Existing Multimodal Transportation Conditions

King City (Beef Bend South) Master Plan
King City, Oregon

Prepared For:
3J Consulting and King City, Oregon

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Project Information

Project:	King City (Beef Bend South) Master Plan
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Reviewing Agency

Jurisdiction:	King City, Oregon

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1 INTRODUCTION

This report has been prepared to document existing transportation conditions in the vicinity of the *King City (Beef Bend South) Master Plan* study area. This report will serve as a baseline assessment of issues that should guide the development of transportation infrastructure within the study area and connect that area to the surrounding street and roadway system. The material included in this report will be incorporated into a larger project report on existing conditions for the project area.

The report is built upon information collected and analyzed for the *Urban Reserves Area 6D Concept Plan*, prepared in 2018, as well as other transportation planning efforts recently or currently underway that will influence multimodal access and circulation in the study area. These other study efforts include:

- The City's first *Transportation System Plan* (TSP) which is in early stages of development. This planning effort will run roughly concurrently with the King City master planning effort and will need to be carefully coordinated and integrated at each stage. The primary focus of the TSP will be on citywide transportation issues and the integration of the city's transportation system within the regional multimodal network of services and facilities operated by ODOT, Washington County, Tigard, Sherwood, Tualatin and TriMet.
- The Washington County *Urban Reserves Transportation Study* (URTS) which began in the Spring of 2019 and is nearing completion. The URTS is examining how future land development in the County's existing Urban Reserve areas will affect the transportation system. The study identifies which area roadways will need to be widened to accommodate the added traffic from Urban Reserve development and will provide guidance to affected cities in planning for future priority transportation improvements and reservation of the necessary rights-of-way.

1.1 Report Content and Organization

This report is organized into three chapters, the first of which is this Introduction. Chapter 2 is intended be a subset of an Infrastructure and Public Facilities chapter in the larger existing conditions report to be prepared for the project area. It's focus is on documenting and describing the existing transportation system within the project study area including street characteristics, study area intersections, existing and long-term future transportation volumes and operations, and the City's TSP.

Chapter 3 presents a discussion of the larger transportation context focusing on integration with the surrounding street system including existing arterials and collector streets, key findings from the County's URTS, and proposed development for River Terrace in the City of Tigard. The chapter also addresses existing or potential street standards and access limitations, discusses existing multimodal system elements, and highlights opportunities for separate active transportation facilities and full modal connections.

1.2 Study Area

The study area for evaluating future transportation conditions as part of the *King City Master Plan* (KCMP) is primarily focused on the area north of the Tualatin River, south of Beef Bend Road, east of Roy Rogers Road, and west of the existing city limits and the BPA utility corridor. The location of the KCMP study area is illustrated in **Figure 1**, along with the existing boundaries of King City.

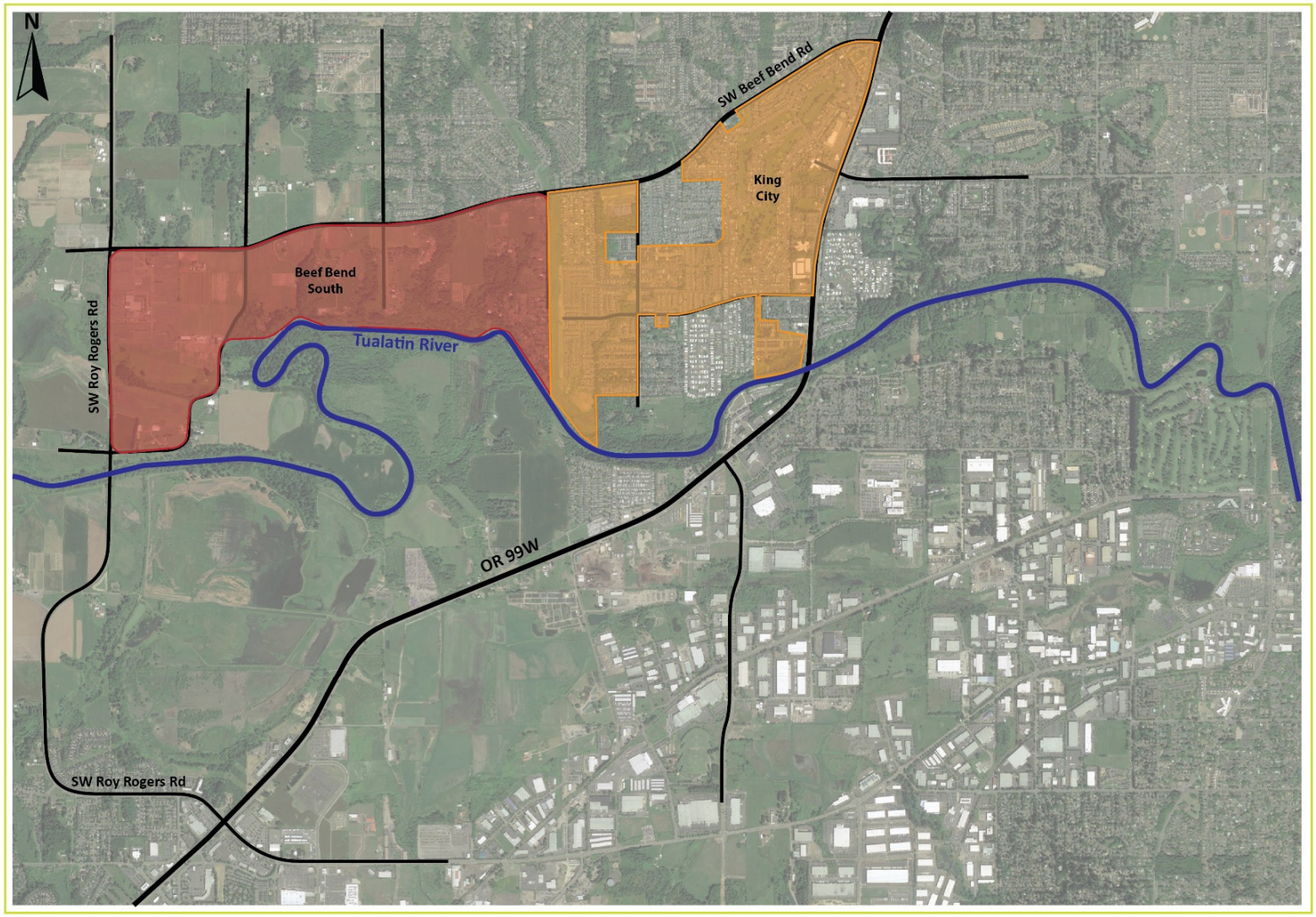

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Figure 1. **Project Study Area**

2 TRANSPORTATION INFRASTRUCTURE

This chapter is intended to be incorporated into a larger discussion of existing infrastructure and public utilities that serve or will serve the Master Plan study area. The chapter includes a discussion of the existing transportation system focusing on:

- Functional classification of the existing street and roadway system
- Existing physical characteristics of the street system
- Study area intersections
- Intersection traffic control
- Traffic performance standards
- Existing PM peak hour traffic volumes
- Existing PM peak hour traffic operational performance
- Future (2035) PM peak hour traffic conditions
- Summary of transportation system improvement needs
- Development of the City's Transportation System Plan (TSP)
- Washington County Urban Reserves Transportation Study (URTS)

2.1 Existing Street Characteristics

This section provides a brief overview of the existing street and roadway system in the vicinity of the study area. Data collected includes identification of existing roadway functional classification, a general description of the physical characteristics of key roadways, and study area intersection and intersection traffic control at key locations. These features characterize the backbone transportation system upon which new roadway improvement concepts for the study area will be developed. They also help to define factors that affect roadway and intersection capacity and influence driver route choices.

2.1.1 Existing Street Functional Classification in Study Area

The existing functional classification of streets in King City study area as adopted in either the County's TSP or the City's *Comprehensive Plan* is presented in **Table 1**. Any street not designated as either an arterial, collector, or neighborhood route is considered a local street. Since most of the streets within or near the study area are under the jurisdiction of Washington County, most of these streets follow the County's classification system. In a few instances, the City street classification is also identified. Table 1 also includes information about the number of travel lanes planned to be provided on each of these streets.

Table 1. Classification of Major Study Area Streets

Street	Functional Classification		Planned Lanes
	King City	Washington County	
Oregon 99W (SW Pacific Hwy)	--	Principal Arterial	5
Roy Rogers Road	--	Arterial	4/5
Beef Bend Road	--	Arterial	2/3
Elsner Road	--	Collector	2
150th Avenue	--	Collector	2
146th Avenue	--	Neighborhood Route	2
131st Avenue north of Fischer Road	Collector	Collector	2
131st Avenue south of Fischer Road	Neighborhood Collector	Neighborhood Route	2
Fischer Road east of 131st Avenue	Neighborhood Collector	Collector	2

Source: Washington County 2015 TSP and King City West Concept Plan

2.1.2 Existing Streets and Roadways

Located on the east side of Roy Rogers Road between Beef Bend Road and the Tualatin River, the study area is characterized by higher speed roads on its perimeter, and narrow, rural roads in its interior. The following is a short description of each key roadway.

Roy Rogers Road – This arterial provides for high capacity north/south travel that connects the study area with Highway 99W and the City of Sherwood to the south and the City of Tigard to the north. Roy Rogers has one travel lane in each direction with wide shoulders to accommodate bicycle travel. Left turn channelization is provided at key intersections and driveways. The posted speed is 45-55 mph. A traffic signal and turn lane channelization is provided at the intersection with Beef Bend Road.

Beef Bend Road – This arterial provides for high capacity east/west travel for study area traffic, connecting the study area with Highway 99W, and, ultimately, OR 217 and I-5. Beef Bend Road has one travel lane in each direction with minimal shoulders west of 150th Avenue. There are sidewalks along the south side for portions of this road between 150th and east of 137th Avenues. The posted speed is 35-45 mph in the study area. A traffic signal and turn lane channelization is provided at the intersection with 131st Avenue.

Elsner Road – This collector road provides for local circulation and property access in the western portion of the study area. The road has one travel lane in each direction and has minimal shoulders. The road runs between Roy Rogers Road on the west and south, and Beef Bend Road on the north and east. The intersections with Roy Rogers and Beef Bend Roads are stop sign-controlled. The speed limit is unposted but there are several 30-35 mph curves.

150th Avenue – This north/south collector road provides residential property access and circulation for the area north of Beef Bend Road and connects the study area to Bull Mountain Road. This road is narrow with no shoulders or sidewalks and a posted 40 mph speed. Within the study area on the south side of Beef Bend Road, 150th Avenue is a narrow, paved facility with no shoulders that provides local access only. It dead ends at private properties boundaries adjacent to the Tualatin River. The speed limit along this roadway segment is unposted.

137th Avenue – This local street provides a north/south connection between Beef Bend Road and the Rivermeade community located along the north bank of the Tualatin River. The BPA powerline corridor runs parallel and immediately east of 137th Avenue which creates a barrier between the existing King City limits and the study area. 137th Avenue is a narrow, paved facility with no shoulders. This road is posted for a 25 mph speed limit.

It should be noted that regional mobility to and from the study area is hindered along its southern edge by the Tualatin River. Connectivity across the river to the regionally significant Highway 99W corridor is provided only along Roy Rogers Road or via Beef Bend Road and other local streets after Highway 99W crosses north of the river itself.

2.1.3 Study Area Intersections

The study area evaluated during the *King City URA 6D Concept Plan* included an evaluation of twelve key intersections located on the streets surrounding the project area. These twelve locations were identified for analysis in consultation with Washington County and the Oregon Department of Transportation (ODOT). Analysis focused on identifying any potential future (2035 PM peak hour) impacts that could be associated with the Plan. These intersections included:

- Beef Bend Road at Roy Rogers Road
- Beef Bend Road at Elsner Road

- Beef Bend Road at 150th Avenue
- Beef Bend Road at 137th Avenue
- Beef Bend Road at 131st Avenue
- Elsner Road at Roy Rogers Road
- Fischer Road at 131st Avenue
- OR Highway 99W at Beef Bend Road
- OR Highway 99W at Durham Road
- OR Highway 99W at Fischer Road
- OR Highway 99W at 124th Avenue
- OR Highway 99W at Roy Rogers Road

Existing roadway geometrics for study area intersections are illustrated in **Figure 2**.

The City's effort to develop a new Transportation System Plan (TSP) will include an update to each of these intersections using newly collected traffic counts and will add the intersections of:

- Roy Rogers Road at a future entrance to the proposed Master Plan town center south of Beef Bend Road
- Beef Bend Road at a new intersection with the main River Terrance north/south collector street
- OR Highway 99W at Bull Mountain Road

As new traffic counts and accompanying operational analysis for the TSP will not be available until later in the winter of 2021, the analysis conducted in 2018 for the *URA 6D Concept Plan* will be highlighted in this report.

2.1.4 Intersection Traffic Control

Most intersections within the study area are stop signed-controlled for minor street movements (i.e., for traffic entering Roy Rogers Road or Beef Bend Road). Traffic signals currently operate at the following intersections:

- Roy Rogers Road at Beef Bend Road, Scholls-Sherwood Road, and Borchers Drive
- Beef Bend Road at 131st Avenue
- OR 99W at Beef Bend Road, Durham Road, Fischer Road, 124th Avenue, and Roy Rogers Road

2.2 Existing Traffic Volumes

Figure 3 presents existing (2018) PM peak hourly traffic volumes at key intersections in the study area. Since traffic counts in the study area were obtained during February of 2018, which is an off peak time of the year, volumes were seasonally adjusted for the intersections along Highway 99W to account for fluctuations in travel that occur over a typical year. The methodology used to seasonally adjust Highway 99W turning movement volumes is identified in the ODOT *Analysis Procedures Manual*.[1] The 30th highest annual hourly traffic volumes from this adjustment were rounded to the nearest five vehicles.

[1] Oregon Department of Transportation, Analysis Procedures Manual Version 2, updated October 2015.

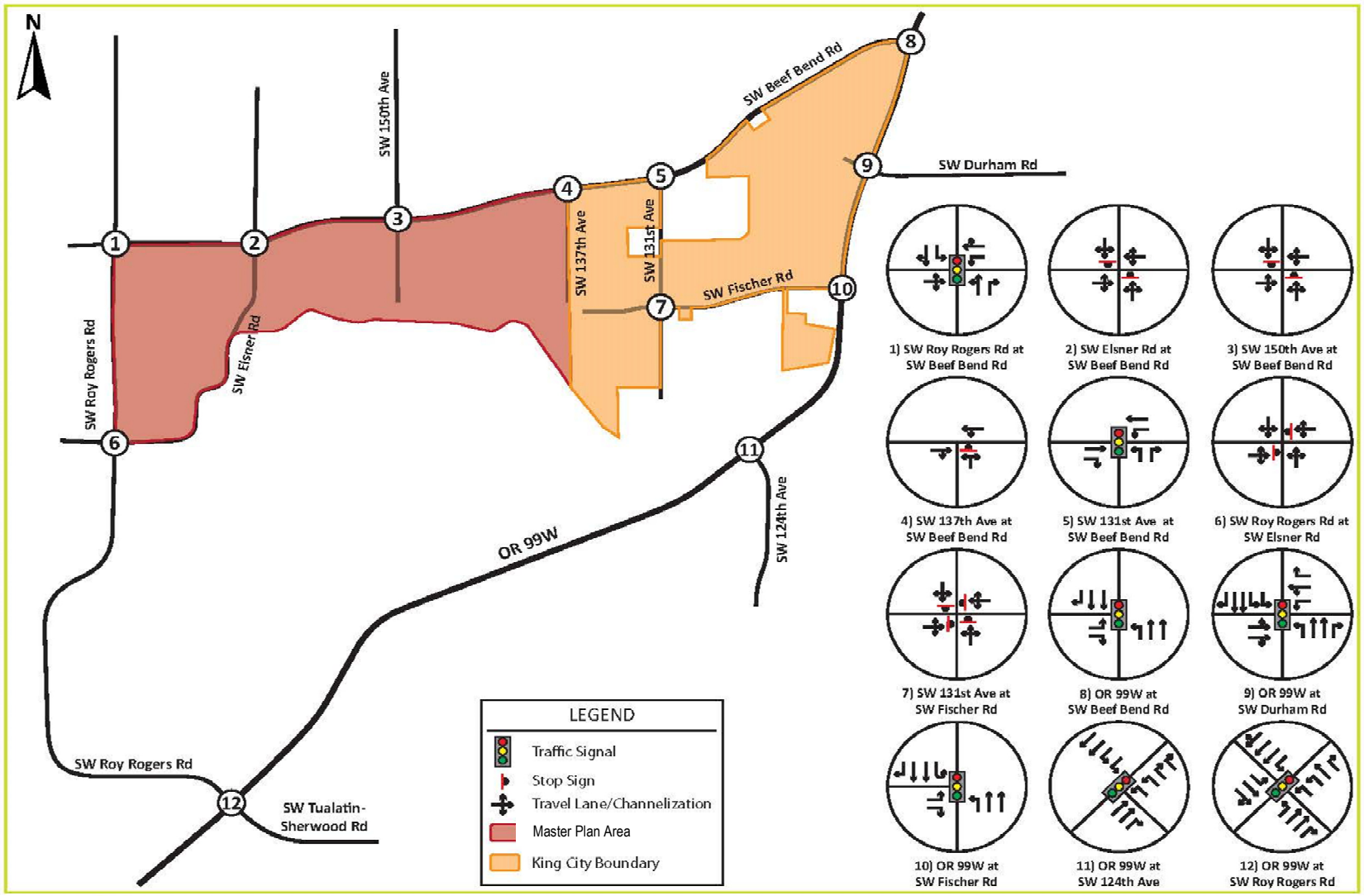

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Figure 2. **Existing Study Area Intersections – Traffic Control and Channelization**

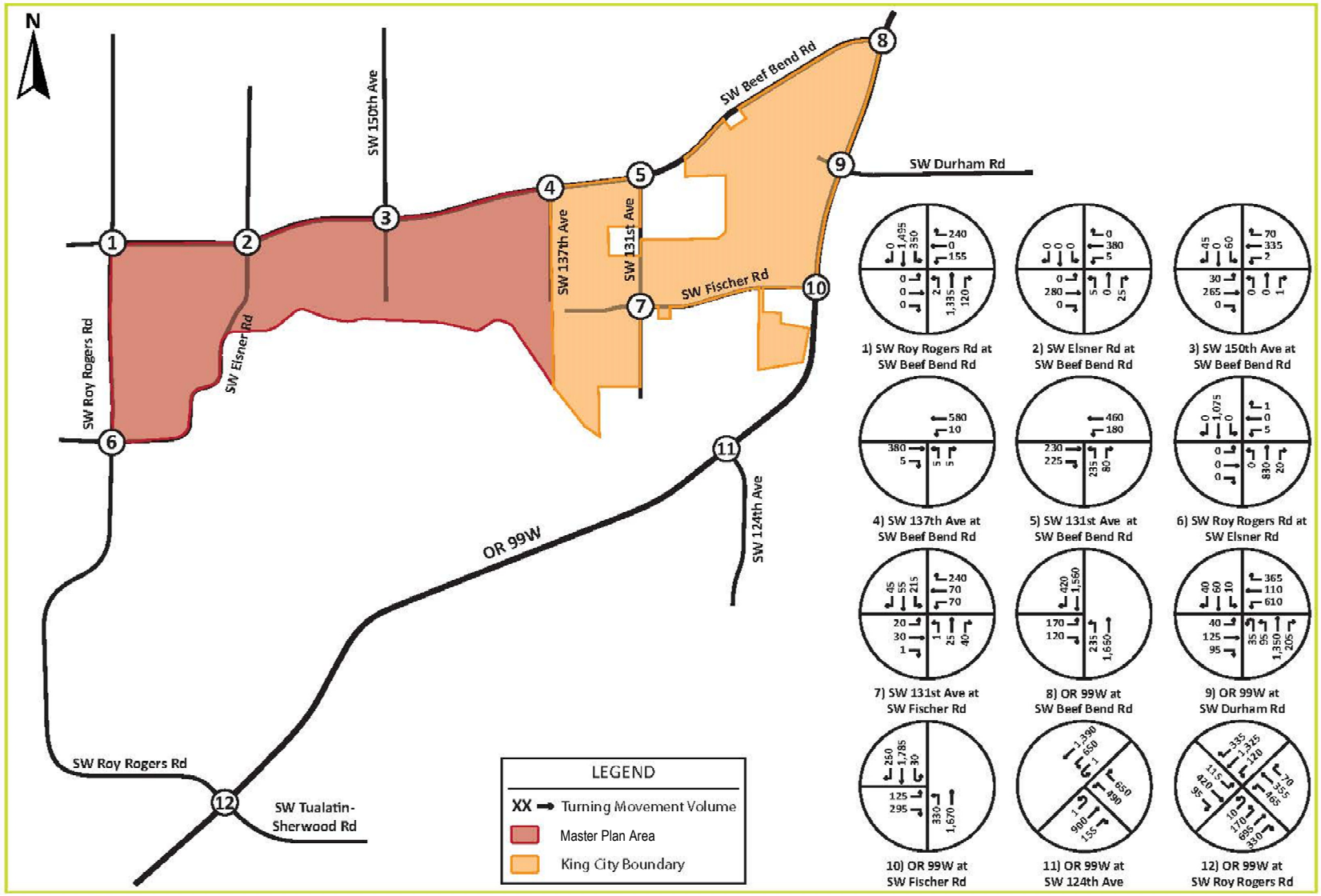

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Figure 3. 2018 PM Peak Hour Traffic Volumes

2.3 Existing Traffic Performance Standards

State, local, and regional transportation plans require that all study area intersections must operate at or below adopted performance measures or mitigation in the form of roadway improvements may be necessary to support future growth. The intersection performance measures (or mobility targets) vary by roadway jurisdiction including both ODOT and Washington County. King City does not yet have an adopted *Transportation System Plan* or mobility targets, but it is expected that these will be adopted when the TSP is completed.

2.3.1 ODOT Facilities

Five intersections included in the study area are under the jurisdiction of ODOT. ODOT currently uses volume-to-capacity (v/c) ratio targets to assess traffic performance at intersections on state highway facilities. The mobility target for these intersections is identified in Table 7 of the *Oregon Highway Plan (OHP)*, Policy 1F as revised and adopted by the Oregon Transportation Commission through May of 2015. From Table 7, the adopted mobility target identified along Highway 99W is an overall v/c ratio of 0.99.

2.3.2 Washington County Facilities

All the remaining study area intersections are under the jurisdiction of Washington County. For streets designated as "Corridors" or "Neighborhoods" in Metro's Arterial and Throughway Network, current regional standards[2] require that a volume to capacity (v/c) ratio of 0.99 to be maintained during the highest two consecutive hours of the day. Within the urban portion of the study area Roy Rogers Road is a designated corridor and Beef Bend Road is a designated neighborhood route. For the portions of Roy Rogers Road and Beef Bend Road outside of the Urban Growth Boundary (UGB), mobility targets are governed by Washington County. Table 3.1 of the County's TSP identified the mobility target for rural roads is a v/c of 0.90.

2.3.3 Update to Regional Mobility Standards

A joint effort is being undertaken by Metro and the Oregon Department of Transportation to update the way the Portland metropolitan region defines mobility and measures success in meeting transportation objectives. The updated policy will guide development of regional and local transportation plans and studies, and the evaluation of potential impacts of plan amendments and zoning changes on the transportation system.

Current policy focuses solely on vehicles and does not measure mobility for people who are using transit, walking, bicycling, or moving freight. Current policy also does not consider the capacity of state and local governments to construct projects to meet existing standards, particularly in newly urbanizing areas. Additionally, current policy has been criticized as having undesirable land use, housing, air quality and environmental impacts.

The primary outcome of this effort will be to recommend an updated mobility policy with associated measures and performance targets for the Portland metropolitan area. The updated policy will be

[2] Metro, *Regional Transportation Functional Plan*, Updated 2010, Table 3.08-2.

included in the 2023 update to the *Regional Transportation Plan* and incorporated into the highway mobility policy of the *Oregon Highway Plan* (Policy 1F).

2.4 2018 Traffic Operational Analysis

Traffic analyses were conducted to identify any existing deficiencies within the study area for the 2018 PM peak hour. The acknowledged source for determining overall capacity for signalized and unsignalized intersections is the *Highway Capacity Manual (HCM)*. Consistent with the ODOT *Analysis Procedures Manual*, the 2010 HCM was used to obtain average delay, v/c ratios and level of service output for unsignalized intersections, as well as delay and levels of service for signalized intersections. The 2000 version of HCM was used to determine v/c ratios at signalized intersections, Capacity analyses were completed for all study intersections using the Synchro (Version 10) software package. The results of the 2018 PM peak hour intersection operations analysis are presented in **Table 2**. As indicated in this table, all intersections are currently operating within their identified mobility target.

Table 2. 2018 PM Peak Hour Intersection Operations

			PM Peak Hour		
Intersection	**Traffic Control**	**Mobility Target**	**Volume/ Capacity**	**Avg Delay (sec.)**	**Level of Service**
Beef Bend Road at Roy Rogers Road	Signal	v/c 0.90	0.81	23.9	C
Beef Bend Road at Elsner Road	Stop Sign	v/c 0.90	0.05	11.3	B
Beef Bend Road at 150th Avenue	Stop Sign	v/c 0.99	0.26	16.7	C
Beef Bend Road at 137th Avenue	Stop Sign	v/c 0.99	0.03	14.8	B
Beef Bend Road at 131st Avenue	Signal	v/c 0.99	0.55	9.3	A
Roy Rogers Road at Elsner Road	Stop Sign	v/c 0.90	0.15	91.2	F
Fischer Road at 131st Avenue	Stop Sign	v/c 0.99	0.47	12.8	B
Highway 99 at Beef Bend Road	Signal	v/c 0.99	0.81	19.5	B
Highway 99 at Durham Road	Signal	v/c 0.99	0.90	56.3	E
Highway 99W at Fischer Road	Signal	v/c 0.99	0.91	41.8	D
Highway 99W at 124th Avenue	Signal	v/c 0.99	0.85	34.4	C
Highway 99W at Roy Rogers Road	Signal	v/c 0.99	0.89	49.7	D

Note 1: Performance results for the unsignalized intersections represent the worst movement.
Note 2: Analysis conducted based on 2010 Highway Capacity Manual except for volume/capacity ratios at signalized intersections which used 2000 HCM.

The Washington County URTS included analysis of existing PM peak hour traffic operations at the intersection of Roy Rogers Road and Beef Bend Road based on turning movement counts collected in the fall of 2019. This analysis was conducted using the 6th Edition of the HCM and yielded a v/c ratio of 0.64 and an overall delay of 6.7 seconds or LOS A. This represents improved operations from the analysis conducted in early 2018 which likely reflects a significant difference in the number of southbound left-turning vehicles counted between the two time periods.

2.5 Future Background Traffic Conditions

2.5.1 Future (2035) Background Traffic Volumes

Figure 4 presents future 2035 PM peak hourly traffic volumes at key intersections in the study area. These volumes were developed using the Washington County transportation model and reflect

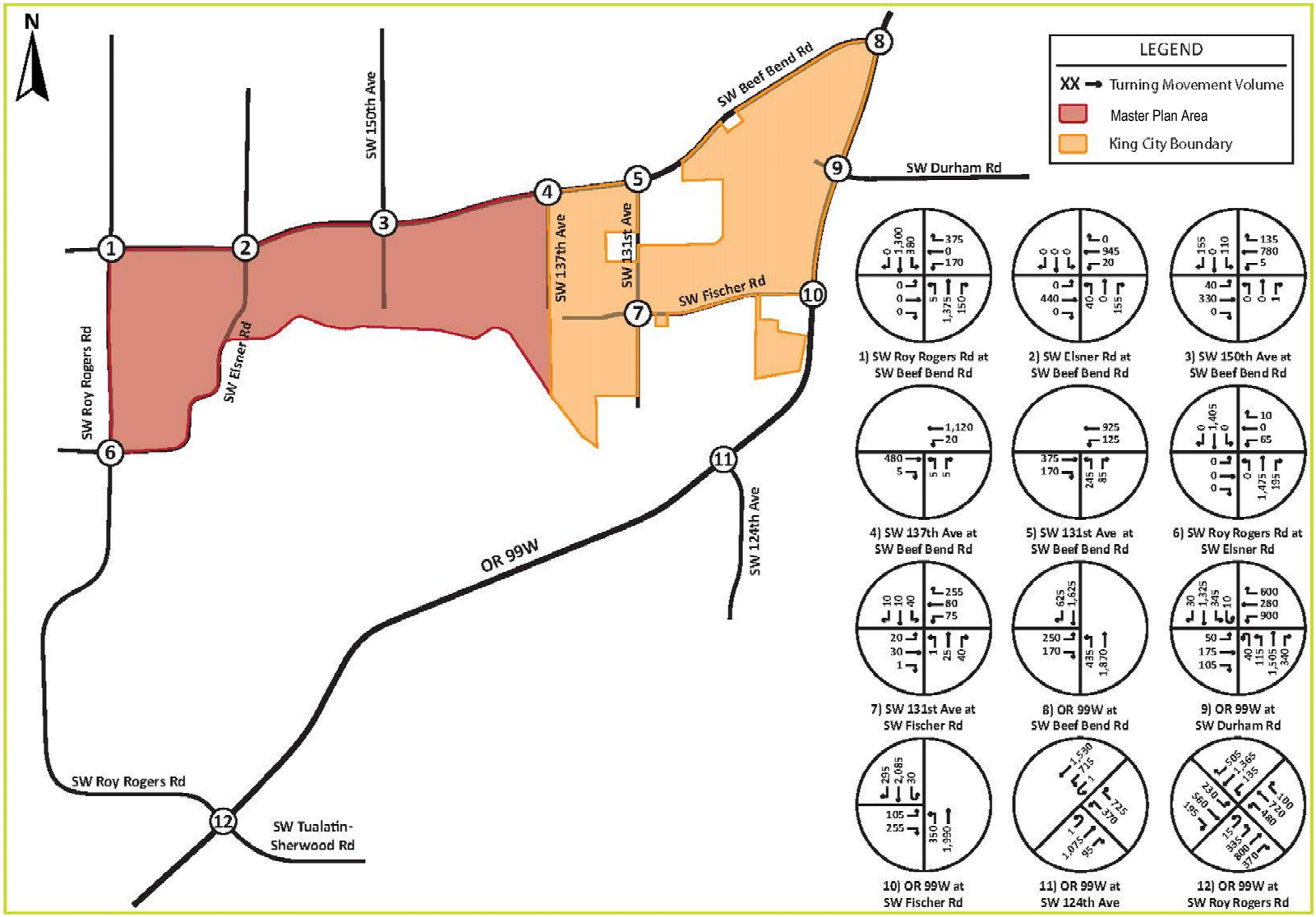

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Figure 4. 2035 PM Peak Hour Traffic Volumes

conditions without full build-out of the land uses identified in the Concept Plan. This information will be updated for the City's TSP which is presently under preparation. In the absence of future traffic projections from the TSP planning effort, these volumes and the traffic operational performance described below is useful for providing an initial evaluation of the transportation implications associated with Master Plan land use alternatives (to which the incremental increase in traffic volumes attributed to land use growth can be added).

2.5.2 Future (2035) Background Traffic Performance

Traffic operations analysis was conducted to identify any future long-term (2035) PM peak hour background traffic deficiencies within the study area. The results of the 2035 PM peak hour intersection operations analysis are presented in **Table 3**.

Table 3. 2035 PM Peak Hour Background Intersection Operations

			PM Peak Hour		
Intersection	**Traffic Control**	**Mobility Target**	**Volume/ Capacity**	**Avg Delay (sec.)**	**Level of Service**
Beef Bend Road at Roy Rogers Road	Signal	v/c 0.90	0.92	58.3	E
Beef Bend Road at Elsner Road	Stop Sign	v/c 0.90	0.71	43.3	E
Beef Bend Road at 150th Avenue	Stop Sign	v/c 0.99	1.36	>200	F
Beef Bend Road at 137th Avenue	Stop Sign	v/c 0.99	0.06	26.7	D
Beef Bend Road at 131st Avenue	Signal	v/c 0.99	0.82	14.1	B
Roy Rogers Road at Elsner Road	Stop Sign	v/c 0.90	>2.00	>200	F
Fischer Road at 131st Avenue	Stop Sign	v/c 0.99	0.52	12.2	B
Highway 99 at Beef Bend Road	Signal	v/c 0.99	1.00	35.8	D
Highway 99 at Durham Road	Signal	v/c 0.99	1.14	114.5	F
Highway 99W at Fischer Road	Signal	v/c 0.99	1.01	46.7	D
Highway 99W at 124th Avenue	Signal	v/c 0.99	0.86	34.2	C
Highway 99W at Roy Rogers Road	Signal	v/c 0.99	1.33	104.9	F

Note 1: Performance results for the unsignalized intersections represent the worst movement.
Note 2: Analysis conducted based on 2010 Highway Capacity Manual except for volume/capacity ratios at signalized intersections which used 2000 HCM.
Black boxes with white numbering indicates where the relevant mobility target will be exceeded.

As indicated in the table, several intersections are expected to exceed their identified mobility target. These include:

- *Beef Bend Road at Roy Rogers Road* – This intersection is assumed to be improved to add a second through lane in each direction on Roy Rogers Road as identified in the RTP and County TSP. In the background condition this intersection would remain outside the UGB with a target mobility standard of v/c = 0.90. Intersection operations would slightly exceed this target. In the fall of 2020, Washington County began an improvement project to widen Roy Rogers Road between Scholls Ferry Road and a point 2,500 feet south of Bull Mountain Road to five lanes (two travel lanes in each direction with a center turn lane) with bicycle/pedestrian facilities along both sides of the road.

- *Beef Bend Road at 150th Avenue* – This stop-controlled intersection would operate substantially above its mobility standard of v/c = 0.99 for the southbound side street (150th Avenue) movement.
- *Roy Rogers Road at Elsner Road* – The side street stop-controlled movement at this intersection would substantially exceed its mobility standard of v/c = 0.90.
- *Highway 99W at Beef Bend Road, Durham Road and Fischer Road* – Each of these intersections is expected to exceed its mobility target of v/c = 0.99. At Beef Bend and Fischer Roads, the target would only be slightly exceeded. Longer delays would be experienced at Durham Road, in part due to the split phase signal operations necessitated by existing lane geometry.
- *Highway 99W at Roy Rogers Road/Tualatin-Sherwood Road* – This intersection is expected to substantially exceed its mobility target of v/c = 0.99 even with the addition of a second northbound and southbound through lane on Roy Rogers Road as identified in the RTP and County TSP.

2.6 King City Transportation System Plan

The City's first *Transportation System Plan* (TSP) is in early stages of development. This planning effort will run roughly concurrently with the King City Master Plan effort and will need to be carefully coordinated and integrated at each stage. The primary focus of the TSP will be on citywide transportation issues and the integration of the city's transportation system within the regional multimodal network of services and facilities operated by ODOT, Washington County, Tigard, Sherwood, Tualatin and TriMet. Key work elements identified for preparation of the TSP include:

- Establish a transportation vision, goals, and policies along with infrastructure standards and performance measures. Includes walking, bicycling, low speed vehicles, transit, freight, motor vehicles, other modes, safety, and connectivity *(Timeline: August to December 2020).*
- Existing conditions and needs analysis *(Timeline: October 2020 to February 2021)*.
- Transportation network evaluation including improvement alternatives, map and project lists, financial feasibility assessment, and revenue enhancement analysis *(Timeline: January to April 2021)*.
- Draft TSP *(Timeline: April to June 2021)*.

Key points of integration with the King City Master Plan include:

- Input into the transportation vision, goals, policies, and performance measures for King City that reflects the unique characteristics and intent for development of the study area
- Input into the development of infrastructure standards (for motor vehicles, low speed vehicles and active transportation) that meet the vision for the Master Plan
- Update existing conditions analysis as necessary with a focus on modal integration, connectivity to the existing city and surrounding area and accommodation of natural resource constraints
- Input into the development and/or phasing of multimodal transportation system improvements for the study area, including consideration of connectivity and/or modal elements

- Input into cost and revenue analysis for the TSP representing findings for the Master Plan study area

3 MULTI-MODAL TRANSPORTATION SYSTEM ANALYSIS

Discussion presented in this chapter focuses on identifying key elements of the transportation system context for the Master Plan study area including:

- Issues related to integration of new or existing streets in the study area with the surrounding transportation system
- Recent or on-going transportation studies and community development activities
- Early discussion on potential street standards and guidelines for multimodal connectivity that suit the vision for the study area
- Multimodal system elements and potential improvement opportunities

3.1 Transportation System Context

3.1.1 Integration with the Surrounding Street System

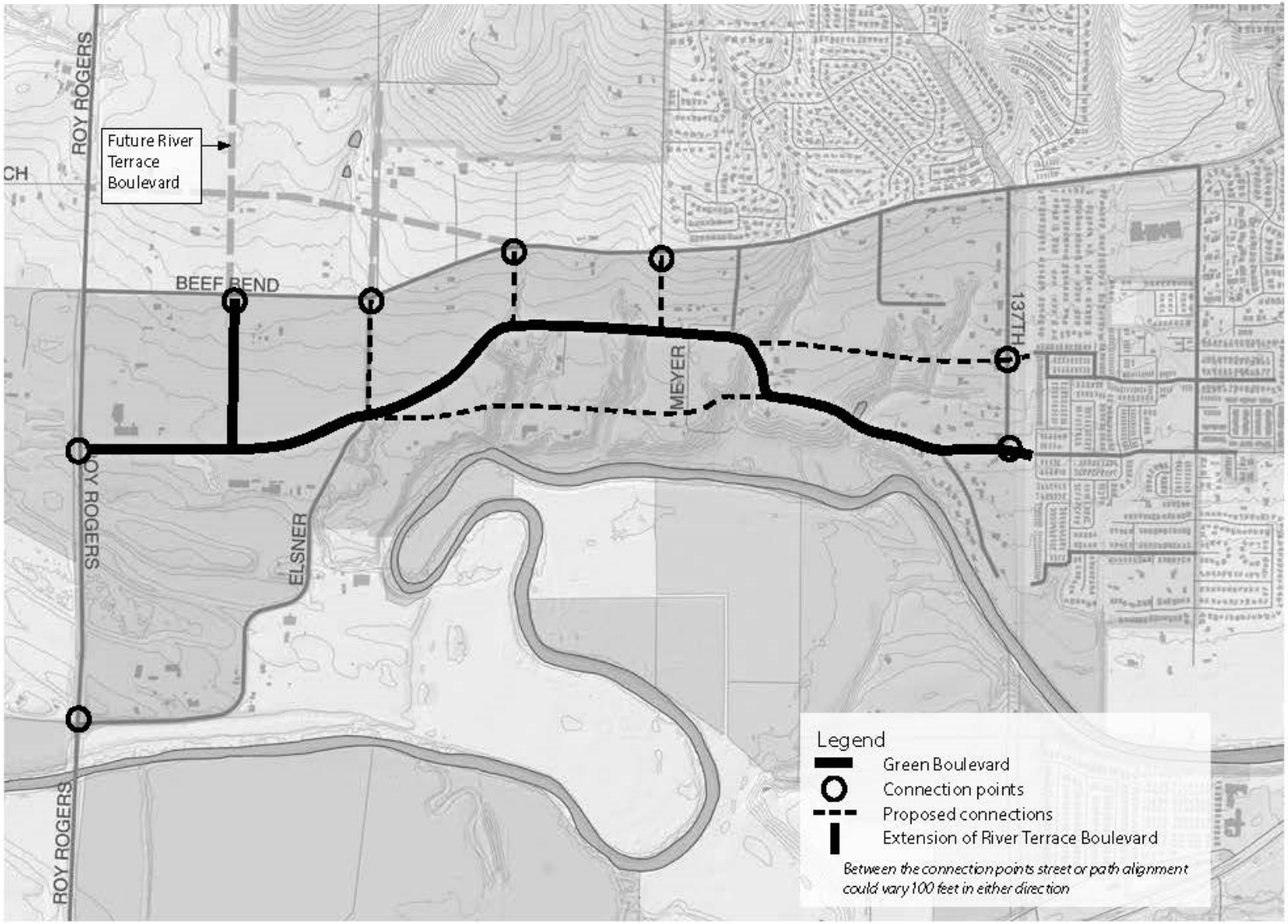
The TSP will focus on many of the issues related to integration of the Master Plan study area with the surrounding street system and adjacent developed urban areas. **Figure 5** from the Concept Plan illustrates a vision of the backbone transportation system (composed largely of collector streets) that could serve the Master Plan study area. This figure is intended to provide planning context. Key issues to keep in mind while preparing the Master Plan include:

- ***Roy Rogers Road*** - Pending or potential improvements to Roy Rogers Road. As noted in Chapter 2, in the fall of 2020, Washington County began an improvement project to widen Roy Rogers Road between Scholls Ferry Road and a point 2,500 feet south of Bull Mountain Road to five lanes (two travel lanes in each direction with a center turn lane) with bicycle/pedestrian facilities along both sides of the road. This improvement represents about ½ of the distance from Scholls Ferry Road to Beef Bend Road. Improvements including widening and multimodal facilities in the vicinity of Beef Bend Road are included in the Washington County TSP as a rural road enhancement area.

- ***Beef Bend Road*** is identified as an ultimate urban three-lane cross-section in the Washington County TSP between OR 99W and 150th Avenue. No improvement west of 150th Avenue was identified. Questions have been raised as to whether this road should be further widened to a five-lane cross-section to provide added east/west arterial capacity through this portion of the County.

- ***East/West Backbone Street*** - Connectivity to the existing developed portions of the City are largely expected to be focused on Fischer Road due to the lack of other connectivity on existing east/west streets. The Concept Plan envisioned a more-or-less continuous connection from Elsner Road to the existing alignment of Fischer Road which would require crossing several large ravines with their added construction cost. Close consideration should be given to the ultimate alignment of this street to both minimize costs and encourage local traffic within King City to stay on this road for shorter trips rather than using Beef Bend Road. The ultimate location of this backbone east/west street should also be constructed at sufficient distance from Beef Bend Road to allow for appropriate land use.

Figure 5. URA 6D Concept Plan Circulation System



- ***Collector Streets*** in the Master Plan study area – Per Washington County requirements, any direct connections to Roy Rogers Road or Beef Road must be made from a collector level street. Thus, many of the north/south streets proposed in the study area will need to be designated, designed and function as collector streets. Access to the proposed Master Plan Town Center area from Roy Rogers and/or Beef Bend Road should also be allowed and is anticipated in the TSP as a key analysis location.
- ***Connections to River Terrace*** – As discussed below, the approved River Terrace development located north of Beef Bend Road and east of Roy Rogers Road identifies road and trail connections to the south. Any road or trail connections to the north from the study area should be coordinated with the development plan for this area.

3.1.2 Washington County Urban Reserves Transportation Study

The Washington County *Urban Reserves Transportation Study* (URTS) began in the spring of 2019 and is nearing completion. The URTS examines how future land development in the County's existing Urban Reserve areas will affect the existing and potential future transportation system. The study identifies which area roadways will need to be widened to accommodate the added traffic from Urban Reserve development and will provide guidance to affected cities in planning for future priority transportation improvements and reservation of the necessary rights-of-way.

The URTS includes the Master Plan study area and evaluates the following:

- ***Two alternatives for realignment of Beef Bend Road*** were evaluated with the primary objective of avoiding impacts to the Tualatin River National Wildlife Refuge. The Refuge could be affected by any extension of this road further west to serve future urban reserve areas to the west and north of the study area. Option 1 would relocate the intersection with Roy Rogers Road immediately north of its current location, while Option 2 would relocate the Roy Rogers Road intersection about 900 feet north of its location opposite Lasich Lane. Preliminary costs and potential benefits of these two alignments were identified but no recommendation was made.
- ***The effectiveness of a westerly extension of Fischer Road*** from its existing terminus to Roy Rogers Road was evaluated. The URTS found that lack of such a facility restricts local access between the existing city and the Master Plan study area. As noted: *"Without the extension in place, future development must use Beef Bend Road to access these areas, adding 4,800 vehicles to Beef Bend Road each day along with other key local access roads, such as 131st Avenue. The Fischer Road extension allows for local traffic to circulate through the city without having to use Beef Bend Road, leaving the arterial capacity for through traffic from Roy Rogers to OR 99W."* As further noted: *"Without the Fischer Road extension, westbound Beef Bend Road between 131st Avenue and 150th Avenue, and northbound Roy Rogers Road between Beef Bend Road and Elsner Road will exceed their capacity. Northbound 131st Avenue is also expected to exceed Washington County's mobility standard without the Fischer Road extension."*
- ***The extension of Tile Flat Road*** south from Scholls Ferry Road to Roy Rogers Road with an expected connection to Beef Bend Road. Two phases of the project were identified, Extension A and Extension B. Extension A would run from Scholls Ferry Road to Bull Mountain Road and provide a backbone road for development in the River Terrace West Urban Reserve (see

Appendix A for an illustration). Extension B would run from Bull Mountain Road to Beef Bend Road east of and parallel to Roy Rogers Road. It would complete a new corridor for regional travel that diverts traffic from Roy Rogers Road and Scholls Ferry Road. As noted in the URTS report: *" Constructing Tile Flat Road Extension B can further reduce traffic on Roy Rogers Road between Bull Mountain Road and Beef Bend Road which is expected to be highly congested in the future. With this extension in place, most segments of Roy Rogers (between Scholls Ferry Road and Scholls-Sherwood Road) will not exceed capacity."* The project would also add sidewalks and bike lanes and provide lower speeds to create a more comfortable active transportation corridor than Roy Rogers Road. Construction of Extension B is expected to occur in concert with development in the area.

Appendix A provides graphics of the urban reserve areas that were studied and identifies potential necessary transportation system improvements with defined projects and associated costs.

3.1.3 River Terrace Development

The *River Terrace Community Plan* envisions a comprehensive circulation system for motor vehicles, pedestrians and cyclists in the River Terrace development located north of Beef Bend Road and east of Roy Rogers Road. This system, including trails, would link the many existing natural resource areas, proposed parks, future schools and services, residential and employment areas to the surrounding transportation system including potential future development in the Master Plan study area.

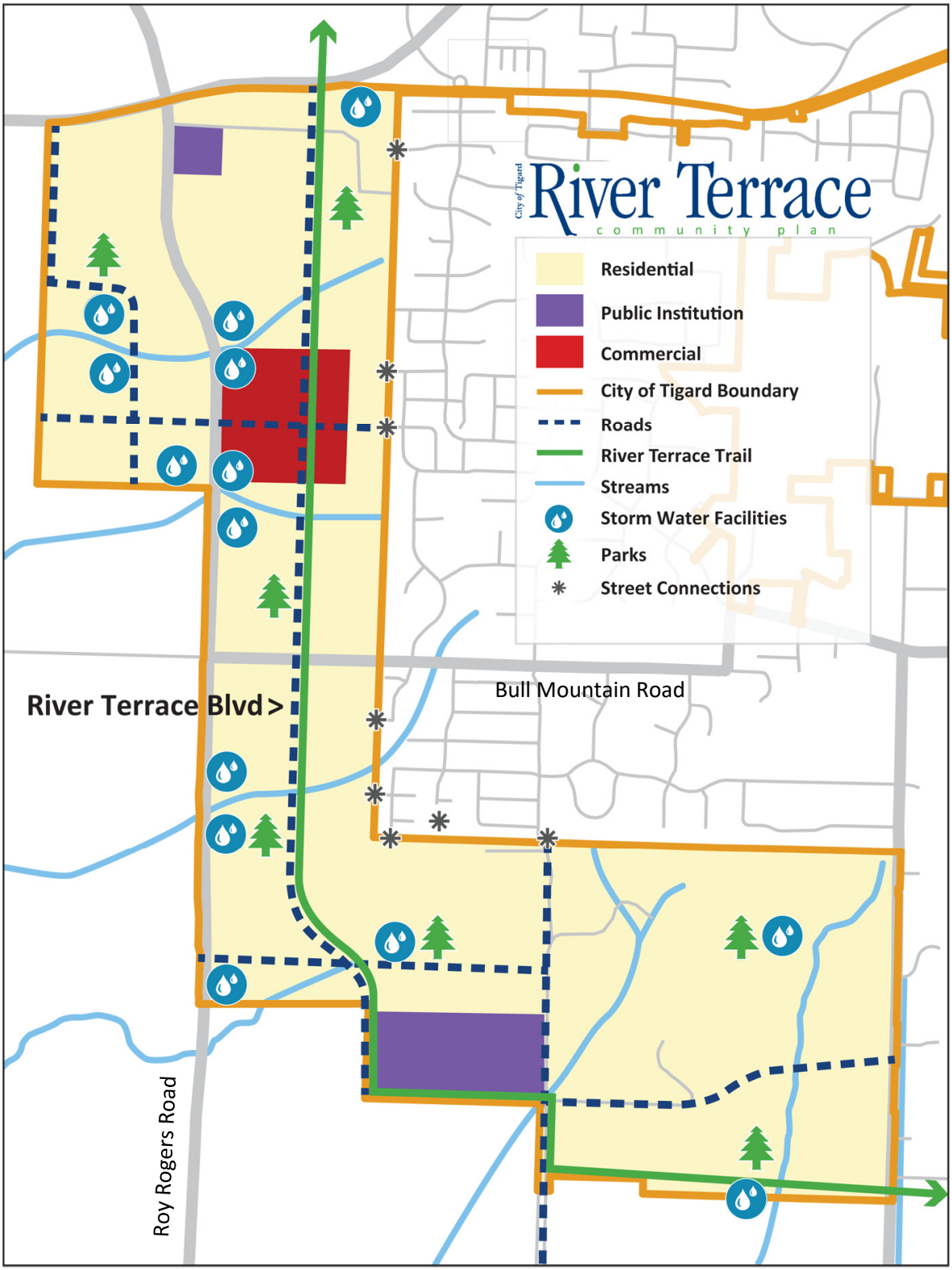
Figure 6 from the River Terrace project website illustrates the proposed River Terrace backbone circulation system. The key part of this system is a north/south facility to be known as River Terrace Boulevard east of and parallel to Roy Rogers Road. This roadway alignment would run from Bull Mountain Road on the north to the southern edge of the River Terrace development. Completion of a connection to Beef Bend Road will be addressed as part of Tigard's Concept Plan for future development in the River Terrace South Urban Reserve.

Paralleling River Terrace Boulevard is the River Terrace trail which is intended to take the place of the Roy Rogers Road regional trail originally identified in the *Washington County TSP*. The trail alignment within the River Terrace development was preferred over a Roy Rogers Road alignment by most community stakeholders, who also felt that the inclusion of both alignments was neither feasible nor necessary given the proximity of both trails to each other. The River Terrace trail would travel from Scholls Ferry Road on the north to 150th Avenue on the southeast. It would be co-located with the development's main north/south boulevard for approximately 1.5 miles of its 2.25-mile length. This trail was planned, in part, to complement Metro's Westside Trail as it provides a less steep travel option around Bull Mountain. This option is illustrated in the *Westside Trail Master Plan.* When planning active transportation facilities and/or trails for the study area, it will be important to coordinate proposed trail alignments with the River Terrace facilities.

3.1.4 Tigard Transportation System Plan

Tigard is currently engaged in preparation of a Transportation System Plan Update. This TSP will address the needs of all road users including pedestrians, bicyclists, transit riders, drivers, and freight. It will be guided by community input and build off the City's Strategic Vision and Complete Streets policy which

Figure 6. River Terrace Proposed Multimodal Circulation System



has the goal of supporting equitable access for all travelers. Key work elements identified for preparation of the TSP include:

- Set goals and objectives and document existing conditions (*Timeline: October to November 2020*)
- Analyze future conditions and needs, create solutions and strategies (*Timeline: December 2020 to April 2021*)
- Prioritize projects for funding and develop a financial plan (*Timeline: May 2021*)
- Finalize TSP (*Timeline: June to August 2021*)

3.2 Roadway Design Characteristics

Design characteristics of roads in the Master Plan study area were developed as part of the Washington County TSP and articulated in the County's Road Standards. Because the actual design of a roadway can vary, the objective was to define a system that allows standardization of key characteristics for each functionally-classified facility to provide consistency, but also to provide criteria for some flexibility, while meeting standards. The discussion in this section addresses both roadway cross-sections and street connectivity goals and limitations.

3.2.1 Street Cross-Sections

Table 4 highlights key design parameters including street and right-of-way widths and street cross-sections. Details for each street classification are presented in **Appendix B** which depict sample street cross-sections and design criteria for arterials, collectors, neighborhood. routes and local streets based on County standards. King City also provides guidance on street standards as part of the *King City West Concept Plan* which is also included in Appendix B.

Table 4. Design Parameters for Major Study Area Streets

Street	Lanes	Bike Lanes	Maximum Right-of-Way	Max. Paved Width
Oregon 99W	5	Yes	170-230 feet	100-115 feet
Roy Rogers Road	5	Yes	98 feet	74 feet
Beef Bend Road	3	Yes	90 feet	50 feet
Elsner Road	2	Yes	74 feet	50 feet
150th Avenue	2	Yes	74 feet	50 feet
146th Avenue	2	No	60 feet	36 feet
131st Avenue north of Fischer Road	2	Yes	74 feet	50 feet
131st Avenue south of Fischer Road	2	No	60 feet	36 feet
Fischer Road east of 131st Avenue	2	Yes	74 feet	50 feet

Source: Washington County 2015 TSP and King City West Concept Plan

The most common roadways in the Beef Bend Road study area are two, three and five lanes wide. Where center left turn lanes are identified, the actual design of the street may include sections without center turn lanes or with median treatments, where feasible. The actual treatment will be determined within the design and public process for implementation of each project. Specific right-of-way needs

must be monitored continuously through the development review process to reflect current needs and conditions.

The City of King City will need to coordinate with regional agencies to assure consistency in cross-section planning with the Washington County *Transportation System Plan* for roadways under the County's jurisdiction.

3.2.2 Local Street Connectivity

Much of the local street network within the existing King City limits is fairly well connected in a north/south direction with multiple access opportunities for entering or exiting most neighborhoods. Key north/south streets include Royalty Parkway (and connecting streets of King Charles Avenue and 124th Avenue), El Dorado Drive/126th Avenue, and 131st Avenue.

SW Fischer Road, a designated County collector street, provides good east/west connectivity through the existing residential portion of the city between Highway 99W and 131st Avenue. This street offers a potentially good future connection into the study area. The recommended functional classification of this future connection will be determined in the planning process.

There are few other east/west connections that unite existing King City neighborhoods. Particularly isolated are the mobile villages including El Dorado and King Village on the south side of the city, and Mountain View Mobile Estates in the northwest corner of the existing city. Access into, out of or through these villages provides little opportunity for connectivity with the remainder of the City.

Due to the lack of connections, traffic is funneled largely onto SW Fischer Road or onto Beef Bend Road. This type of street network can result in out-of-direction travel for motorists and create an imbalance in traffic volumes. In addition to motor vehicles, direct connections contribute greatly to accessibility for pedestrians and bicyclists.

In developing a proposed road network for the study area, local street connectivity will be an important consideration. By providing good connectivity throughout the study area and into the existing city, out-of-direction travel, and the need to use Beef Bend Road can be reduced. Good local road connections can reduce potential neighborhood traffic impacts by balancing traffic volumes between various streets and can mitigate capacity deficiencies by better dispersing traffic. Additionally, accessibility between various modes can be enhanced to encourage the use of non-automotive travel.

Guidance for Planning Street Connectivity

Guidance in planning for street connectivity in the Master Plan study area can be found in many sources including the Metro *Regional Transportation Functional Plan (RTFP)*, the Washington County Community Development Code (CDC), the Washington County Road Standards, and the King City Municipal Code (KCMC) and *Comprehensive Plan* (*West King Planning Area*).

Detailed information is provided in **Appendix C** and is summarized in **Table 5**. Information presented in this table addresses maximum spacing for connections to arterial and collector streets, pedestrian and bicycle accessways, cul-de-sacs, arterial pedestrian crossings, and maximum block lengths and block perimeters.

Table 5. Street Connectivity Guidelines

Type of Connection	Maximum Dimension	Notes	Source
Street Spacing:			
• Full Street	530 feet	Except if not reasonable or cost-effective	Metro RTFP
• Ped/Bike Accessways	330 feet		Metro RTFP
Water Crossings:			
• Full Street	800-1200 ft	Unless habitat quality or length of crossing prevents full street	Metro RTFP
• Ped/Bike Accessways	530 feet		Metro RTFP
Cul-de-sacs	200 feet	Serving no more than 25 dwellings	Metro RTFP/KCMC
Access to Arterials	600 feet	From collector or other arterial	Washington County CDC
Access to Collectors	NA	150 feet minimum frontage width, no direct access if less than 150-foot width	Washington County CDC
Pedestrian/Bicycle Accessways	600-foot block faces	Accessway required every 400 feet	Washington County CDC
Arterial Pedestrian Crossings	NA	Minimum spacing of 600 feet	Washington County CDC
Block Length	530 feet	Between through streets	KCMC
Total Block Perimeter	1800 feet	Between through streets	KCMC

Other Considerations:

1. Within the West King City Planning Area, the KCMC requires that street system design include a minimum of two future local street connections to SW 137th Avenue and a minimum of one future local street connection to the property presently occupied by the Mountain View Mobile Estates manufactured home park. The Code indicates that the northern street shall be dedicated or otherwise reserved for future public street use.
2. While an interconnected street system is required, local street systems should be designed to discourage motorists traveling between destinations that are outside of the neighborhood being served by the local streets.

Note: Metro RTFP means *Regional Transportation Functional Plan,* KCMC means King City Municipal Code, Washington County CDC means Community Development Code

3.2.3 Alternative Street Standards

This section summarizes prior planning efforts and various ideas to facilitate creation of a typology of streets that reflects the unique character and vision for development of the study area. These typologies build on existing standards but include modifications that are intended to correlate with adjacent land uses, thus suiting the context and sense of place that the Master Plan is trying to achieve - a more walkable and livable community for a diversity of residents.

The discussion of alternative street typologies has been organized by street classification or type. Each street type is presented in **Table 6** which includes information about the function, characteristics, and application of the type. Consideration of alternative street typologies could modify the existing street standards identified in the Washington County TSP and the *West King City Concept Plan*.

Table 6. Summary of Alternative Street Typologies

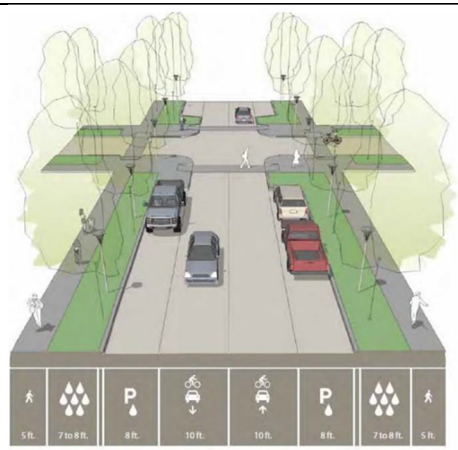
Street Type	Examples	Key Features	Sample Illustration
Big Street (Arterial)	Beef Bend Road	Beef Bend Road is currently suitable for a 3-lane cross-section, but future development could require 5 lanes. The Concept Plan identified a goal for Beef Bend Road to tame traffic, while not impinging on auto mobility through the region. The vision for Beef Bend Road is slower traffic, a park-like setting, a planted median, inviting and safe opportunities for pedestrians and bicyclists. Development along Beef Bend Road would be multi-dwelling residential where homes fact the street and have backside alley access. Homes would be separated from traffic by a wide greenspace. Because of area topography, travel lanes could be splayed to minimize the height and cost of structures (see illustration). A multiuse off-street path would provide a safe and attractive route for bicyclists and pedestrians.	 Beef Bend development design concept  Example of splayed travel lanes
Collectors	SW Fischer Road SE Elsner Road Others to be determined	A variety of collector street cross-sections could be developed with an overall goal of reduced travel speeds (i.e., 20 mph target speeds). Options could include the provision of on-street bicycle lanes, require shared bicycle and auto use on a low-speed facility, or rely on a separated multiuse path. Pedestrian facilities could be provided as buffered sidewalks or as part of a multiuse path. On-street parking could also be provided on one or both sides of the street or could be diagonal. The preservation or planting of street trees would be desirable.	

Table 6 Continued. Summary of Alternative Street Typologies

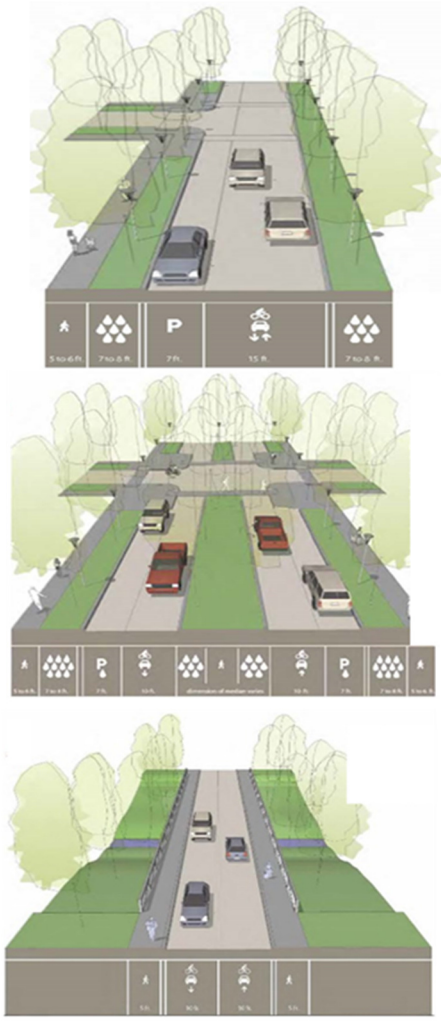
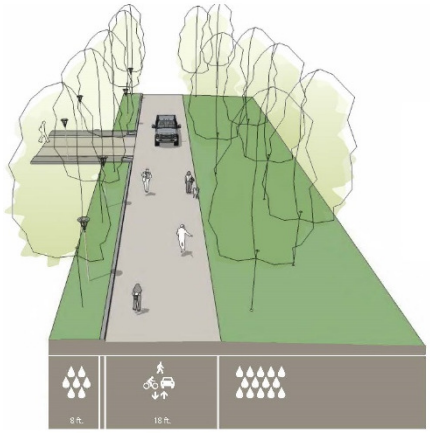
Street Type	Examples	Key Features	Sample Illustration
Local Streets	Neighborhood Street-2 side parking Neighborhood Street-1 side parking Neighborhood Street-Diagonal Parking Informal Walkway Streets Streambed Crossing	Neighborhood Streets are designed to enhance safety for all modes: cars, bikes, pedestrians, and low speed vehicles. Speeds will be slow and cars meeting each other from opposite directions will slow and yield to one another. Bicycles will share the travel lanes with cars. Intersections may be necked-down with bulb-outs to improve safety for pedestrians. Permeable paving could be used in the parking lanes and flow-through planters in the street buffer area would reduce the extent of impervious surfaces in the study area which supports wetland and stream health. Parking could be provided on one of both sides of the street. These streets could also include a median to enhance street appearance and improve water quality by capturing and treating storm water runoff. Streambed Crossing represents a cross-section that could be applied to local or collector streets where the road would cross an existing streambed. The crossing could be made with a culvert or bridge. The street section would narrow to reduce initial and life-cycle costs and minimize the impact of culvert or bridge construction on the creeks. Speeds would be slow, and bicycles would share the travel lanes with cars.	

Table 6 Continued. Summary of Alternative Street Typologies

Street Type	Examples	Key Features	Sample Illustration
Alley and Green Streets	Shared Street Woonerf Rear Lane Universal Street	Shared streets are designed to support a park-like atmosphere where all modes of traffic share a narrow paved surface. Shared streets are places for people and the automobile is a guest using space that has is shared among all travel modes. The pace of walking dictates the speed of all traffic on a shared street. The narrow street section reduces the extent of impervious surfaces and supports wetland and stream health. Proposed locations for shared streets would be adjacent to wetlands and stream corridors. Street edge alternatives may permit storm water flow to re-infiltrate into the ground. Alleys provide off street access to homes, parking pads and garages. Alleys are also known as rear lanes and are very narrow. The street section is 12-feet wide with a 2-foot green edge on either side. Speeds are very low. As with shared streets, the narrow cross-section reduces the extent of impervious surfaces and supports wetland and stream health. Alleyways are curbless and permit storm water re-infiltration	 

3.3 Multimodal Transportation System

As the City's TSP is in early stages of preparation, the information contained in this section was abstracted from the Concept Plan prepared for the study area. There are many opportunities for developing a variety of active transportation facilities and providing full modal connections within and connecting to the study area. This information will be updated by the TSP and coordination will occur between the TSP and the *King City Master Plan* to ensure that multimodal connections reflect the vision and goals for development of the study area.

Key destinations for the active pedestrian and bicycle transportation system within and near the study area include various schools, parks, and employment/retail commercial centers located within reasonable proximity. The study area is also the focus of a significant regional trail system which maximizes proximity to the Tualatin River, the Tualatin River National Wildlife Refuge, and the Bonneville Power Administration's utility corridor.

3.3.1 Existing Pedestrian Facilities

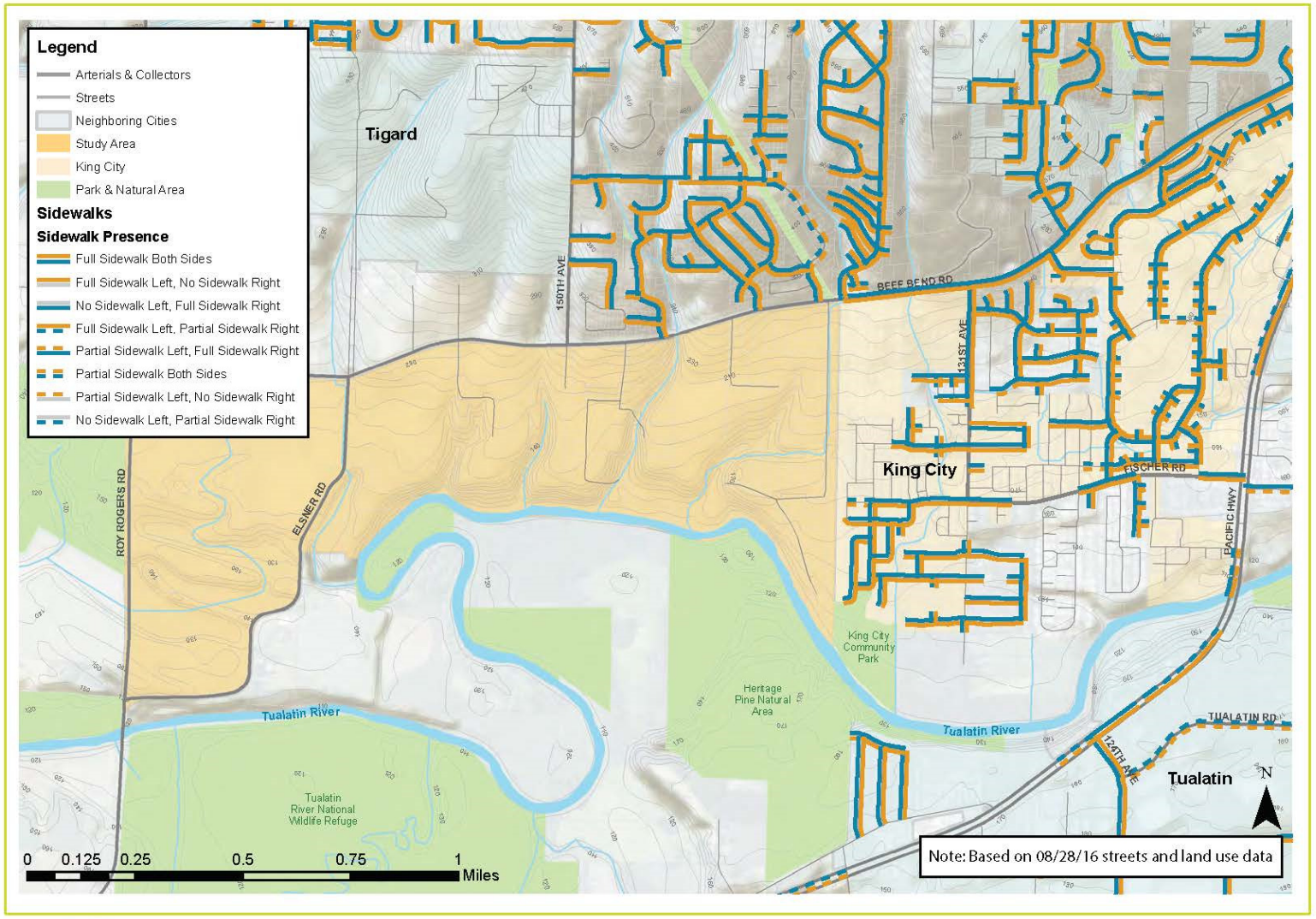
An inventory of pedestrian facilities was conducted for the Washington County TSP Update and was updated in 2018 for the Concept Plan. This inventory considered sidewalks, trails and any enhanced pedestrian crossings to major streets or highways in unincorporated areas or along roads under County jurisdiction and is illustrated in **Figure 7.** As shown in this figure connectivity and pedestrian linkages are generally good on the local street system in the existing developed portions of King City. A key issue with existing pedestrian circulation are the limited east/west circulation opportunities on both the north and south sides of Fischer Road between 131st Avenue and OR 99W (including Fischer Road, King Richard Drive, a pathway between Jordan Road and Morocco Drive and Beef Bend Road). The existing inventory of pedestrian facilities is currently being updated for the TSP, but new mapping is not yet available.

As also shown in Figure 7, there are little or no pedestrian facilities in the study area with walking being largely accommodated on existing roadway shoulders. Sidewalks have recently been constructed along the north side of Beef Bend Road for most of the segment between 137th Avenue and 150th Avenue with a few short gaps. There are no protected pedestrian crossing locations along this street which is signed for 45 mph speeds. There are no existing trails in the vicinity of the study area on the south side of the Tualatin River in the Wildlife Refuge. Existing and proposed regional and community trails in the study area are illustrated in **Figure 8**.

3.3.2 Potential Pedestrian Facilities

Planning for development of a bicycle circulation system in and adjacent to the study area is guided by several documents including the West King City Planning Area in the City's *Comprehensive Plan*, and the *Washington County TSP* and Road Standards.

West King City Planning Area – The West King Planning Area in the City's *Comprehensive Plan* identifies several street cross-sections that can be applied to the planning of new collectors and local streets and associated pedestrian facilities in the study area. Based on these guidelines, pedestrian circulation will primarily be provided with sidewalks on both sides of all streets within and adjacent to the study area. Additionally, the *Comprehensive Plan* encourages the city to look for opportunities to provide pathways



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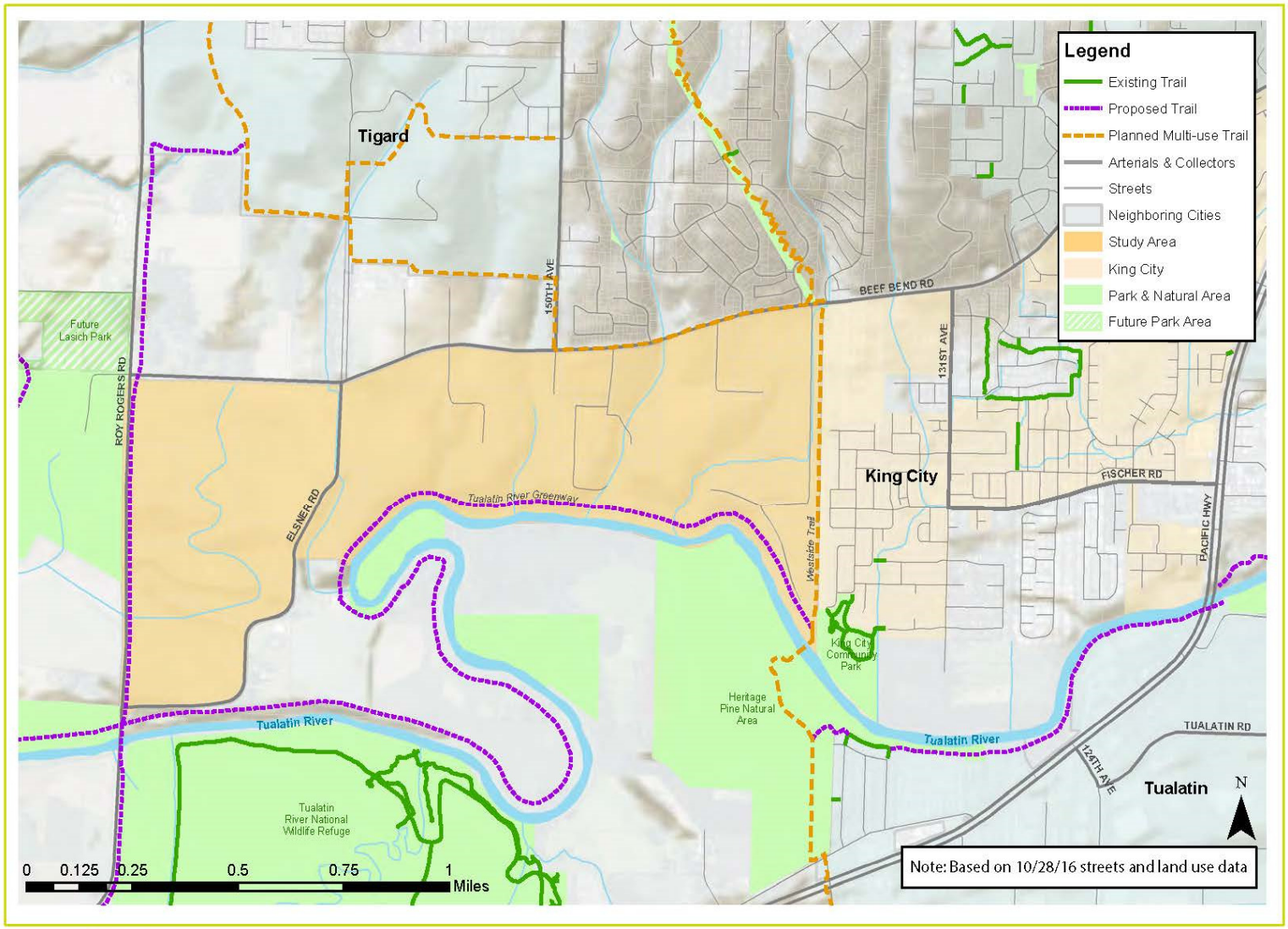
Beef Bend South Master Plan
King City, Oregon

Figure 7. Concept Plan
Existing Sidewalks



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Beef Bend South Master Plan
King City, Oregon

Figure 8. Concept Plan
Existing and Proposed Trails

or trails in conjunction with development and in coordination with other agencies. Special attention should be paid to pathways that will complement existing or planned parks and open space areas or provide direct connections for active transportation modes where full street connections are not necessary or viable from a cost-effectiveness or impact standpoint.

The *Comprehensive Plan* further identifies the need to develop safe pedestrian facilities to provide access between residential areas and the Deer Creek Elementary School. Whether this school will serve the entire Master Plan area or if a new school facility is located within the study area, the city will need to work closely with the Tigard-Tualatin School District and Washington County to provide permanent sidewalks or temporary pathways that provide access to these institutions. School attendance boundaries will also need to be considered in the development of active transportation facilities, particularly if a crossing of Beef Bend Road is necessary.

Washington County TSP – Figure 3-25 in the *Washington County TSP* provides regional context for the development of pedestrian facilities in the study area. This figure identifies locations for pedestrian parkways, streetscape overlay zones, proposed regional trails, and regional trail refinement areas. Particularly pertinent to the development of a pedestrian circulation system in the study area are the proposed regional trails in the vicinity and two of the designated regional trail refinement areas. The refinement areas include along the Tualatin River immediately south of the study area, and along Roy Rogers Road. Regional trails are only conceptually planned within a refinement area, and a specific alignment has not yet been determined. A feasibility study or master plan is necessary to determine the specific alignment. Coordination with Washington County on these refinement areas should occur during the master planning process.

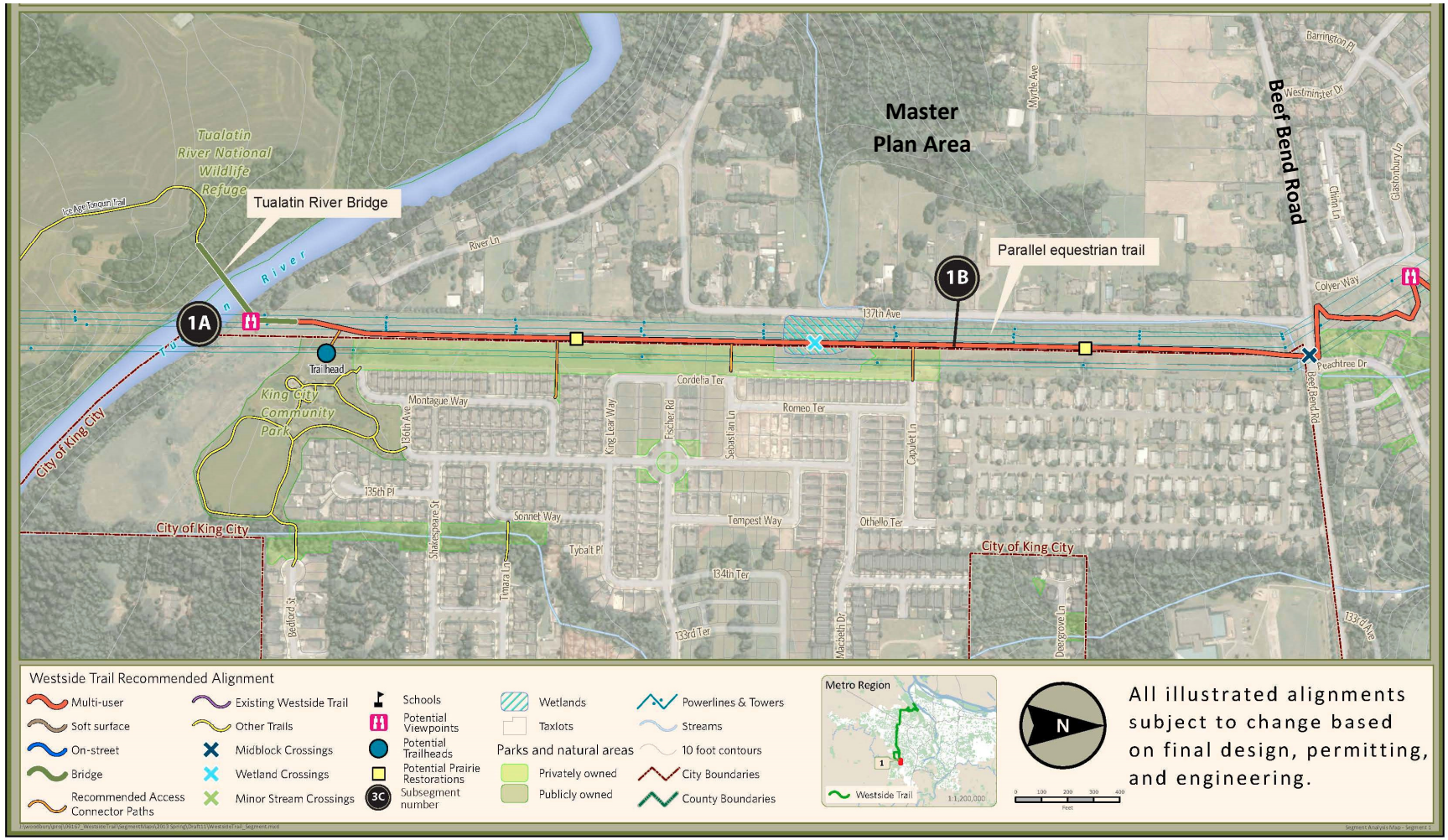
The Washington County TSP also includes an extensive regional trail system as part of both the Plan's Pedestrian Element and Bicycle Element. According to the TSP, *"a regional trail is a multi-use pathway that accommodates regional and local utilitarian pedestrian and bicycle trips. Regional trails serve a transportation function and are encouraged to be designed and constructed in ways that facilitate comfortable, convenient travel."*

Figure 3-25 and Table 3.14 of the TSP identifies the major existing and proposed regional trails in the County. Of particular relevance to the Master Plan are the following:

- Westside Trail – This trail generally follows a north/south power line corridor across Washington and Multnomah counties, eventually connecting the Tualatin River near King City with the Willamette River in far northwest Portland. Many portions are complete between Barrows Road in Tigard and TV Highway in Beaverton. Major challenges in the remaining sections include steep topography on Bull Mountain, and costly crossings of Sunset Highway and the Tualatin River. **Figure 9** shows the proposed alignment for the Westside Trail in the vicinity of the study area.

Westside Trail Segment 1- Looking North (Metro Photo)

Figure 9. Westside Trail Segment 1 - Tualatin River to Beef Bend Road



- Tualatin River Greenway Trail - This riverside trail would extend from the Wildlife Refuge eastward through downtown Tualatin, underneath Interstate 5 and into Clackamas County, where it would enter the Stafford urban reserve.
- Ice Age Tonquin Trail - A three-pronged network of trails will eventually connect Tualatin, Sherwood, and Wilsonville. One section has been completed within Metro's Graham Oaks Nature Park in Clackamas County. The northern prong of the trail would connect with the Westside Trail at a proposed pedestrian/bicycle bridge over the Tualatin River near King City. The western prong would pass through the City of Sherwood as the Cedar Creek Trail.

3.3.3 Existing Bicycle Facilities

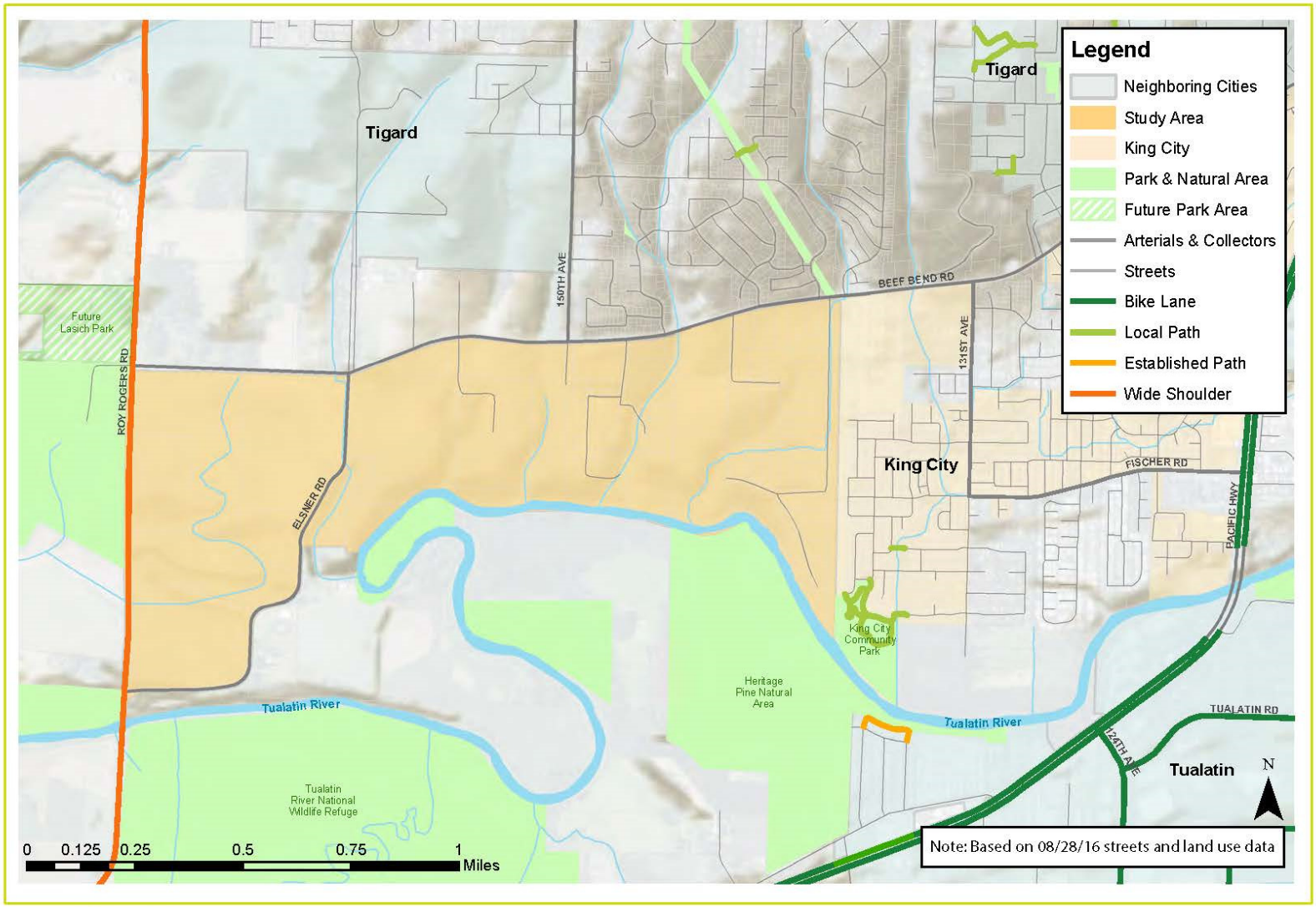
An inventory of bicycle facilities was conducted for the Washington County TSP Update and was updated in 2018 for the Concept Plan. This inventory considered bike lanes, wide shoulders, trails and any enhanced crossings to major streets or highways in unincorporated areas or along roads under County jurisdiction. With the exception of the wide shoulders on Roy Rogers Road as shown in **Figure 10**, none of the arterial and collector streets in study area have bike lanes or wide shoulders to accommodate bicycle travel. Additionally, while there are many planned trails in the vicinity of the study area (see Figure 6), there are no existing trails that specifically benefit the study area. The existing inventory of bicycle facilities is currently being updated for the TSP, but new mapping is not yet available.

Figure 11 was extracted from the Concept Plan and presents a qualitative evaluation of the existing bicycle circulation system in the study area. As noted in the figure, Beef Bend Road, Elsner Road and 150th Avenue are all identified as "Ride with Caution" due to the narrow roadway cross-section, lack of shoulders and relatively high vehicle speed. 131st Avenue has recently been improved to provide two through lanes with left turn channelization and bicycle lanes. Additionally, Fischer Road has been improved to add bike lanes and sidewalks from 131st Avenue to Pacific Highway.

3.3.4 Potential Bicycle Transportation Facilities

Planning for development of a bicycle circulation system in and adjacent to the study area is guided by several documents including the West King City Planning Area in the City's *Comprehensive Plan*, and the *Washington County TSP* and Road Standards.

West King City Planning Area – The West King Planning Area in the City's *Comprehensive Plan* indicates that, when developed, the bicycle circulation system would largely rely on shared use with vehicular traffic on the existing and proposed street system. This system would consist of local and collector facilities that were expected to carry low traffic volumes at relatively low speeds. The sidewalks and pathways would also be available to novice cyclists. The plan notes that bicycle lanes would generally be appropriate when average daily traffic volumes exceed 3,000 and have been recently added by improvements to both for SW 131st Avenue and SW Fischer Road. As with pedestrian routes, bicycle connections between important destinations may include separate pathways in addition to on-street facilities. The *Comprehensive Plan* also encourages the city to look for opportunities to provide pathways



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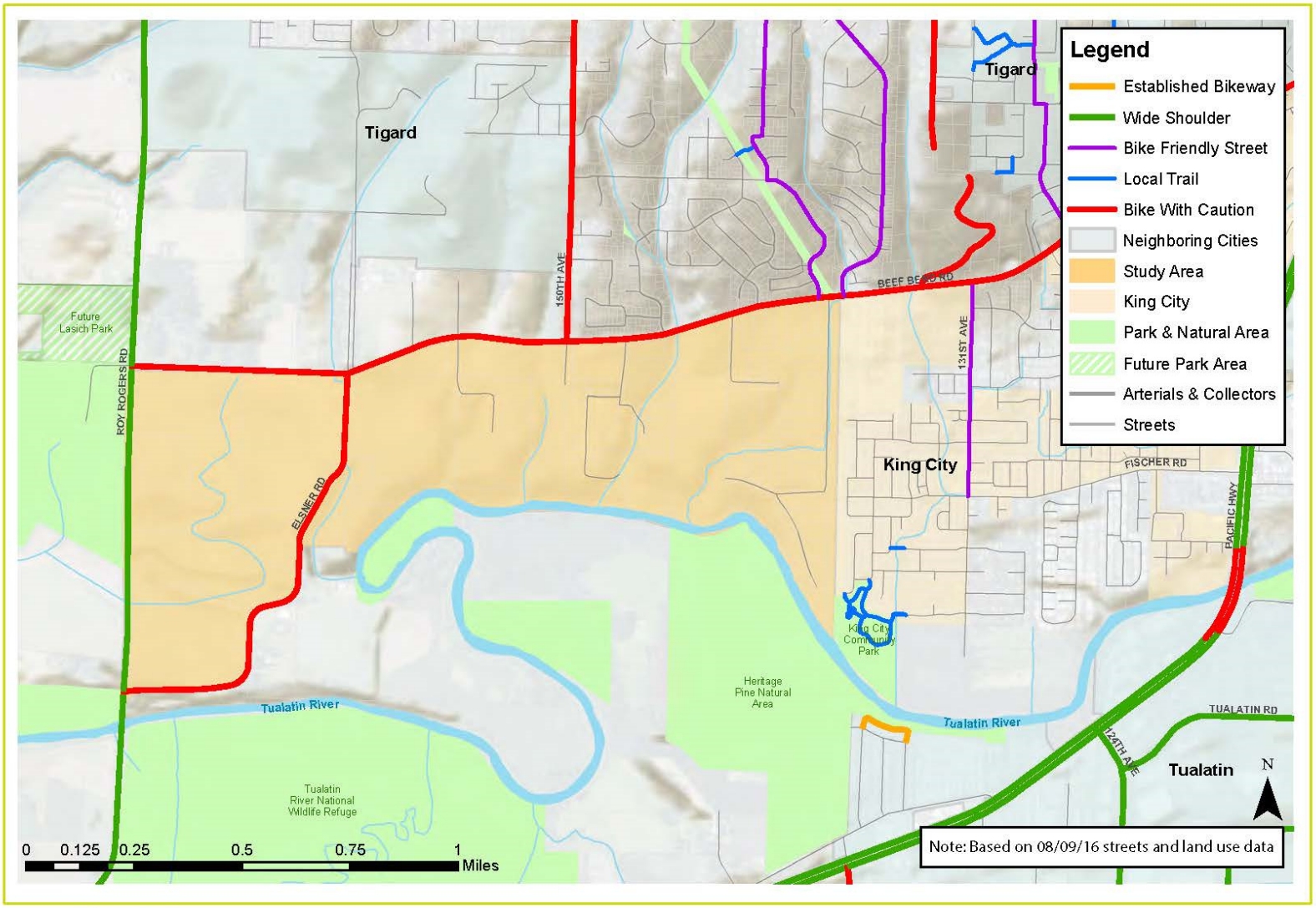
King City, Oregon

Figure 10. Concept Plan
Existing Bicycle Facilities



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Beef Bend South Master Plan
King City, Oregon

Figure 11. Concept Plan
Existing Bicycling Conditions

or trails in conjunction with development and in coordination with other agencies. Special attention should be paid to pathways that will complement existing or planned parks and open space areas or provide direct connections for active transportation modes where full street connections are not necessary or viable from a cost-effectiveness or impact standpoint.

Washington County TSP – Figure 3-27 in the *Washington County TSP* provides regional context for the development of bicycle facilities in the study area. This figure identifies locations for major street bikeways, proposed regional trails, and regional trail refinement areas. Particularly pertinent to the development of a bicycle circulation system in the study area are the proposed regional trails in the vicinity and two of the designated regional trail refinement areas as identified in the pedestrian system discussion.

Table 3-18 in the TSP highlights locations in the rural portions of Washington County (outside of exiting UGBs) where the addition of widened roadway shoulders would help to accommodate the need for bicycle travel in these areas. Specifically pertinent to the study area are identified needs for bicycle lanes (or wider shoulders) along Beef Bend Road and Fischer Road (Fischer Road improvements have recently been completed).

3.3.5 Transit

Transit service is not currently provided within the study area, but two fixed bus routes operate on Highway 99W connecting King City to the rest of the Portland Metropolitan Area. Bus stops are located at most major intersections along the highway through King City, along with two park-and-ride lots. The northern park-and-ride lot serving the study area is on Highway 99W at Bull Mountain Road (in the parking lot at Christ the King Lutheran church). A total of 30 spaces are available. The southern park-and-ride lot is located just off Highway 99W on Tualatin-Sherwood Road. A total of 50 spaces are available. Americans with Disabilities Act (ADA) paratransit service is also provided by TriMet in the study area.

Local paratransit service is provided by Ride Connection, a non-profit organization dedicated to providing transportation in areas and for persons not adequately served by fixed route buses. Ride Connection service is designed primarily for people over the age of 60 and for people with disabilities, although service is available for the general public when traveling in areas not served by public transportation. Ride Connection also provides deviated route service (buses that run on a route and schedule and can make small deviations to pick up or drop off passengers) in rural Washington County, Forest Grove, Tualatin, King City, and North Hillsboro.

3.3.6 Aviation

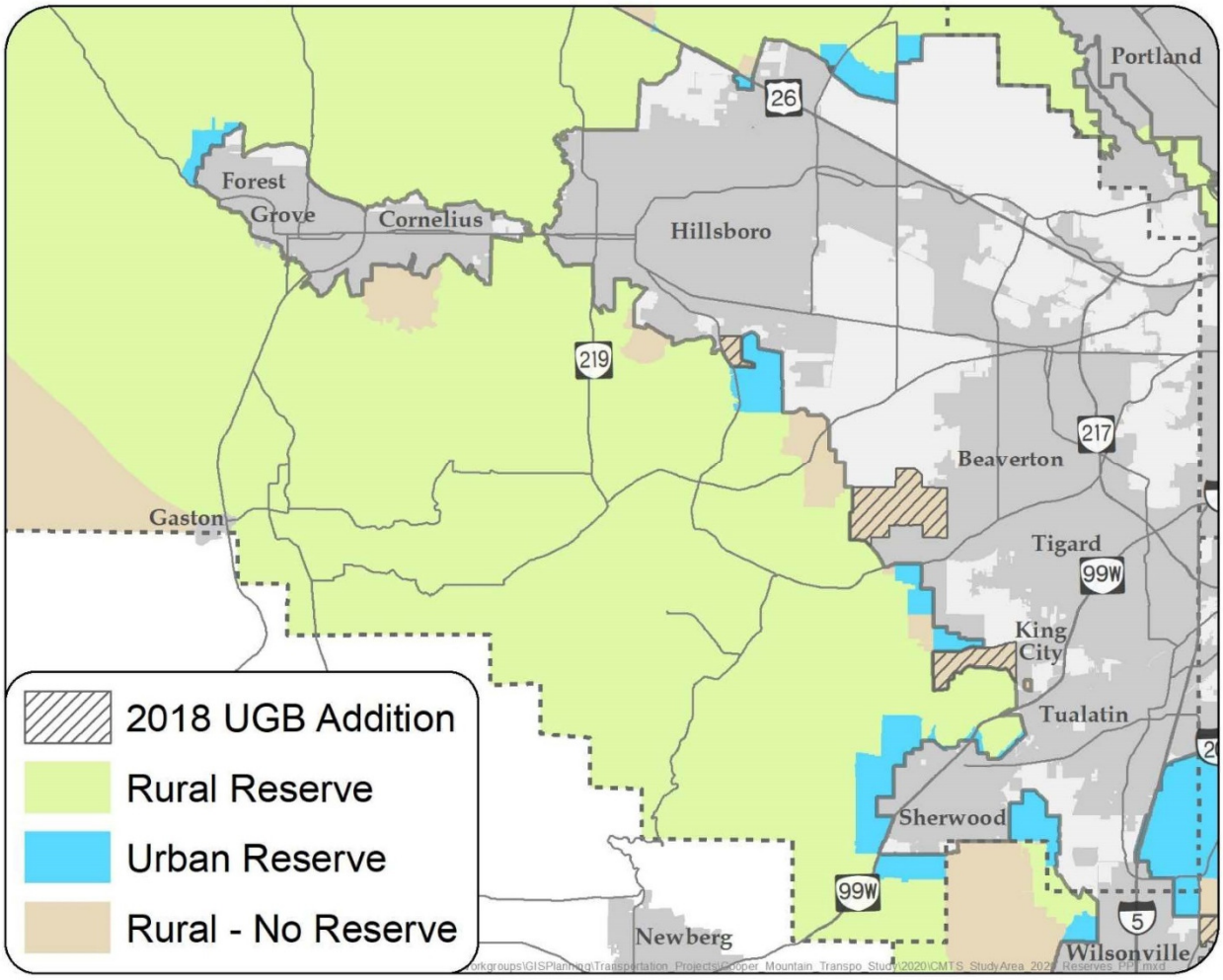
There is one small private use airport in the Master Plan study area – Meyer Riverside Airpark. The airport is located at 147th Avenue, is approximately 1,600 feet long and 100 feet side with a turf surface.

Appendix A

Urban Reserves Transportation Study Areas Near the Study Area

APPENDIX A – URBAN RESERVES TRANSPORTATION STUDY AREAS NEAR BEEF BEND SOUTH

Figure 1. Washington County Study Area



Beef Bend South Urban Reserves

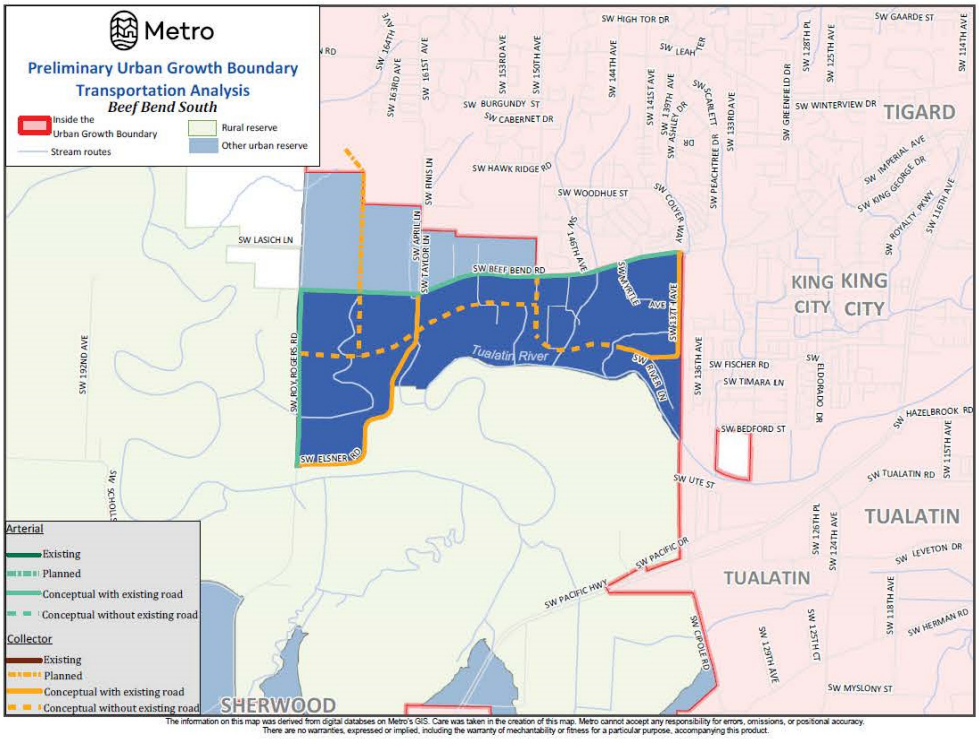
RTP Project ID	Roadway	From	To	Description	Status*	LF	Cost/LF**	Cost Estimate	UR/Regional	Adopted Long-Term Roadway Jurisdiction
11486/ 11903/ 11914	Roy Rogers Rd	Scholls Ferry Rd	Borchers Rd	Improve to 5-lane arterial standards	FC/MSTIP/ MSTIP Bonding/WWS	- - -	Planning Level Planning Level Planning Level	$0.0M $11.0M $25.0M	UR/Regional	County
11577	Beef Bend Rd	Roy Rogers Rd	OR 99W	Improve to 3-lane arterial standards	FC	-	Planning Level	$41.9M	UR/Regional	County
Metro UGR	River Terrace Blvd	Beef Bend Rd (extends further north into River Terrace South UR)	East-West collector	Extend as 2/3-lane collector roadway	New	1,500	$2,500	$4.0M	UR	TBD
Metro UGR	Fisher Rd extension	Fisher Rd existing terminus (west)	150th Ave	Extend as 2/3-lane collector roadway	New	3,400	$2,500	$8.5M	UR	County/TBD
Metro UGR	150th Ave extension	Beef Bend Rd	Fisher Rd extension	Extend as 2/3-lane collector roadway	New	1,400	$2,500	$3.5M	UR	Private/TBD
Metro UGR	East-west collector (parallel to, and south of, Beef Bend Rd)	150th Ave extension	Roy Rogers Rd	Extend as 2/3-lane collector roadway	New	5,700	$2,500	$14.5M	UR	TBD
TSP	Elsner Rd	Roy Rogers Rd	Beef Bend Rd	Improve to 2/3 -lane collector standards	TSP	5,750	$2,500	$14.5M	UR	County
Metro UGR	137th Ave	Beef Bend Rd	Fisher Rd	Improve to 3-lane collector standards	New	2,400	$2,500	$6.0M	UR	County
Total								**$128.9M**		
Total UR								**$51.0M**		
Total UR/Regional								**$77.9M**		

* FC = Financially Constrained by 2040, TSP = Included in TSP but not FC, New = Recently identified, MSTIP Bonding = MSTIP Bonding Cost-Sharing Program, WWS = Willamette Water Supply Project

**Assume $2,500/LF based on previous County roadway projects (e.g Springville, Cornelius Pass, Brookwood, Roy Rogers)

Indicates rough high-level cost estimate

Projects included in more than one UR area



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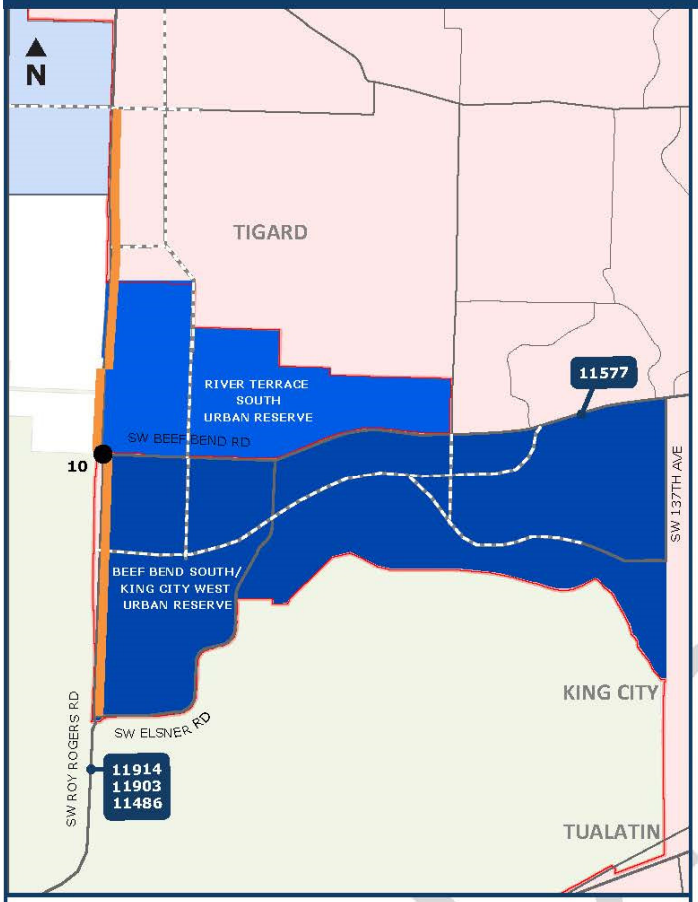
RIVER TERRACE SOUTH URBAN RESERVE



LEGEND

- STUDY INTERSECTIONS
- FREEWAY
- EXISTING ROADWAY
- ASSUMED FUTURE ROADWAY
- URBAN GROWTH BOUNDARY
- URA ADDED TO UGB IN 2018
- URBAN RESERVE
- STUDY INTERSECTION FAILS TO MEET MOBILITY STANDARDS WITH GROWTH FROM UR
- FAILS TO MEET MOBILITY STANDARDS WITH GROWTH FROM URBAN RESERVES

ASSUMED REGIONAL TRANSPORTATION PLAN IMPROVEMENTS

PROJECT	DESCRIPTION	EXTENT
11577	Widen SW Beef Bend Rd to 3 lanes	Roy Rogers to OR-99W
11914 11903 11486	Widen SW Roy Rogers Rd to 4-5 lanes	Scholls Ferry to Borchers

ASSUMED LAND USE

URBAN RESERVE	ACREAGE	HOUSEHOLDS	EMPLOYEES
River Terrace South	190	1,235	1,389

PM PEAK HOUR OPERATIONS

#	STUDY INTERSECTION	EXISTING V/C	GROWTH WITH UR V/C	INCREASE IN VEHICLES*
10	SW Roy Rogers Rd/SW Beef Bend Rd	0.64	0.68	1,535

*Increase in total entering vehicles to intersection

KEY POINTS/FURTHER CONSIDERATION THROUGH CONCEPT/COMPREHENSIVE PLANNING PROCESS

- Consider extension of SW Tile Flat Road to SW Beef Bend Road.
- Coordinated area planning efforts are needed to control access onto Roy Rogers Road, including parallel routes within the urban reserves.

River Terrace West Urban Reserves

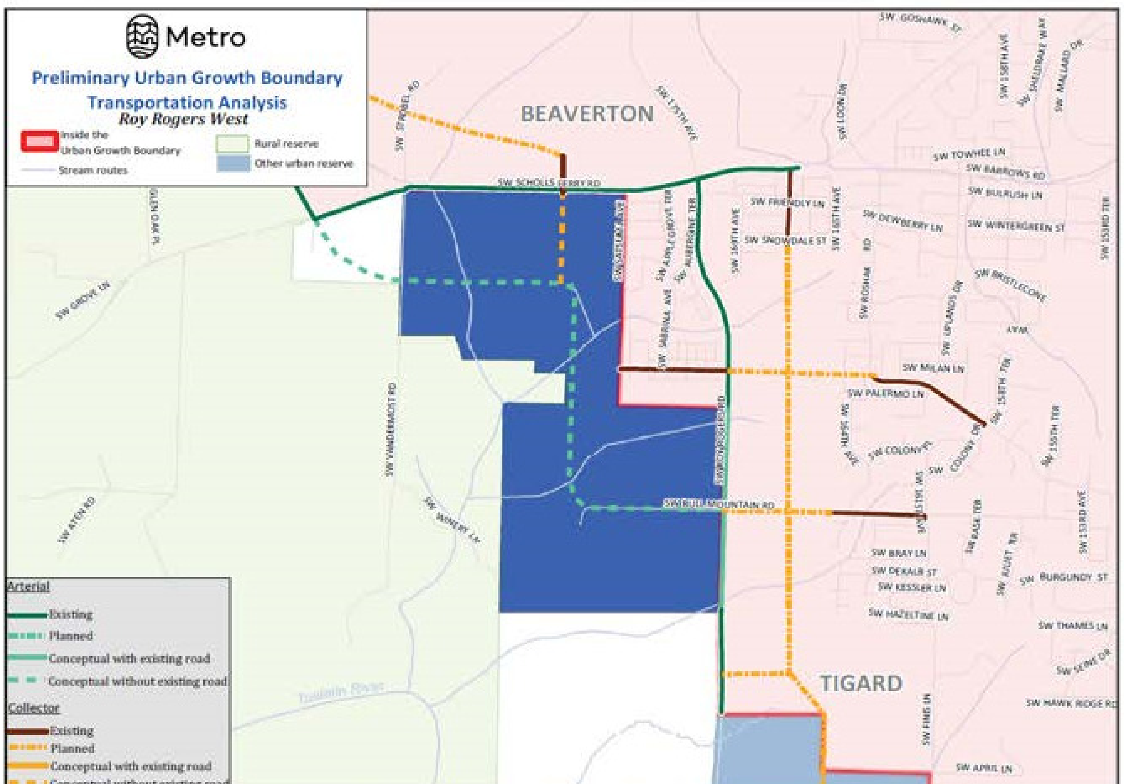
RTP Project ID	Roadway	From	To	Description	Status*	LF	Cost/LF**	Cost Estimate	UR/ Regional	Adopted Long-Term Roadway Jurisdiction
11436/ 11903/ 11914	Roy Rogers Rd	Scholls Ferry Rd	Borchers Rd	Improve to 5-lane arterial standards	FC/MSTIP/ MSTIP Bonding/WWS	- - -	Planning Level Planning Level Planning Level	$0.0M $11.0M $25.0M	UR/Regional	County
11915	Scholls Ferry Rd	Tile Flat Rd	Roy Rogers Rd	Improve to 5-lane arterial standards	FC/MSTIP Bonding/SCM/RT	-	Planning Level	$8.3M	Regional	County
11452	Scholls Ferry Rd	West of Tile Flat Rd		Realign curves to improve safety	FC	-	Planning Level	$4.6M	Regional	County
Metro UGR	Tile Flat Rd extension	Scholls Ferry Rd	Bull Mountain Rd	Extend as 2/3-lane arterial roadway	New	-	Planning Level	$72.9M	UR/Regional	TBD
Metro UGR	Jean Louise Rd	Existing terminus (west)	Tile Flat Rd extension	Extend as 2/3-lane collector roadway	New	550	$2,500	$1.5M	UR	Tigard
Metro UGR	New North-South Collector Rd (aligns with Mountainside Way)	Scholls Ferry Rd	Tile Flat Rd extension	Extend as 2/3-lane collector roadway	New	1,200	$2,500	$3.0M	UR	TBD
Total								$126.3M		
Total UR								$4.5M		
Total UR/Regional								$121.8M		

* FC - Financially Constrained by 2040, TSP - Included in TSP but not FC, New - Recently Identified, MSTIP Bonding - MSTIP Bonding Cost-Sharing Program, SCM - South Cooper Mtn. SDC, RT - River Terrace SDC, WWS - Willamette Water Supply Project

** Assume $2,500/LF based on previous County road-way projects (e.g. Springville, Cornelius Pass, Brookwood, Roy Rogers)

Indicates rough high-level cost estimate

Projects included in more than one UR area



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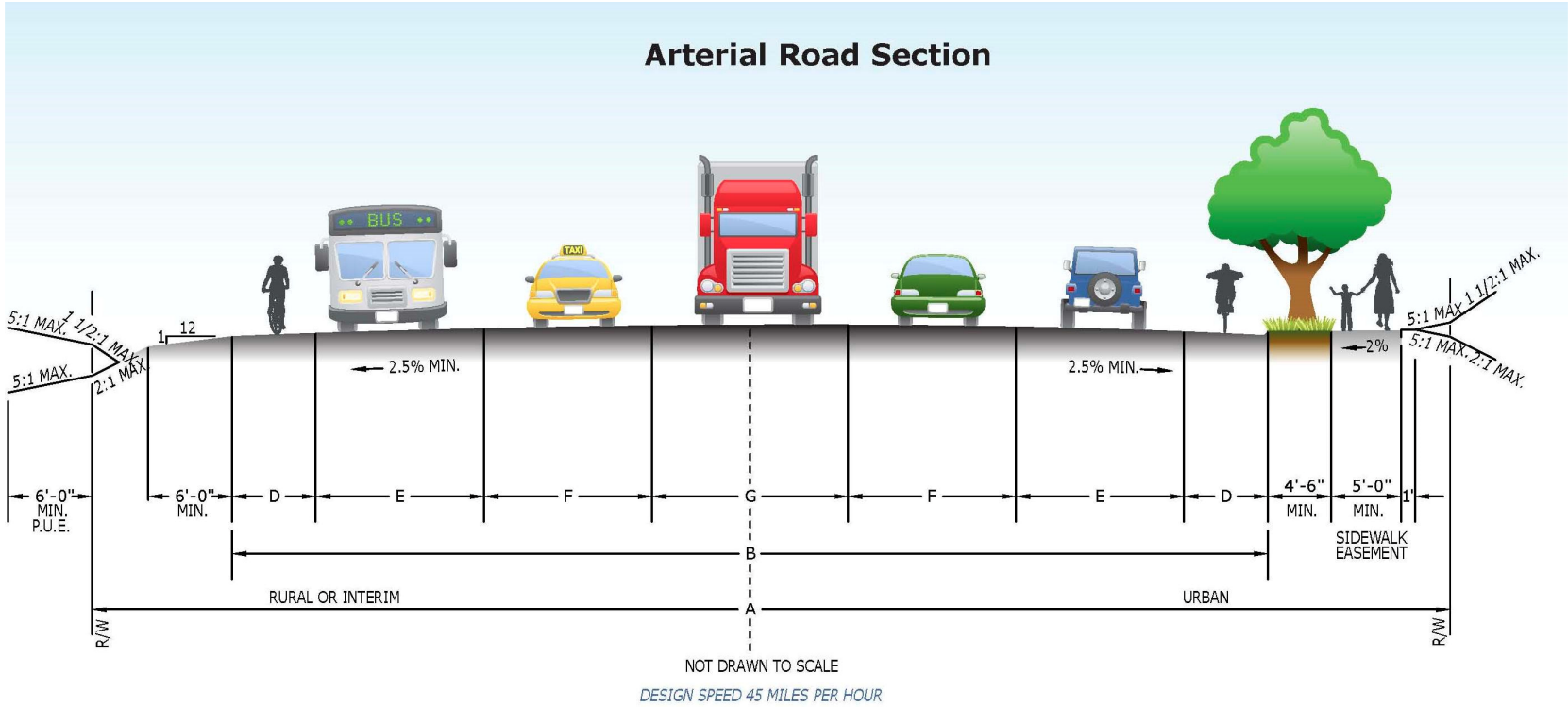
Appendix B

Washington County and King City Street Standards

APPENDIX B – EXISTING COUNTY AND KING CITY STREET STANDARDS

Figure B-1. County Arterial Road Cross-Section

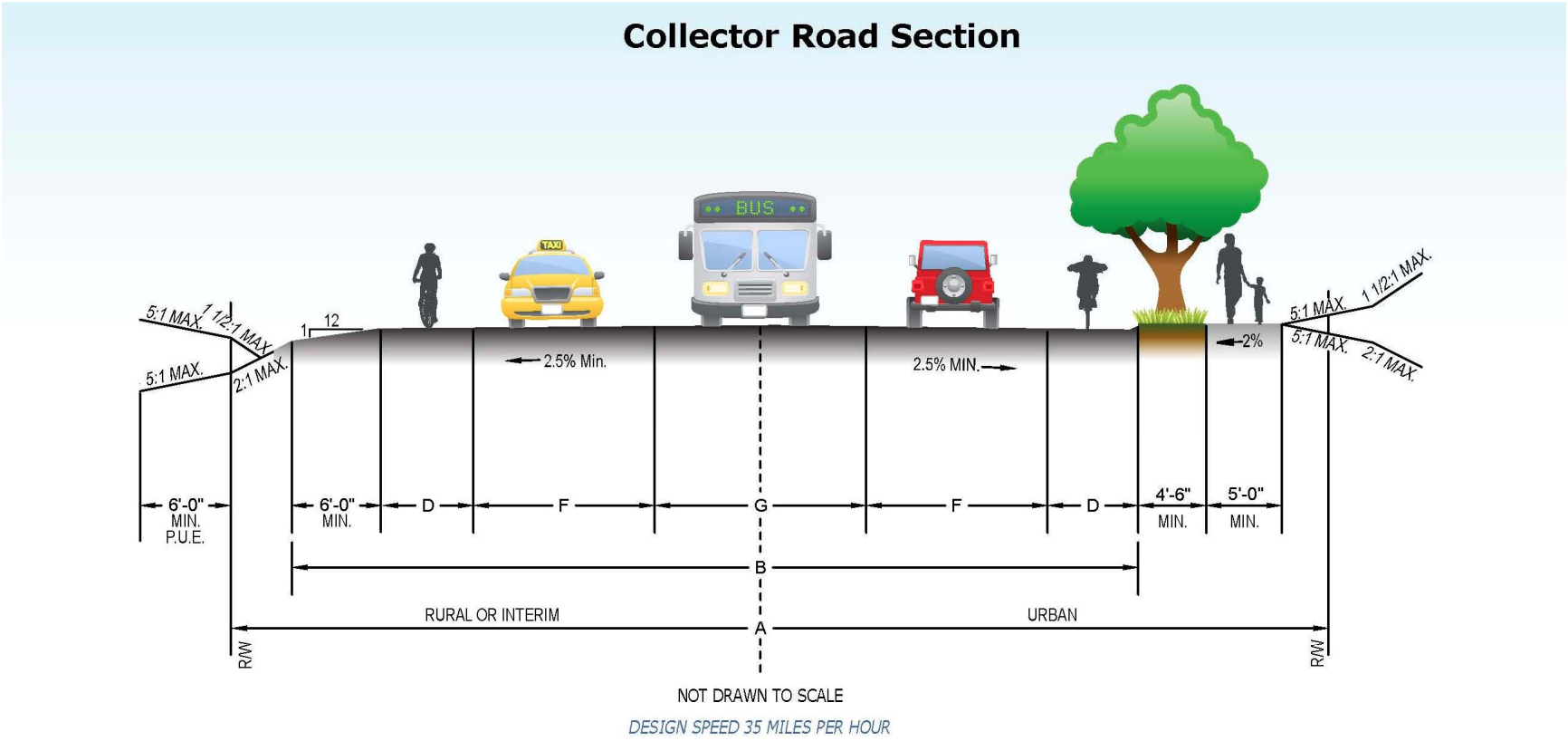


Road Classification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Number of Lanes	Bike Lane / Paved Shoulder	Curb Travel Lane	Travel Lane(s)	Center Turn Lane	Parking Allowed
		A	B		D	F	F	G	
Arterials	A-1	122	98	7	6	12 + 12	12	14	NONE
	A-2	98	74	5	6	12	12	14	NONE
	A-3	90	60 *‡	4	6	12	12	0	NONE
	A-4	90	50 *	3	6	0	12	14	NONE

*GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTH ONLY. STANDARD INTERIM SECTION
‡ P.U.E.'S REQUIRED OUTSIDE OF R/W IF SHOULDERS AND DITCHES ARE USED.

The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision.
See Appendices A and B for maps of County arterial roads.

Figure B-2. County Collector Road Cross-Section



Road Classification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Number of Lanes	Bike Lane/ Paved Shoulder	Travel Lane	Center Turn Lane	Parking Allowed
		A	B		D	F	G	
Collectors	C-1	74	50	3	6	12	14	NONE
	C-2	**	36 *‡	2	6	12	0	NONE

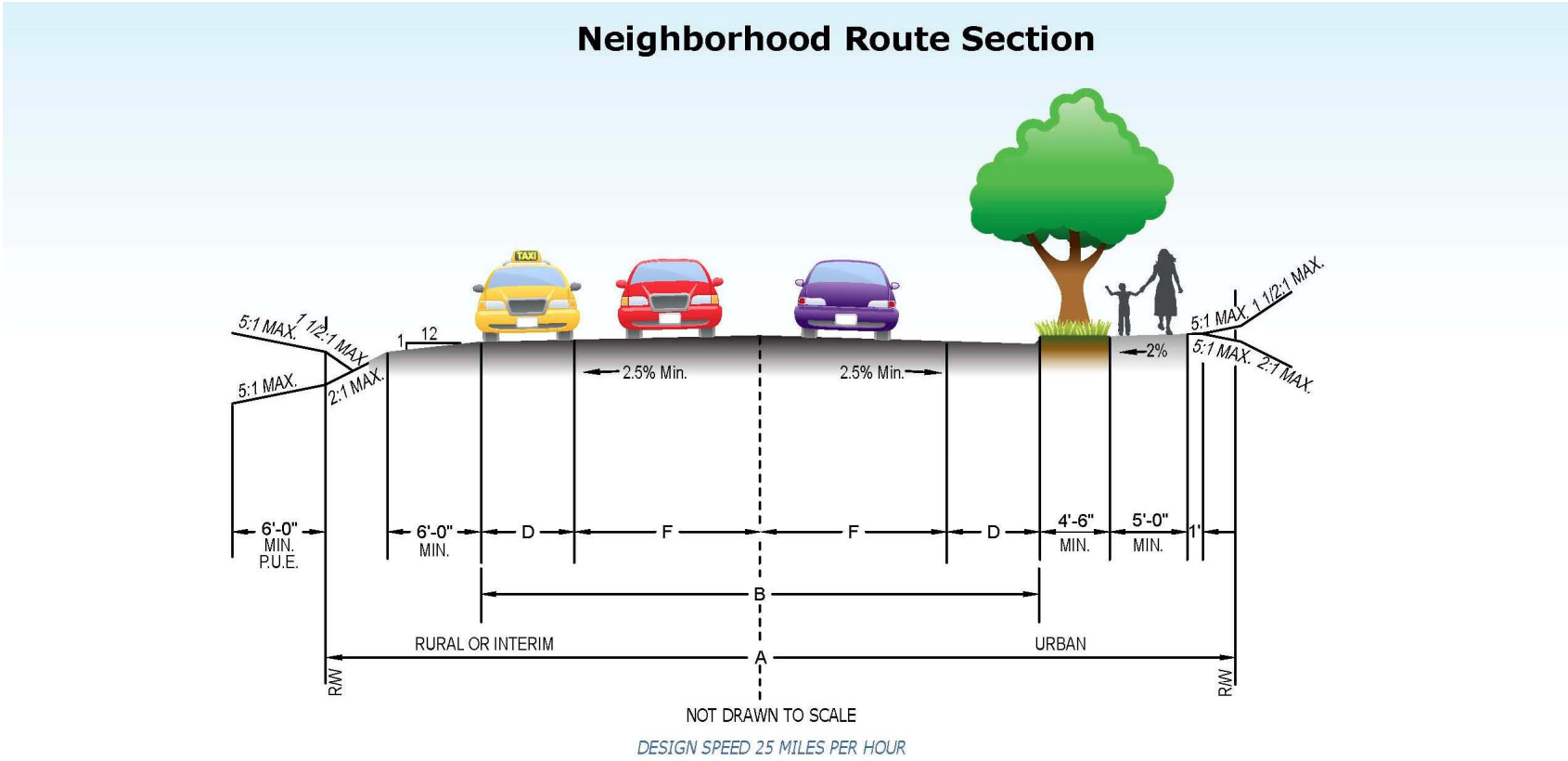
*GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTHS ONLY. STANDARD INTERIM SECTION

** USE ULTIMATE R/W FOR PAVED WIDTH IDENTIFIED IN THE TRANSPORTATION PLAN, IF NOT KNOWN USE 74 FOOT R/W, IN RURAL AREAS 60' OF RIGHT OF WAY IS REQUIRED.

‡ P.U.E.'S REQUIRED OUTSIDE OF R/W IF SHOULDERS AND DITCHES ARE USED.

The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision.
See Appendices C and D for maps of County collector roads.

Figure B-3. County Neighborhood Route Cross-Section

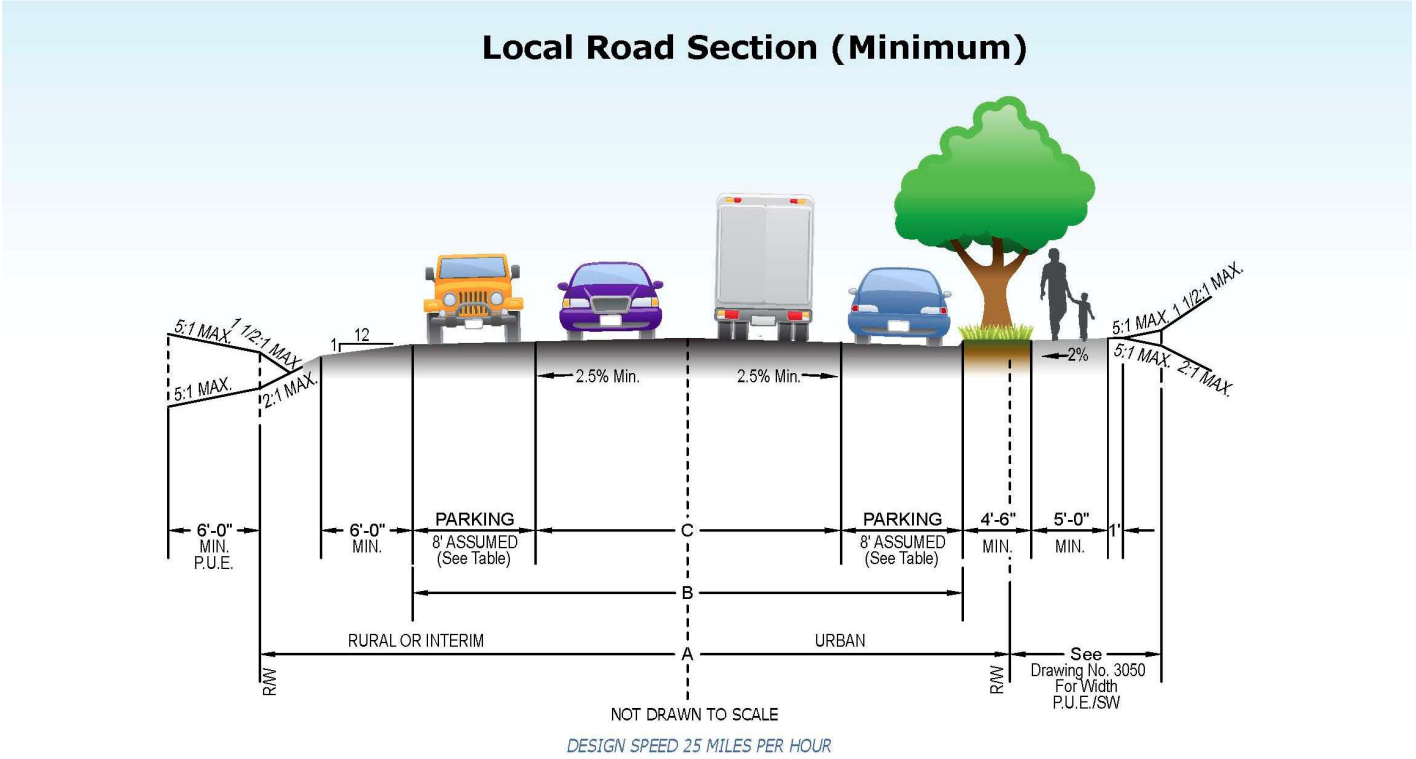


Road Clasification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Number of Lanes	Bike Lane	Parking Lane	Travel Lane(s)	Parking Allowed
		A	B		D	D	F	
Neighborhood Routes	NR-1	60	28*‡~	2	0	0	14	NONE
	NR-2	60	32*‡~	2	0	8	12	ONE SIDE
	NR-3	60	36	2	0	8	10	BOTH SIDES
	NR-4	60	36	2	6	0	12	NONE
	NR-5	50 ~	28	2	0	0	14	NONE
	NR-6	50 ~	32	2	0	8	12	ONE SIDE

*GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTHS ONLY. STANDARD INTERIM SECTION.
‡ P.U.E.'S REQUIRED OUTSIDE OF R/W IF SHOULDERS AND DITCHES USED.
~ FOR THESE SECTIONS, 60 FEET OF R/W FOR 200 FEET FROM THE INTERSECTIONS WITH ALL COLLECTOR OR ARTERIALS SHALL BE DEDICATED AND A 36 FOOT SECTION BUILT AT SUBJECT INTERSECTIONS.

The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision.

Figure B-Error! No text of specified style in document.**. County Local Road Cross-Section**



Road Classification	Washington County Designation	Right of Way (Feet)	Paved Width (Feet)	Traveled Way	Parking Allowed
		A	B	C	
Local Roads(Standard)	L-1	50	24*	24	NONE
	L-2	38	32	16	BOTH SIDES
	L-3	34	28***	12	BOTH SIDES
	L-4	30	24	16	ONE SIDE
Local Roads (Alternate)[1]	L-5	26	20	20	NONE

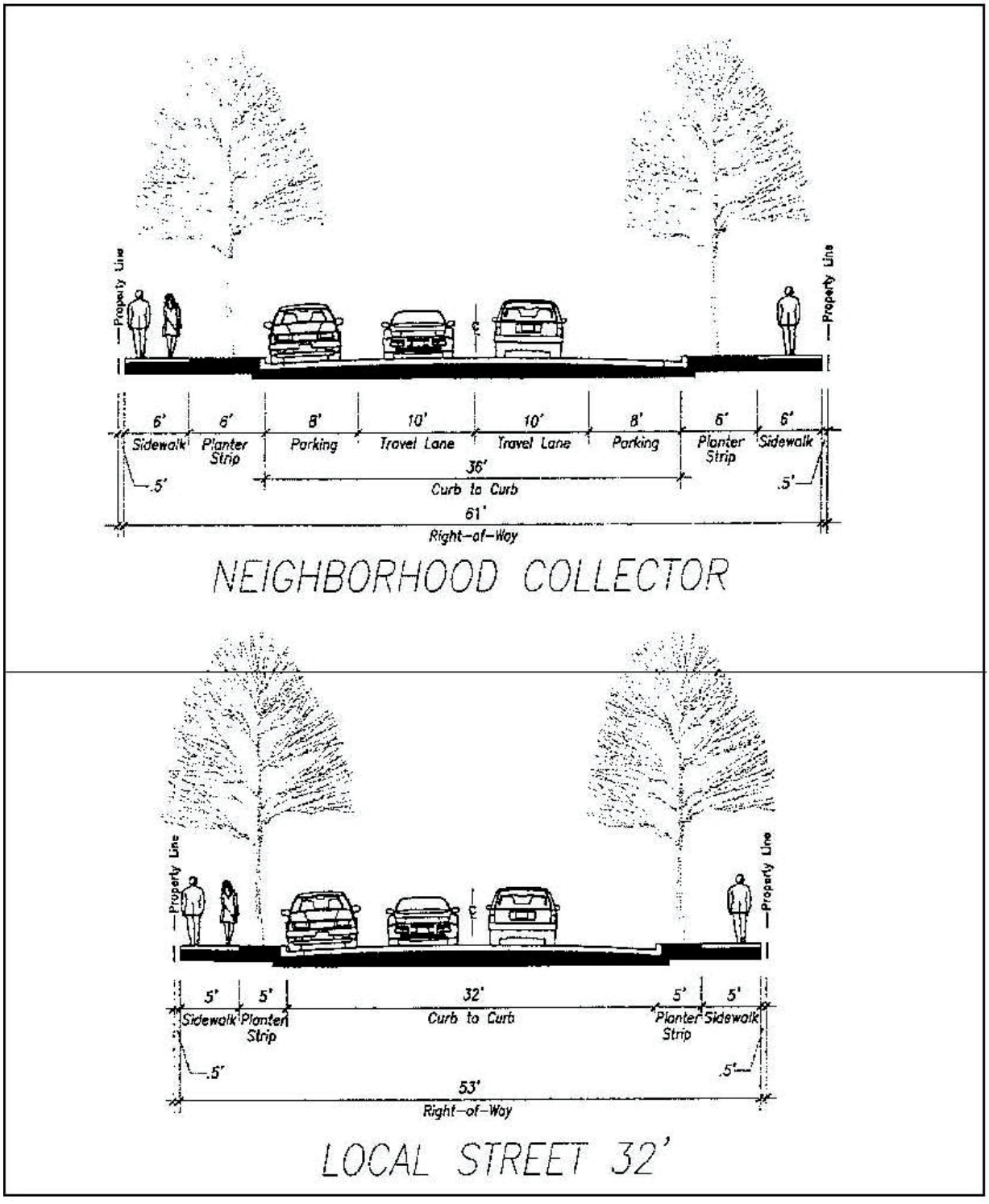
* GRAVEL SHOULDERS AND DITCHES ALLOWED FOR THESE WIDTHS ONLY. STANDARD INTERIM SECTION.

*** PARKING SHALL BE PROHIBITED WITHIN 50' OF A PUBLIC STREET INTERSECTION.

1) USE OF THE DESIGN STANDARDS FOR ALTERNATE LOCAL ROADS REQUIRES APPROVAL THROUGH THE LAND USE PROCESS. USE OF NEIGHBORHOOD TRAFFIC MANAGEMENT DEVICES ARE PERMITTED ON THE MODIFIED LOCAL ROADS AND SHALL BE PLACED AS DETERMINED THROUGH THE LAND USE PROCESS AND SHALL MEET THE STANDARDS FOR NEIGHBORHOOD TRAFFIC MANAGEMENT DEVICES AS SPECIFIED HEREIN.

The applied "Washington County Designation" is determined by the county's transportation plan and the land use decision.

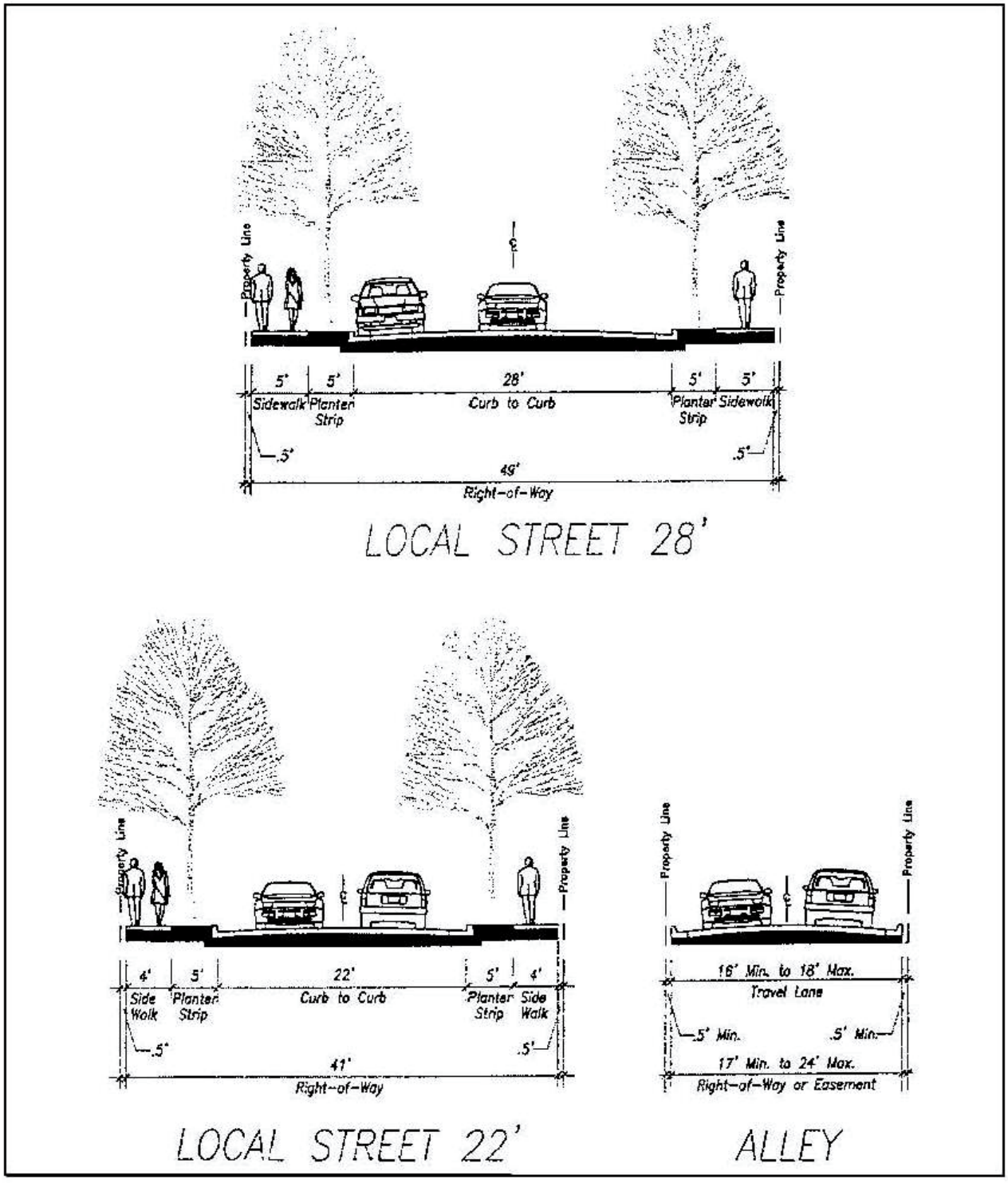
Figure B-5. King City Neighborhood Collector and Local Street Cross-Sections



Neighborhood Street Designs

West King City Planning Area

Figure B-6. King City Local Street Cross-Sections



Neighborhood Street Designs

West King City Planning Area

Appendix C

Guidance for Street Planning and Connectivity

APPENDIX C
GUIDANCE FOR STREET PLANNING AND CONNECTIVITY

The following documents provide guidance on layout and connectivity for the multimodal transportation system focusing primarily on streets, but also address the needs of bicycle and pedestrian modes.

Metro Regional Transportation Functional Plan – Title 1 of the Metro RTFP (3.08.110) lays out criteria for planning new street construction or reconstruction to meet the objectives of the Regional Transportation Plan. The RTFP identifies the need for a network of major arterial roads on approximate one-mile spacing, and a network of minor arterial or collector streets at one-half mile spacing. Consideration in laying out these facilities is given to existing topography, constraints in built and natural environmental features, and other issues. The RTFP encourages development of a street network that is logical and direct, and that incorporates connections not only within the development but also to existing streets. Provision of direct public right-of-way routes with limited closed end street design is supported.

The RTFP requires city and/or county regulations to provide:

- Full street connections with spacing of no more than 530 feet between connections except where not reasonably practical or cost-effective.
- Bicycle and pedestrian accessways on public easements or right-of-way spaced not more than 330 feet apart where full street connections are not possible (and where not precluded for the same reasons that full street connections cannot be made).
- Full street crossings of water features protected under Title 3 every 800 to 1,200 feet, or bicycle and pedestrian crossings every 530 feet unless habitat quality or the length of the crossing prevents a full street crossing.
- Limitations on cul-de-sacs or other closed-end streets to a length of 200 feet and serving no more than 25 dwellings.

Washington County Community Development Code (CDC) – The CDC provides standards for managing access along roads under the County's jurisdiction (section 501-8.5 B). Pertinent for arterial and collector roads in the study area are the following:

- Arterials - Direct access to arterial roads shall be from collector or other arterial streets. Exceptions for local streets and private accesses may be allowed if collector or arterial access is not available. The spacing of direct access onto an arterial should not be less than 600 feet from any intersection or other access.
- Collectors - All commercial, industrial and institutional uses with one hundred fifty (150) feet or more of frontage will be permitted direct access to a Collector. Uses with less than one hundred fifty (150) feet of frontage shall not be permitted direct access to Collectors. New Collector Street alignments identified in the TSP may be adjusted within the subject property, as approved by the County Engineer.
- For those block faces that are more than 600 feet in length on an arterial or collector, an accessway for pedestrian and bicycle circulation must be provided every 400 feet. Within designated "Connectivity Lands," these maximums are reduced to 530 and 330 feet. As indicated in the TSP, these standards may result in pedestrian crossing demand where local streets and accessways meet the arterial/collector.

While R&O 10-107 may still allow a crossing within 300 feet of a signalized intersection, the CDC requirement essentially establishes a de facto minimum spacing of 600 feet between arterial pedestrian crossings.

Washington County Road Standards – The Road Standards provide specific guidance on the design and development of cul-de-sac or other closed end roads. Cul-de-sacs will be allowed only on local roads and commercial/industrial roads. Cul-de-sacs shall not be more than six hundred (600) feet in length.

King City Municipal Code (KCMC) – The KCMC (section 16.212) establishes requirements for local street connectivity in neighborhoods consistent with the Transportation Planning Rule and Title 6, Section 3 of the Metro *Urban Growth Management Functional Plan*. The same section of the KCMC establishes the following criteria related to block size and access spacing:

1. Block lengths for local and collector streets shall not exceed 530 feet between through streets.
2. The total length of a perimeter of a block for local and collector streets shall not exceed 1,800 feet between through streets, measured along the nearside right-of-way line.
3. Streets shall connect to all existing or approved public stub streets that abut the developing area.
4. Within the West King City Planning Area, the KCMC required that street system design include a minimum of two future local street connections to SW 137th Avenue and a minimum of one future local street connection to the property presently occupied by the Mountain View Mobile Estates manufactured home park. The Code indicates that the northern street shall be dedicated or otherwise reserved for future public street use.
5. While an interconnected street system is required, local street systems should be designed to discourage motorists traveling between destinations that are outside of the neighborhood being served by the local streets.
6. Cul-de-sacs and permanent dead-end streets are prohibited except where construction of a through street is found to be impractical. When cul-de-sacs are allowed, they shall be limited to 200 feet and no more than 25 dwelling units unless a modification is justified.
7. A circulation analysis is required in conjunction with site plan review, conditional use, partition and/or subdivision application to show proposed location of streets and accessways in the vicinity of the development site.

The code also indicates that for blocks abutting an arterial or major collector and exceed lengths of five hundred thirty feet, an accessway shall be provided to connect streets for every 330 feet of block length or portion thereof.

West King City Planning Area – This portion of the *Comprehensive Plan* identified an extension of SW Fischer Road west of 131st Avenue as the primary access route connecting the planning area to the remainder of the city. East of 131st Avenue, Fischer Road is designated as a collector street; while to the west the *Comprehensive Plan* designated this street as a local road. This street could not connect with 137th Avenue since this facility was located outside of the UGB. Such a connection would require an exception from the Transportation Planning Rule (OAR 660-12-065) to allow the use of a rural local road by urban development within the UGB.

The *West King City Planning Area study* noted that the UGB may be expanded at a future date to include SW 137th and land to the west, thereby allowing access from the West King City Planning Area. The street system

design for development in the West King City Planning Area allowed for at least two future local street connections to SW 137th Avenue if and when the UGB is moved farther west. In addition, it was recommended that a possible future connection be identified that would correspond with one of the dead-end driveways in the Mountain View Mobile Estates. A public street right-of-way or access easement should be reserved as part of the planning effort for the area west of the BPA alignment to provide for this connection in the future to be used if and when the Mobile Estates redevelop.