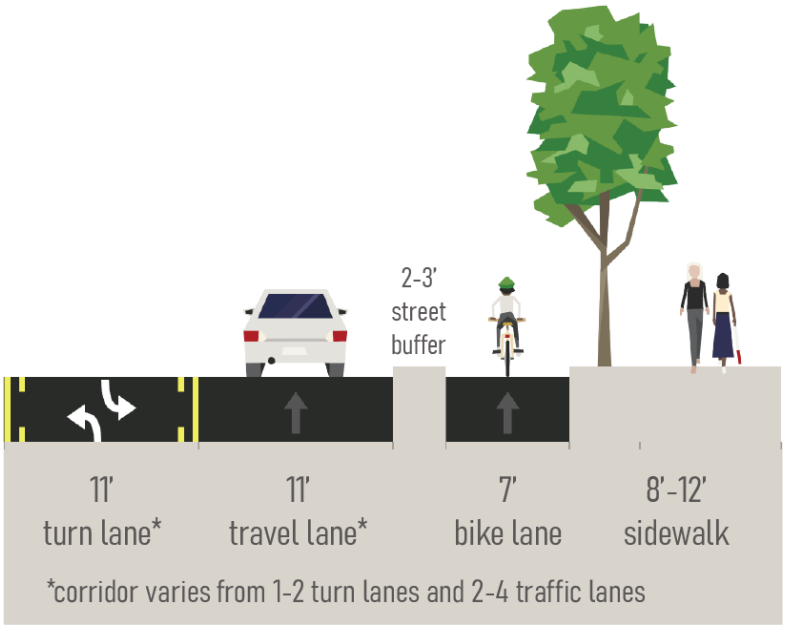
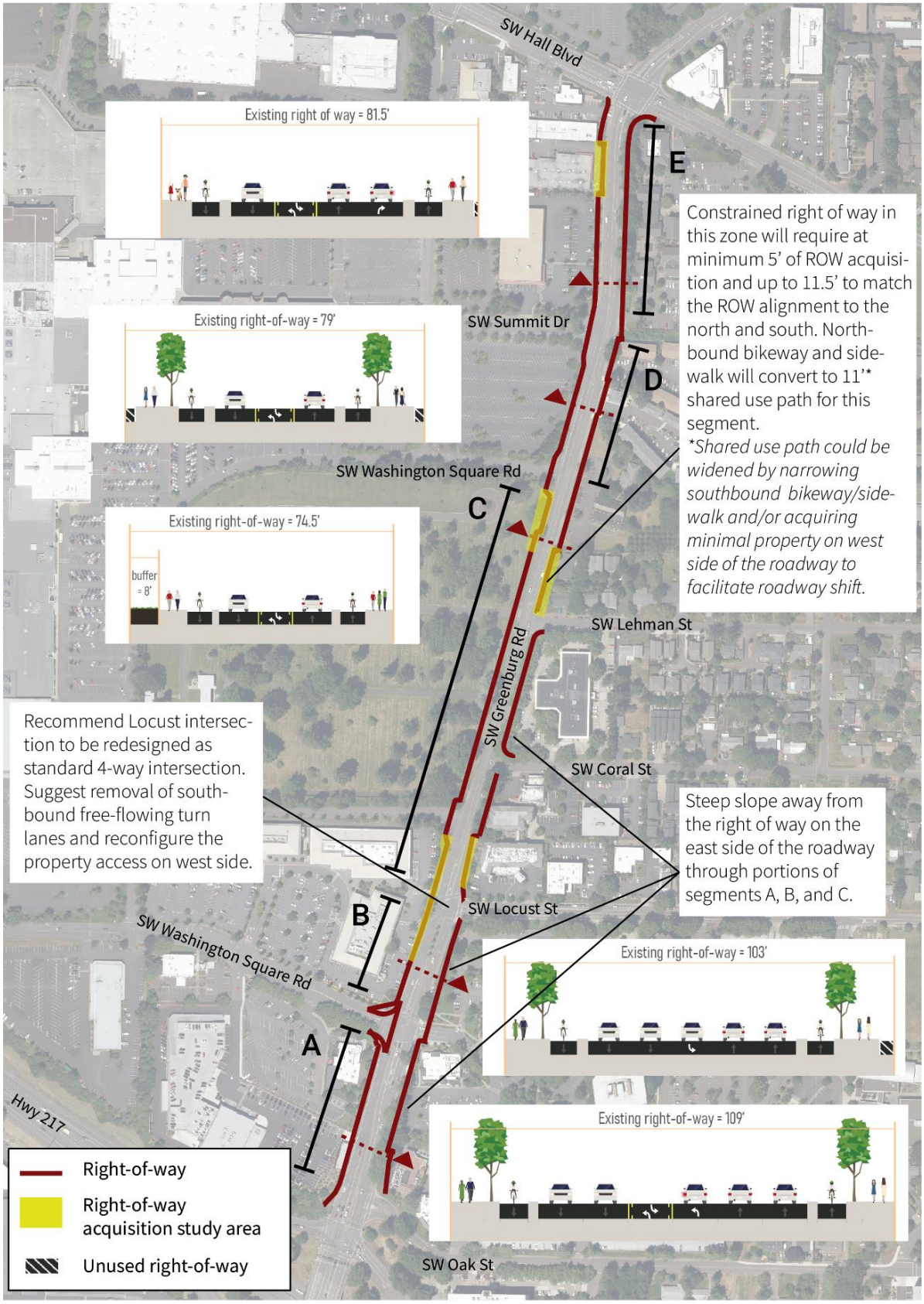


Figure 15. Cross-Section Recommendations by Segment



Segment Analysis

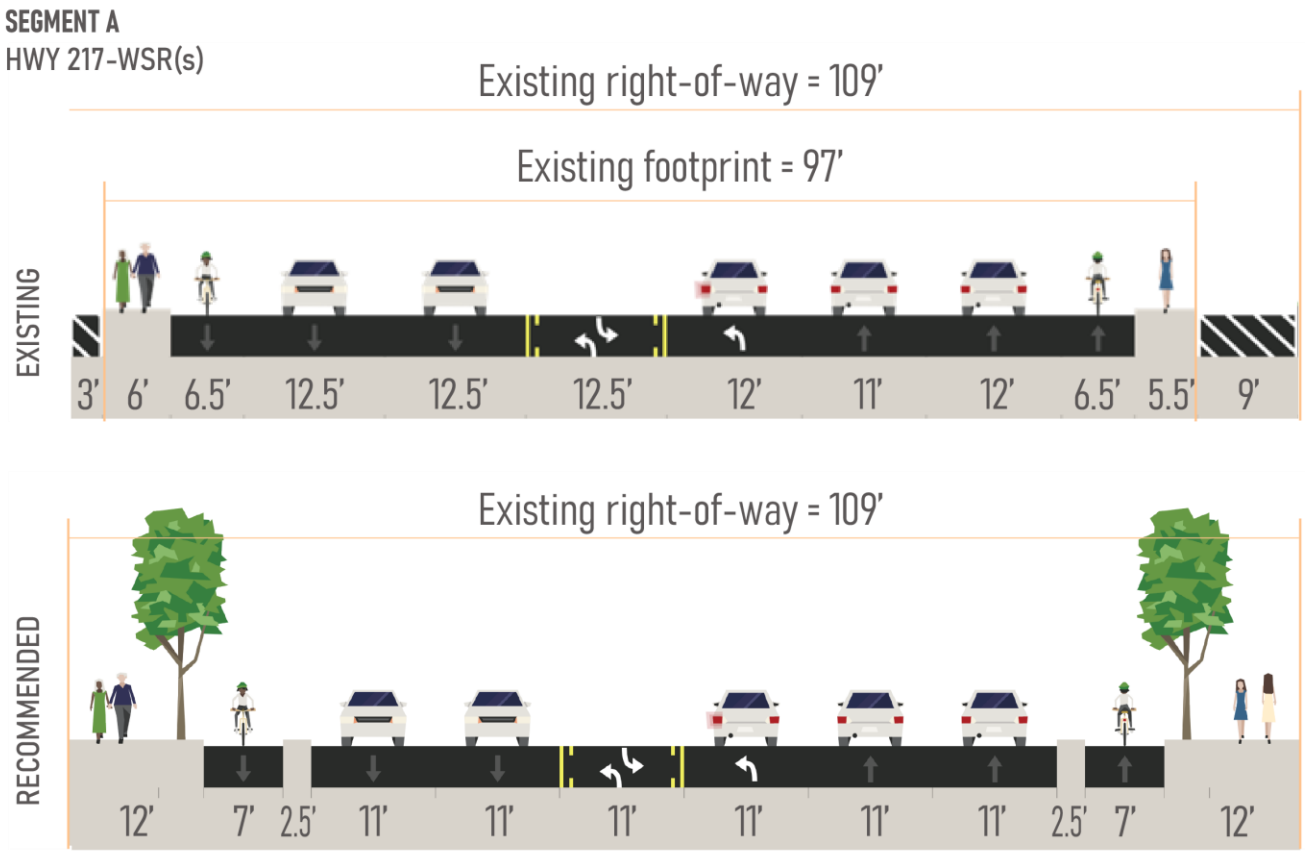
The following sections outline segment-by-segment recommendations for changes to the roadway cross section to improve the safety and comfort of people walking, rolling, biking, and accessing transit. The above graphic and individual segment descriptions highlight areas for right-of-way acquisition study and other relevant considerations for implementation.

To the extent possible, cross section elements are kept consistent through the corridor as the overall width and number of travel lanes varies. The vertical element used for the separated bike lane buffer could be in the form of pre-cast concrete curbs, cast-in place concrete curbs, heavy duty plastic Tuff Curb or similar, rigid or flexible posts, or some other delineator as determined in final design. Shy distance should be considered in determination of curb types. One to two feet of shy distance is suggested next to a vertical curb, and this becomes particularly important when the bike facility is located between two curbs.

Where the sidewalk width is being increased to 12 feet, there are several options for incorporation of trees and other landscape or stormwater elements. The preliminary recommendation is to provide a furnishing zone with occasional tree wells of approximately 5 feet by 15 feet to provide adequate space for plants to grow and thrive while maximizing the utility of the curbside space to intermix the tree wells with other furnishings such as street lights, benches, trash cans, utility poles, signal infrastructure, etc.

Segment A – Highway 217 to Washington Square Road (south)

Figure 16. Existing and Recommended Cross Sections for Segment A



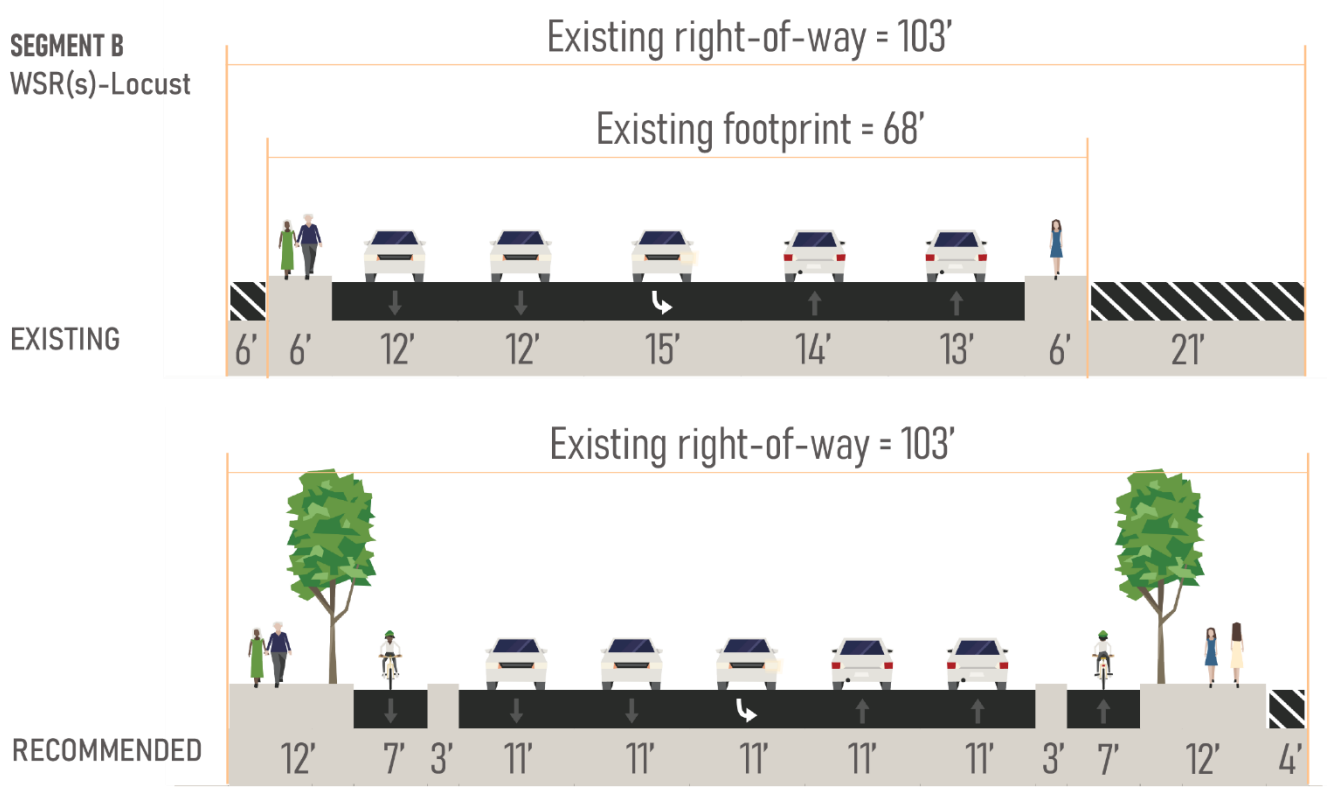
Segment A is the portion of the corridor closest to Highway 217 and therefore has limited flexibility in the number of lanes provided and requires slightly more capacity than the rest of the corridor in order to avoid impact to Highway 217 operations. In this segment, it is recommended that all travel lanes, including turn lanes, be narrowed to a consistent 11 feet. In combination with using the unused right-of-way, this provides enough space for a separated bike lane and sidewalk with furnishing zone. In this segment, the bikeway buffer is 2.5', slightly below the preferred 3' buffer, but still wide enough to fit most vertical element options.

In this segment, the landscaped area behind the sidewalk on the east side of the road is currently lined with large trees. Further analysis will be needed to understand how close to the right-of-way they are and if it is feasible to maintain them and shift elements of the bike and pedestrian facilities to work around them. If not, it should be noted that while new trees would be planted in the new cross section location, they will not have the same mature canopy as the existing trees.

Final design of this segment should include truck turning analysis due to the proximity to Highway 217 as well as the Jaguar Land Rover Portland dealership. The bikeway buffer or sidewalk width may need to be reduced or not have as much separation for short distances at or around the interchange and large driveways to accommodate truck movements.

Segment B – Washington Square Road (south) to Locust Street

Figure 17. Existing and Recommended Cross Sections for Segment B



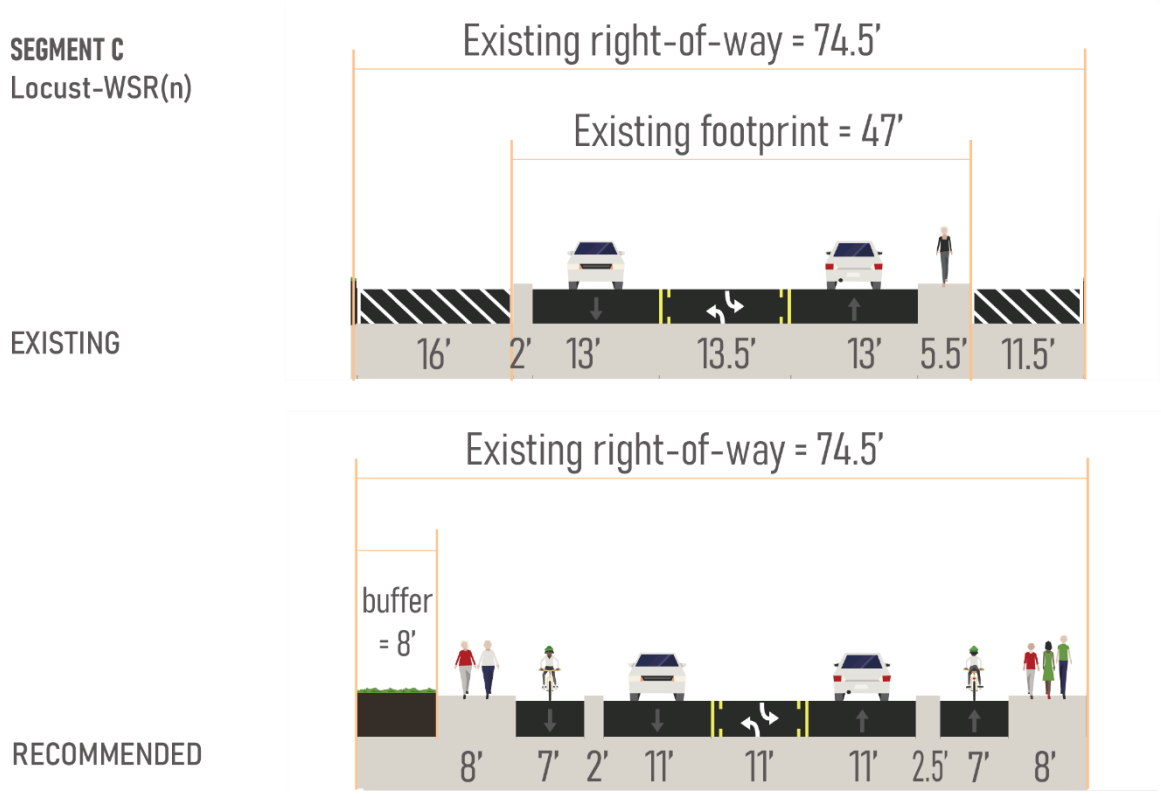
Similar to segment A, this segment has a need for increased automobile capacity due to the proximity to Highway 217 and being the primary access to the Washington Square Mall. Currently, there is a large amount of unused right-of-way, primarily on the east side of the road, and a lesser amount on the west side. The majority of unused right-of-way is utilized in the recommended cross section and several spot locations may require right-of-way acquisition in order to maintain a consistent cross section (i.e. the sidewalk and the right-of-way line on the east side of the street are not parallel). In this segment, it is recommended that all travel lanes, including turn lanes, be narrowed to a consistent 11 feet. In combination with using the unused right-of-way, this provides enough space for a separated bike lane and a sidewalk with furnishing zone. The preferred 3' bikeway buffer is feasible in this section.

The east side of Segment B contains a landscaped area that begins to slope away from the roadway at or beyond the edge of the right-of-way. At the northern end of the segment, there is a several-foot elevation difference between the roadway and the adjacent parking lot. The elevational difference continues to increase as Segment B becomes Segment C and will be a key consideration in the proposed improvements at the SW Locust Street intersection. The Locust Street intersection is discussed in the Crossing Analysis section.

The west side of this segment has a narrow landscaping strip between the back of the sidewalk and the adjacent land use (parking lot) that also introduces a steep slope upwards away from the right-of-way. The subsequent grade change is greatest at the southern end of the segment, where stairs are provided to access the parking lot from the sidewalk at the northwest corner of the SW Greenburg Road and SW Washington Square Road (south) intersection.

Segment C – Locust Street to Washington Square Road (north)

Figure 18. Existing and Recommended Cross Sections for Segment C



Segment C is the most constrained portion of the corridor, bounded to the west by the Crescent Grove Cemetery for the majority of the segment. It is recommended all existing travel lanes be reduced to 11' and to utilize all available right-of-way to achieve minimal widths for the bikeway buffer, bike lane, and the sidewalk.

The recommendations for the southern-most block of the segment, SW Locust Street to SW Coral Street on the east and to the unmarked access road on the west, are discussed in relation to the proposed intersection changes at SW Locust Street; see the Crossings Analysis section for more details. Similar to the east side of Segments A and B, this block has a landscaped area with a steep slope down and away from the right-of-way creating a significant elevation difference between the roadway and the adjacent land use (parking lot in front of building). This will be a key consideration for the SW Locust Street intersection options.

The west side is bounded by Crescent Grove Cemetery and a mix of developed land uses on the east side for the remainder of Segment C. The right-of-way on the west side extends approximately 16' into the cemetery property. To account for unknowns, this study assumed an 8-foot buffer of unusable right-of-way along the cemetery. However, there may be opportunity to deviate from this in the northern edge of the cemetery where there is a large area not being actively used by the cemetery, as identified in

Figure 15. Utilizing this space may help to navigate through the right-of-way pinchpoint on the east side just north of SW Lehman Street. Aside from this pinchpoint, the east side right-of-way is fairly consistent.

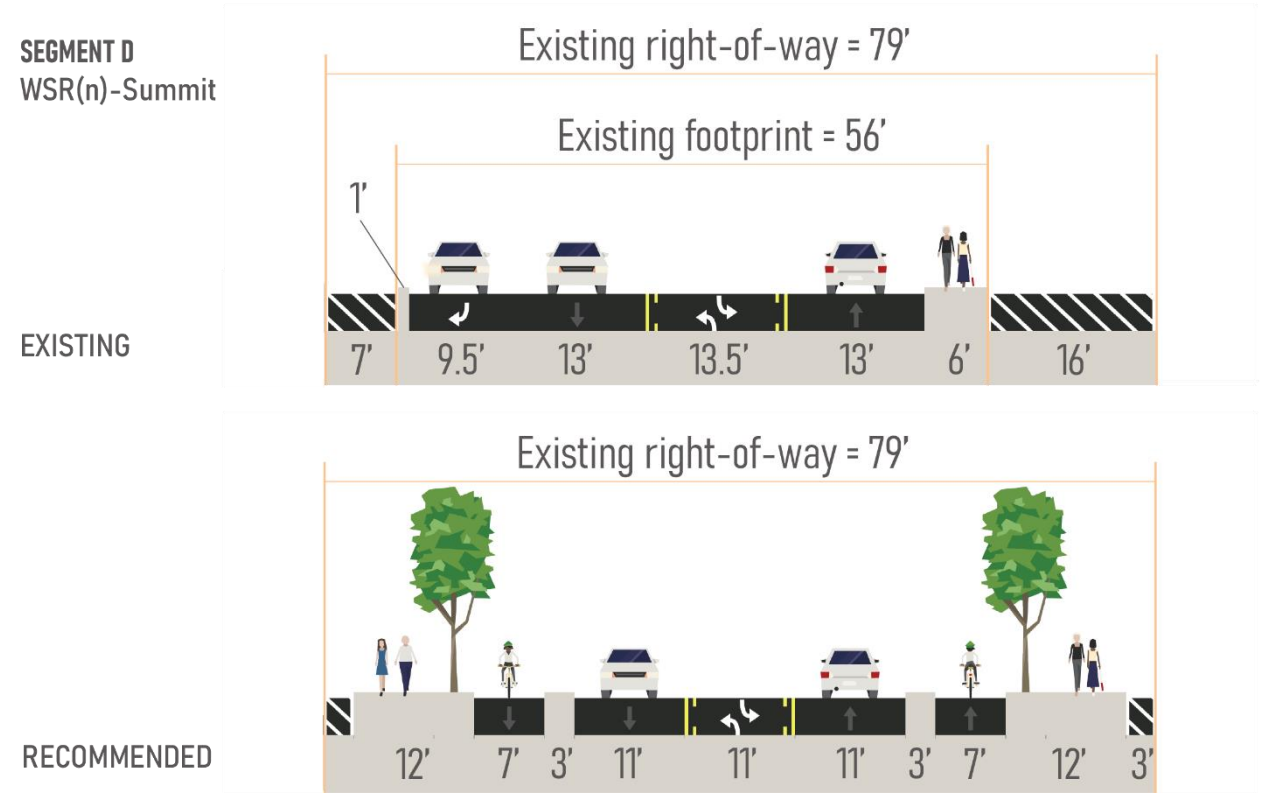
The pinchpoint is directly north of Lehman Street where the right-of-way is approximately 11.5' narrower than the right-of-way to the north and south of this pinched section. Right-of-way acquisition may restrict access to the

property on the east due to the driveway facing Greenburg Road, however it should be explored further as the corridor design advances. It appears an acquisition of 5’ may maintain approximately 20’ of driveway length. Through this stretch, the cross section shown in Figure 18 would narrow by 6.5’-11.5’ (dependent on right-of-way acquisition) on the eastern side, eliminating the ability to provide the separated bike lane and sidewalk. A potential solution would be transition to an 11’ shared use path in the northbound direction. Final design should consider widening that path by narrowing the southbound bikeway and/or sidewalk and/or by exploring property acquisition on the west side at the northern end of the cemetery to shift all lanes over for additional space.

At the northern end of Segment C and extending slightly into Segment D is a parcel (currently a church) that has submitted plans for redevelopment to multifamily housing. As part of this development, the property will dedicate 4.5’ of right-of-way. This additional width is not accounted for in the cross section shown in Figure 18 but will be useful in developing the transition between Segments C and D. Given the pinchpoints described above and the general shift in corridor alignment, this area should be a focus of future efforts to ensure a consistent design.

Segment D – Washington Square Road (north) to Summit Drive

Figure 19. Existing and Recommended Cross Sections for Segment D

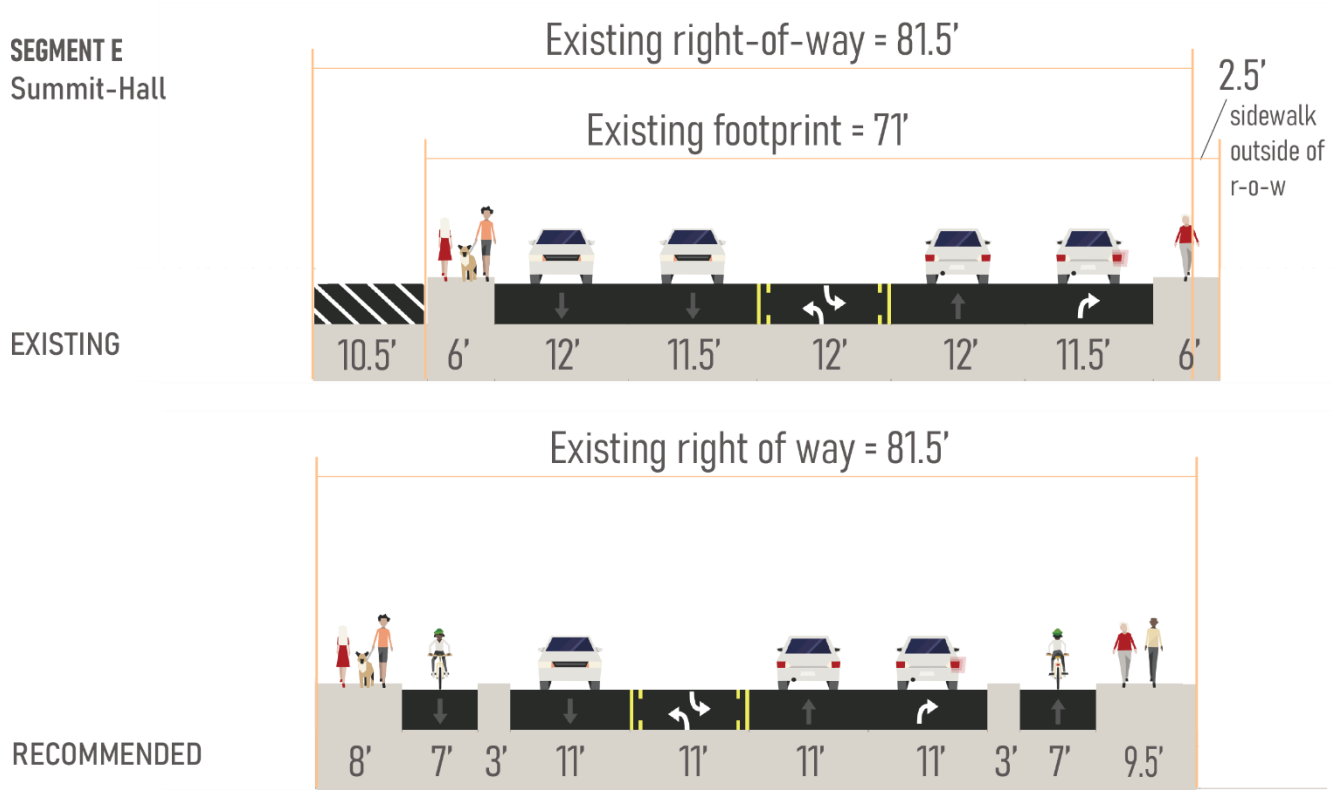


Segment D contains the portion of the corridor that has most opportunity for future redevelopment. On the east side, redevelopment is planned for the church as discussed in the Segment C section and a relatively new multifamily complex has been built adjacent to existing multifamily complexes. On the west side, there are long-term plans to redevelop the mall parking lots and create a double-loaded pedestrian-oriented street at or near where Summit Drive currently exists.

For this segment, it is recommended all existing vehicle travel lanes be reduced to 11' and the southbound turn lane that ends at SW Washington Square Road (north) be removed. With these changes and coupled with unused right-of-way, the preferred widths for each cross-section element are achievable and there is an additional 3' of right-of-way on each side to aid in transitions or provide extra width to elements at key points (e.g., widened sidewalk near a transit stop, widened tree well without narrowing the sidewalk, etc.).

Segment E – Summit Drive to Hall Boulevard

Figure 20. Existing and Recommended Cross Sections for Segment E



Segment E will require more vehicular capacity as it approaches SW Hall Boulevard. It is recommended all existing vehicle travel lanes be reduced to 11 feet and one of the two existing southbound lanes be removed. North of SW Hall Boulevard, there is only one southbound lane coming from SW Oleson Road, and the existing second lane on SW Greenburg primarily serves as an auxiliary lane for business access and vehicles turning south from SW Hall Boulevard. As noted in Segment D, this lane becomes a turn-only lane and ends at the SW Washington Square Road (north) intersection.

The right-turn lane onto SW Hall Boulevard would remain and the two-way center turn lane would convert to a left-turn lane as it does under existing conditions. Business access on the west side of SW Greenburg Road just south of SW Hall Boulevard should be a key consideration for final design (see the Existing Conditions section for more information on the current sidewalk gap and driveway configuration).

These changes provide enough space to accommodate the preferred bikeway width and a sidewalk without a furnishing zone. The bike lane would provide separation between motor vehicles and people walking on the sidewalk, providing safety and comfort in the absence of the furnishing zone.

As shown in

Figure 20, the existing sidewalk extends 2.5 feet outside of the eastern right-of-way and the recommended cross section footprint shows a 9.5 foot sidewalk that utilizes all of the existing right-of-way width. This extra width could be allotted anywhere in the cross section to provide flexibility in the transition from Segments C and D into Segment E where the roadway curves and right-of-way constraints may force additional shifts in alignment. In the

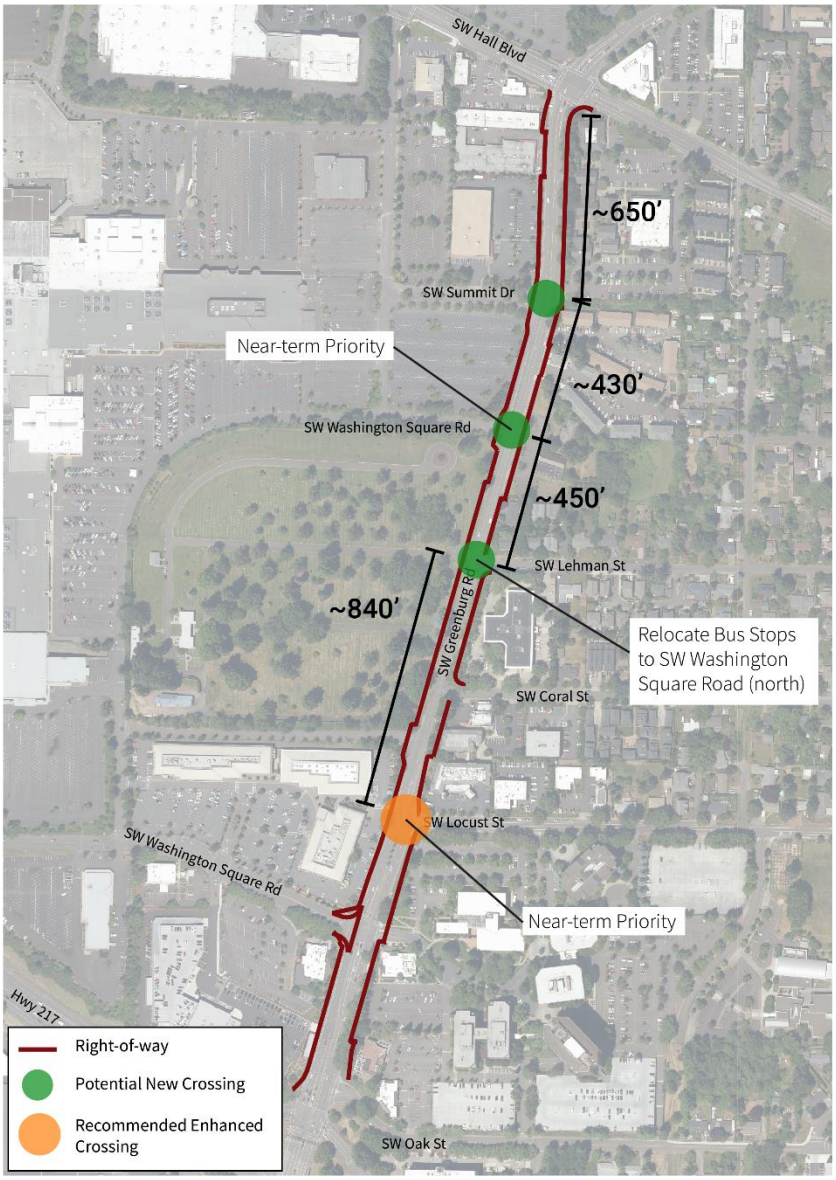
areas where the existing sidewalk extends beyond the right-of-way, it is recommended the existing sidewalk remain in place to limit the impact to adjacent trees that have matured with the sidewalk in place.

Crossings Analysis

The following sections provide an overview of three potential crossing locations and considerations for a reconstructed intersection at SW Locust Street. Figure 21 shows the crossing locations as well as the approximate spacing between each location. The FHWA Safe Transportation for Every Pedestrian Countermeasure Matrix was referenced in the findings below.

Under both the existing and recommended conditions, the number of lanes, vehicle speeds, and vehicle volumes would indicate that a Full Signal or Pedestrian Hybrid Beacon should be provided at each of the crossings discussed below. High visibility crosswalk markings and a median refuge should be considered, as well as increased pedestrian scale lighting placed per national best practices. At locations where the cross section is limited to three lanes, a Rectangular Rapid Flashing Beacon could be provided instead of the PHB or Full Signal if a median refuge is provided. For each of the locations, this would likely require reducing the curb radii at the crossing location to have space for ADA curb ramps and to slow motorist turning movements.

Figure 21. Crossing Recommendations



SW Locust Street

It is recommended that the intersection of SW Greenburg Road at SW Locust Street be reconfigured to create a more standard four-leg intersection. This may involve acquiring right-of-way along the western side pending intersection operations and turn lane requirements. The existing landscaped median would be removed and reutilized in the intersection configuration. Removal of the splitter island that allows for free-flowing movements in and out of the west side driveway is recommended to provide for the west leg of the intersection. Marked crosswalks are recommended on all four legs.

As noted in the Segment Analysis, the east side of the road near SW Locust Street has steep slopes down and away from the right-of-way. Final design should explore opportunities to retain the existing back of sidewalk location to maintain the existing fill between the right-of-way and the adjacent land uses.

SW Lehman Street

There are existing bus stops in both directions located at SW Lehman Street, but no sidewalk or landing to access the southbound stop and no amenities at either stop.

SW Washington Square Road (north)

There are no existing pedestrian crossings provided at this location, however a new crossing is a condition of the adjacent church property redevelopment so there is immediate opportunity. A crossing should include a landing on the west side and access to the parking lot since there are no existing sidewalks in the area. Adding sidewalks would be the preferred option, although may not be a requirement of the redevelopment condition.

SW Summit Drive

There are several multifamily residences on the east side across from the SW Summit Drive intersection with businesses on both sides of the residences. Additionally, there are sidewalks on both sides of the street for a crossing to connect to. This location is approximately 650’ away from SW Hall Boulevard and a controlled crossing may result in operational impacts to the existing signal.

Priority Recommended Crossings

Each of the three above potential crossing locations were considered, but it was immediately identified that they were too closely spaced to recommend all three at this time. Given that SW Summit Drive is relatively close to SW Hall Boulevard and that SW Lehman Street does not presently have sidewalk access or adequate amenities for the bus stop, the SW Washington Square Road (north) location is the recommended priority crossing location. The crossing improvement conditioned on the adjacent redevelopment is also a factor in this recommendation. The City of Tigard and TriMet are discussing the potential relocation of the bus stop at SW Lehman Street to the new crossing location to provide the crossing and an accessible transit stop at the same location. Moving the transit stop increases the distance (~1,300’) between the SW Locust Drive signal and SW Washington Square Road (north); however, this is a non-issue because there are no major pedestrian destinations on the west side of the street in that gap.

Future construction of the additional crossing improvements is recommended, with the Summit Drive location potentially being upgraded at the time of any redevelopment of the northwest portion of the mall property.